U.S. Environmental Protection Agency

New England Region
Boston, Massachusetts

Ecological Characterization

Of The

Housatonic River

September 2002

Environmental Remediation Contract

General Electric (GE)/Housatonic River Project

Pittsfield, Massachusetts

Contract No. DACW33-94-D-0009/032

WOODLOT ALTERNATIVES, INC.
ENVIRONMENTAL CONSULTANTS
www.woodlotalt.com

Ecological Characterization
Of The
Housatonic River

September 2002

Prepared by

Woodlot Alternatives, Inc.

Topsham, Maine 04086

Prepared under

EPA Contract No. DACW33-94-D-0009/032

with Weston Solutions, Inc.

Prepared for

U.S. Environmental Protection Agency

Region 1

Boston, Massachusetts

TABLE OF CONTENTS

Section **Page**

TABLE OF CONTENTS

(Continued)

Section **Page**

TABLE OF CONTENTS

(Continued)

Section **Page**

TABLE OF CONTENTS

(Continued)

Section **Page**

TABLE OF CONTENTS

(Continued)

Section **Page**

LIST OF TABLES

Title **Page**

LIST OF FIGURES

LIST OF FIGURES

(Continued)

LIST OF FIGURES

(Continued)

LIST OF FIGURES

(Continued)

LIST OF ATTACHMENTS

Title

SECTION I INTRODUCTION

1.0 Introduction

The United States Environmental Protection Agency (USEPA) and Army Corps of Engineers (ACOE) are characterizing the natural resources and contaminants found in and adjacent to the Housatonic River in portions of Pittsfield, Lenox, and Lee, Massachusetts. The river section being investigated for this report is approximately 12 miles (19 km) long and extends from Fred Garner Park in Pittsfield downstream to Woods Pond Dam in Lee (Map I-1). This area, with the associated floodplains, is referred to as the primary study area (PSA) in this report. The PSA includes riverine habitat, adjacent floodplain wetlands, and uplands associated with the main stem of the river. Elevated levels of polychlorinated biphenyls (PCBs), which originated from the General Electric facility in Pittsfield, have been found in this area (Blasland, Bouck & Lee, Inc. 1996).

This report contains a characterization of the ecosystems found in the PSA, including descriptions of methods used to perform the characterization and results of the survey efforts.

1.1 Purpose of Report

The objective of this study was to characterize the ecosystems occurring within the PSA, including both plant and animal communities. Information in this report is intended to complement and update material found in a preliminary characterization of the PSA (TechLaw, Inc. 1999). The wetlands in the PSA were also characterized using a functions and values assessment (FVA) prior to the studies reported in 1999 (TechLaw, Inc. 1998). These and other related investigations are reviewed in Section 3.0, *Relationship to Previous and Ongoing Studies*, below.

The ecological characterization was one of a series of biological investigations designed to support baseline human health and ecological risk assessments and modeling efforts (Roy F. Weston, Inc. 2000). These biological investigations included:

- Investigations to support fate and transport modeling

- Investigations to support ecological characterization
- Investigations to support ecological risk assessment

The ecological characterization investigations were defined in a series of eight work plans that included study objectives, methods, and quality assurance/quality control protocols (Roy F. Weston, Inc. 2000). The eight study plans addressed:

- Rare Plants and Natural Communities
- Dragonflies
- Freshwater Mussels
- Reptiles and Amphibians
- Raptors and Waterfowl
- Forest Birds and Marsh and Wading Birds
- Small Mammals
- River Otter, Mink, and Bats

The purpose of this document is to report on the results of these investigations within the context of an overall ecological characterization.

2.0 Report Organization

The report is organized into three sections:

- Section I Introduction
- Section II Study Area Description
- Section III Ecological Characterization

Section I introduces the purpose of the report, describes the report organization, and explains the relationship between the ecological characterization and previous and ongoing studies of a similar nature. A broad description of the PSA is provided in

Section II and includes discussions of land use patterns, the biophysical setting of the PSA, and descriptions of four reference areas used for previous and ongoing investigations.

The bulk of the report is contained in Section III, the Ecological Characterization. This section is further divided into six chapters describing:

- Chapter 1 Natural Communities and Rare Plants
- Chapter 2 Macroinvertebrates
- Chapter 3 Fish
- Chapter 4 Reptiles and Amphibians
- Chapter 5 Birds
- Chapter 6 Mammals

Each chapter is intended to stand alone as a reference to users working on other aspects of the Housatonic River investigation. For this reason, each chapter includes an introduction to the taxonomic group, a description of the methods used to characterize the resource, a characterization of the specific plant or animal community, and a listing of any rare, threatened, or endangered species that were found in the PSA.

The report includes several attachments that provide important background or species- and community-specific information, such as profiles of natural communities found in the PSA and selected communities from the reference areas, profiles of animal species that are the focus of related Risk Assessment work, and a species:habitat matrix of vertebrate wildlife species expected to occur in the PSA. Other attachments include field data forms for some of the investigations conducted from 1998 to 2000.

The electronic version of this document is formatted for convenient use in a digital environment, enabling the reader to use Adobe Acrobat Reader software to view the files and attachments. The main document includes links between the various sections and chapters of the report as well as between the body of the report and relevant attachments.

In reviewing natural communities in the PSA (Section III, Chapter 1, *Natural Communities and Rare Plants*), for example, users can link to the natural community profiles and the species-habitat matrix. Navigation through the document is achieved by clicking on various text and photo links, or by using navigation arrows in Acrobat Reader.

Specific data quality objectives and quality assurance/quality control protocols were provided in the eight separate study plans that comprised the technical directive for the ecological characterization effort. An amendment to Section 5, Field Investigation Tasks, of the Supplemental Investigation Work Plan is provided in Attachment D.

3.0 Relationship to Previous and Ongoing Studies

The ecological characterization reported in this document follows several previous ecological investigations and is a compilation of data collected during approximately three and a half years of study. It is also related to an ongoing study of amphibian reproduction in vernal pools of the PSA by the same investigators (Woodlot Alternatives, Inc. *in prep*). Staff members involved with the ecological characterization have also served in support roles for investigators conducting the risk assessments. For these reasons, and for the sake of clarity, the relationship of the ecological characterization to previous and ongoing studies is explained below.

3.1 Previous Ecological Investigations

3.1.1 Preliminary Wetland Characterization and FVA

A preliminary characterization of the wetlands in the PSA was developed using information from available maps and aerial photographs as well as several site visits in early 1998 (TechLaw, Inc. 1998). A four-phase approach was used to estimate wetland boundaries. The first phase consisted of collecting and reviewing existing information on wetlands in the PSA. The second phase involved reviewing stereo-pairs of color infra-red aerial photographs to identify areas with a wetland signature, which were used for the third phase of work, field verification. The purpose of the field verification task was to confirm and adjust the photo-interpretation, as needed, and to characterize representative

wetland community types. Wetland communities were primarily classified according to the system of Cowardin *et al.* (1979). Once the field verification was completed, the final task of creating a digital map commenced. Wetland-upland boundaries and wetland community boundaries (e.g., the boundary between forest and shrubland communities) were digitized as distinct layers on a digital base map provided by the USEPA.

The wetland maps produced as a result of the 1998 surveys were used as base maps for the ecological characterization studies reported in this document.

3.1.2 Preliminary Ecological Characterization

Following the wetland mapping and functions and values assesssment, an initial characterization of the ecological communities occurring within the PSA was conducted. This work was divided into six complementary studies based on species groups or communities for which initial baseline information was needed. They included reptiles and amphibians; mammals; birds; freshwater mussels; rare plants and natural communities; and rare animals.

A literature review was first conducted to identify the potential wildlife communities and the species present in each habitat type in the vicinity of the PSA. A list of potential species was created based on known habitat requirements of each species and available habitats in or near the PSA. Field surveys were then conducted to verify the occurrence of individual wildlife species, species groups, or required habitats. The methods used were reconnaissance-level, habitat-based assessment surveys.

These methods allowed for the development of general statements on the relative abundance of certain species and the habitats they used in the PSA. Additional, more detailed survey techniques were used to document species use of the PSA using established field methodologies. More specific habitat information was also collected and mapped wetland habitats, as well as uplands adjacent to the river, were more accurately classified using natural community classification systems available at the time (Weatherbee and Crow 1992).

The current studies were designed to complement and update the information reported in the preliminary ecological characterization.

3.2 Risk Assessment Support

Investigators involved with conducting the ecological characterization reported in this document also participated in several studies designed to support the risk assessment. In some cases, data collected to support the risk assessment were also used to complete the ecological characterization. The general nature of these investigations and the data that were used in the ecological characterization are briefly discussed below.

3.2.1 Amphibian Reproductive Study

A study of amphibian reproductive success within vernal pools in the PSA began with field studies in 1999. Field methodologies for the study are described in the Supplemental Investigation Work Plan (Roy F. Weston, Inc. 2000).

Documenting amphibian reproductive success within vernal pools was conducted because these animals may be influenced by PCBs in contaminated sediments. They may also bioaccumulate PCBs, which can then be passed on to other animals in the food chain. In addition, several herps that could occur in the PSA are of conservation concern and are listed as State-Endangered, Threatened, Special Concern, or Watch List Species (MNHESP 1997). These include the Jefferson salamander, spotted salamander, marbled salamander, spring salamander, and four-toed salamander.

Field work for the amphibian reproductive study was completed in 1999. This study documented two species of conservation concern (Jefferson salamander and four-toed salamander) in the PSA (Woodlot Alternatives, Inc. *in prep*) and was used, in part, to update amphibian and vernal pool community characterization data originally presented in the Final Preliminary Ecological Characterization report (TechLaw, Inc. 1999).

3.2.2 Wood Frog and Leopard Frog Collections

The Stover Group investigated the potential impact of PCB exposure on larval frog development, with a focus on leopard frogs and wood frogs. Ecological characterization

investigators have participated in these studies by collecting adult frogs and egg masses from the PSA in 1999 and 2000. These collections were also useful in documenting courtship, breeding, and egg laying dates for frogs in the PSA.

3.2.3 Aquatic Macrophyte Sampling

Sampling and analysis of macrophytes, periphyton, plankton/detritus, and filamentous algae, which make up the base of the food chain in aquatic systems, were conducted to provide information for the fate and transport model (Roy F. Weston, Inc. 2000). Ecological characterization investigators assisted with the collection of samples for these investigations. Characterizing the species composition and spatial distribution of the aquatic macrophyte community was of particular use in characterizing the aquatic habitats in the PSA.

3.2.4 Fish Tissue and Biomass Sampling

Fish have been collected to determine the PCB and other organic contaminant concentrations in tissues for use in both human health and ecological risk assessments, to evaluate congener patterns by species for use in fish and mink reproduction studies, and in the PCB fate and effects model. Fish have also been collected to estimate biomass for use in the fate and transport model (Roy F. Weston, Inc. 2000). These efforts provided information on species composition of the fish community in the various river reaches being modeled. They also provided size class distribution and length and weight data for use in the ecological characterization.

3.2.5 Waterfowl Collection and Tissue Sampling

Waterfowl, including mallards and wood ducks, have been observed using Woods Pond and upstream floodplain wetlands for breeding, brood rearing, and feeding, and waterfowl hunting is a common activity in this portion of the PSA. For these reasons, these areas were chosen as collection sites to evaluate the potential for risk, to the waterfowl directly and to humans consuming waterfowl, due to PCB accumulation in the tissue. Wood ducks and mallards were collected from both the PSA, and a reference area located at Threemile Pond State Wildlife Management Area (SWMA) in Sheffield,

Massachusetts. These investigations provided information on waterfowl habitat use for brood rearing and feeding that was used in the ecological characterizations.

3.2.6 Soil Invertebrate Sampling

The primary objective of this study was to collect representative samples of soil-dwelling invertebrates for the analysis of PCBs, dioxins/furans, and organochlorine pesticide concentrations in tissue. Results were intended to be used in the ecological risk assessment to model exposure through the food chain of higher trophic level consumers. In addition, results of tissue analysis and co-located soil samples were intended to be used to determine the relationship between earthworm tissue concentrations and corresponding soil concentrations (Roy F. Weston, Inc. 2000).

Soil invertebrates were divided into two groups based on their availability to receptors and their degree of exposure to contaminated soils: (1) invertebrates living in the soil, represented by earthworms; and (2) invertebrates living primarily on the soil surface in the leaf litter, as represented by snails, slugs, beetles, and other arthropods (i.e., litter invertebrates). The information collected from this study was used to characterize the soil macroinvertebrate community within portions of the PSA.

4.0 Literature Cited

Blasland, Bouck & Lee, Inc. 1996. Supplemental Phase II/RCRA Facility Investigation Report for the Housatonic River and Silver Lake, Vol. 1 or 2. Report prepared for General Electric Company, Pittsfield, MA, USA.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Hunter, M.L., J. Albright, and J. Arbuckle. 1992. The Amphibians and Reptiles of Maine. Maine Agricultural Experiment Station, Orono, ME, USA.

MNHESP (Massachusetts Natural Heritage and Endangered Species Program). 1997. Massachusetts Natural Heritage Atlas. 1997-98 ed. Massachusetts Division of Fisheries and Wildlife, Westborough, MA, USA.

Roy F. Weston, Inc. 2000. Supplemental Investigation Work Plan for the Lower Housatonic River, General Electric (GE) Housatonic River Project, Pittsfield Massachusetts. Volumes 1 and 2. Prepared for the U.S. Army Corps of Engineers, North Atlantic Division, New England District, Concord, MA, USA.

Soil Conservation Service. 1984. Soil Survey of Berkshire County, Massachusetts. U.S. Department of Agriculture Soil Conservation Service.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

TechLaw, Inc. 1998. Preliminary Report: Wetland Characterization and Function-Value Assessment, Housatonic River from Newell Street to Woods Pond. TechLaw, Inc., Boston, MA, USA.

_____ 1999. General Electric II, Pittsfield, Massachusetts: Final Preliminary Ecological Characterization, Newell Street to Woods Pond. Vol. 1 and 2. Prepared for USEPA, Region 1. TechLaw, Inc., Boston, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

Woodlot Alternatives Inc. *in prep*. Amphibian Reproductive Success with Vernal Pools Associated with the Housatonic River from Newell Street to Woods Pond. Report prepared for Roy F. Weston, Inc.

SECTION II STUDY AREA DESCRIPTION

1.0 Introduction

In this section, land use patterns and population trends, climate, geology, and soils are described as they relate to the overall ecological characterization. Information on hydrology and plant communities is also presented for both the PSA and reference areas.

2.0 Land Use Patterns and Population Trends

2.1 Historical Land Use Patterns and Population Trends

Native American peoples were present in Berkshire County prior to European settlement. Two small groups of Mahican Native Americans were known to subsist along the Housatonic River in the early 1700s and as recently as 1735 (Weatherbee 1996). They primarily used the alluvial plain for hunting and agriculture. Because cutting of trees was primarily done for heating purposes, and crops (such as corn, beans, and squash) were often planted in abandoned beaver impoundments, it is believed that the impact of the Native Americans on the natural communities was minimal (Weatherbee 1996). The Native American population at this time had been reduced by European diseases, most notably smallpox. All the resident Native Americans of the Great Barrington area were moved in 1736 to a mission established in Stockbridge (Southern Berkshire Chamber of Commerce 2001). It was near and shortly after that time that several local towns (e.g., Pittsfield, Great Barrington, Sheffield) became incorporated and European settlers began to exert significant influences on the landscape (see Section 2.1).

Settlement of the Central Valley[1] of Berkshire County progressed in the late 1700s and early 1800s. Both the forest products industry and summer vacationing brought people to the Central Valley towns in the 1800s (Southern Berkshire Chamber of Commerce 2001, Weatherbee 1996). Great Barrington was reported to have grown from a rural community of 961 people in 1776 to become a manufacturing center of 2,264 people in 1830 (Southern Berkshire Chamber of Commerce 2001). Paper mills, blast furnaces, wool factories, and grist mills were important industries in the mid to late 1800s, all of

[1] The geographic region of Berkshire County in which the PSA is located.

which relied on timber or river resources for material stock and power. The influx of summer people into Berkshire County, primarily after the Civil War, led to swelling seasonal populations and home construction to accommodate the temporary residents.

European settlement brought rapid land clearing to Berkshire County (Dwight 1822, Brooks 1953). In some parts of the County, as much as 77 percent of the forests had been cleared for agriculture by 1800 (Brooks 1953), and wood shortages were reported from the region (Federal Writer's Project 1938). Sargent (1884) reported one-third to one-half of Berkshire County was forested. Most of the broad-leaved and eastern hemlock forests had been replaced by second- or third-growth eastern white pine stands. At that time, only the spruce forests of the high hillsides and ridgelines were still intact. In addition to clearing land for crop space, local industries began to affect the surrounding forests in the 19th century. Sawmills, tanneries, railroads and their engines, iron furnaces, and lime kilns all required trees for everyday operation (Weatherbee 1996). In 1867, the first paper mill in the area was established in Lee. Local timber supplies were eventually exhausted and raw materials were transported from increasingly more distant sources (Federal Writer's Project 1938).

By the end of the 19th century, two factors caused a reduction in the use of the forest products in the area. The first factor was the development of Midwestern farms and the creation of the Erie Canal, which allowed farm products to be transported to the east. The second factor was the exhaustion of marketable timber from the surrounding forests (Fisher 1933). Farm abandonment and reforestation, in the form of both natural and planted trees, began to shape the landscape of Berkshire County in the early part of the 20th century.

Berkshire County population grew steadily over the first half of the 1900s. From 1900 to 1960, it experienced a 48 percent increase in population, starting from 95,667 and ending with 142,135 people over that time period (United States Census Bureau 2001a). Neighboring counties in western Massachusetts, while also experiencing overall growth, did so at differing rates compared to Berkshire County over the same time period (e.g., Franklin County grew at 33 percent, Hampden County grew at 144 percent) (United States Census Bureau 2001a).

As a result of this historical population growth and development in the region, considerable disturbances and modifications to the Housatonic River in the vicinity of the study area have occurred. These modifications take the form of river channelization and impoundment.

Channelization has taken place largely within the limits of urban Pittsfield. Much of the river, from above Newell Street to Holmes Road, has been highly modified by realignments and the introduction of artificial banks and substrates such as rip-rap of large boulders, concrete, and even asphalt.

Impoundment has occurred upstream of the PSA in association with paper making facilities, and the downstream limit of the PSA is a storage dam. Impoundment of riverine systems changes shoreline configuration, traps fine sediments above dams, and scours riverbeds below dams. In addition, impoundment typically changes the natural flow regimes of a river system.

Municipal, agricultural, and industrial uses of the river and its riparian systems have also occurred. Industrial and municipal discharges to the Housatonic River contribute significantly to the flow quantities of the river. Approximately 1.3 cubic meters per second (cms) is added to the flow of the river from several industrial facilities and seven municipal facilities in Massachusetts, including the Pittsfield Wastewater Treatment Facility (WWTF), which discharges into the river within the study area (Blasland, Bouck, & Lee, Inc. 1996a; Harrington Engineering and Construction, Inc. 1996). Clearing of riparian areas for development purposes has occurred throughout the study area as well. This includes urban development in the upper 3.1 miles (5 km) of the PSA. Agricultural fields, including corn and hay fields, are a predominant land use within the PSA, and have affected the size of the natural riparian habitats in the middle section of the PSA and downstream sections near New Lenox Road.

From 1937 to 1977, GE used PCBs as insulating liquids for certain transformer applications (Blasland and Bouck Engineers, P.C. 1991). These materials came to be located in the sediments of the Housatonic River and associated floodplain by direct discharge from the facility, discharge from Silver Lake, erosion and runoff of

contaminated soil, discharge of contaminated groundwater, and inadvertent discharge due to spills and other events (Roy F. Weston, Inc. 1998a). Elevated levels of PCBs (1 ppm) appear to be largely confined to the ten-year-flood zone (Blasland and Bouck Engineers, P.C. 1991, 1992, 1993; Blasland, Bouck, & Lee, Inc. 1994a). During the channelization of the Housatonic River, a number of oxbows were filled (MADEP 1995). Some of the fill material was contaminated by PCBs (Blasland, Bouck, & Lee, Inc. 1996b). The total extent of PCBs in the sediments has been under investigation.

2.2 Current Land Use Patterns and Population Trends

In contrast to the earlier portion of the century, Berkshire County has experienced population decline since 1970. From the period of 1970 to 1990, the county has lost 2,783 residents amounting to a population decline of one percent (United States Census Bureau 2001a). More recently, Berkshire County was reported to have a population of 132,218 people in 1999. This represents a 5.1 percent decline in population since 1990 (United States Census Bureau 2001b). Farm abandonment, industrial factory closure and downsizing, and general migration to other population centers are reasons that may have contributed to the observed population decline.

Land use patterns have changed during this recent period as well. Most of the PSA is contained in the Housatonic River Valley State Wildlife Management Area. This management area extends over 5.6 miles (9 km) from the confluence of the East and West Branches of the Housatonic River to Woods Pond. This area is primarily used by outdoor recreation enthusiasts; hunting, fishing, and paddling are primary activities observed in the wildlife management area. Horseback riding, running, and birding also take place. A smaller wildlife sanctuary is located at Canoe Meadows, a Massachusetts Audubon property below Holmes Road.

Much of the upper two-thirds of the PSA appears to have been cleared for agriculture at one time. Active cropland, however, is relatively uncommon and generally restricted to a few locations upstream of the Pittsfield WWTF outfall, where corn, squash, and pumpkin are grown. Fallow fields are found more often, with the majority of this land located south of New Lenox Road.

The current use of the Housatonic River in Pittsfield, Lenox, and Lee is primarily as a natural area. Though several bridges, a railroad, former agricultural fields, buried sewer lines, and abutting residences influence the character of the riparian communities, most of the PSA is managed as a wildlife area and is largely free of development and forest clearing activities. Non-native flora, altered local hydrology, and open rights-of-way and fields are some of the more observable ecosystem impacts that human habitation and transportation system development have had on the Housatonic River floodplain communities.

The railroad line along the west edge of the lower PSA is a berm of crushed stone that is elevated above the ten-year-flood line. The substrate is coarse (over 1 cm in diameter), and therefore is well drained. This xeric habitat contains unique flora relative to other portions of the PSA. Wild thyme, love grass, common mullein, and tower mustard are species capable of growing on the xeric, crushed stone substrate. These weedy, colonizing species do not invade the neighboring communities because the soil moisture regimes are very different between the dry, railroad berm and the hydric, wetland soils. The significant impacts of the railroad include bisection of rare natural communities and altered hydrology. The cleared railroad line has been placed through and adjacent to a black ash–red maple–tamarack calcareous seepage swamp, a community of state conservation concern. Furthermore, ditching for the railroad has created linear, ponded areas in regions that were formally closed canopy forest with pit-and-mound topography.

3.0 Biophysical Setting

The study area is located in central Berkshire County, Massachusetts (Map I-1). Berkshire County is on the western edge of the state and is bordered by Connecticut (south), New York (west), and Vermont (north). This part of Massachusetts contains the most topographical relief, as well as the highest point in the state (Mount Greylock - 1064 meters). Though sometimes referred to by different names, Berkshire County is usually divided into three geographic sections: (1) the Berkshire Plateau; (2) the Taconic Range; and (3) the Central Valley region (New England River Basins Commission 1980, Veit and Petersen 1993, Weatherbee 1996). The Berkshire Plateau, a southern extension of

Vermont's Green Mountains, forms a ridge that runs along the eastern edge of the county. The Taconic Range, extending from Vermont to New York, forms the western edge of the county. The Central Valley region lies between these two mountain ranges, and is where the PSA is located.

3.1 Climate

Berkshire County is considered to have a continental climate, similar to the rest of interior New England, characterized by cold winters and hot summers (Soil Conservation Service 1988). Average annual temperature, average daily July temperature, and average daily January temperature for Lanesboro (immediately north of Pittsfield) have been 6, 19, and –8 degrees Celsius, respectively, for the time period between 1981 to1987. The number of frost-free days (i.e., the growing season) ranges from 103 – 144 days. Growing season for native vegetation begins in March (e.g., willows, evergreen trees, skunk cabbage) and ends in October with the last frost-tolerant herbs (e.g., asters, gentians) (Weatherbee 1996). Moisture supply usually exceeds evaporation, except during periods of drought. Average total rainfall is 109 cm and is evenly distributed throughout the year (i.e., 55 percent of the annual precipitation occurs between April and September). Average total snowfall is 181 cm (Weatherbee 1996).

3.2 Geology

The geologic features of the Berkshire County region and the PSA have been summarized in previous engineering and characterization reports (e.g., Blasland, Bouck & Lee 1994b; Roy F. Weston, Inc. 1998b; TechLaw, Inc. 1999; Roy F. Weston, Inc. 2000). This section provides an overview of those aspects relevant to the ecological characterization, as derived from a review of engineering reports and pertinent scientific literature.

3.2.1 Regional Geological Setting

The Housatonic River lies within the New England Physiographic Province, more specifically within the Taconic geologic region of western Massachusetts. The river occupies a broad, sediment-filled valley (i.e., the Central Valley) that separates two major

geologic: the Taconic Hills to the west, and the Berkshire Plateau (also referred to as the New England Uplands) to the east. The geomorphology of the region is typified by rounded hills and mountains draped with glacial deposits, and relatively narrow, steep-sided valleys cut into the hills by streams and rivers. Due to extensive continental glaciation and the thick deposits of glacial materials left behind, bedrock formations are generally exposed only in the hills and mountains.

3.2.2 Bedrock Geology

The Taconic region has been subjected to a series of depositional and tectonic events over the past 600 million years, related to repeated openings and closings of the Iapetus ocean basin (precursor to the Atlantic) and resultant continental collisions. From the late Cambrian to the early Ordovician period (from about 450 – 500 million years ago) the Pittsfield region was on the edge of a stable, warm-water continental shelf, located near the equator. Shallow water marine sediments, dominated by carbonates such as magnesium-rich dolomite and calcium-rich limestone (mapped as the Stockbridge formation), and quartz-rich sands (the Cheshire formation), were deposited in the Pittsfield area at this time, while deeper-water deposits such as mud and silt were deposited in an ocean basin that lay further to the east.

In the late Ordovician period (about 410 – 440 million years ago) the closing of the Iapetus ocean basin represented the onset of the Taconic Orogeny (mountain building activity), a tectonic event that compressed and buried the offshore deep-water sediment pile, metamorphosing the mud and silt into a series of slates and pelitic schists mapped as the Nassau, Everett, and Woolumsac Formations and the Greylock Schist (Zen 1983). Continued compression eventually pushed these basin deposits up and over the shelf carbonate rocks, forming a series of stacked, fault-bounded thrust sheets that today form the Taconic Hills west of the Housatonic River. As the ocean basin closed completely, a series of older, highly metamorphosed schists and gneisses (representing either the leading edge of the colliding continent or more deeply buried sediments on the western side of the basin) was also pushed upward and westward to form the Berkshire Plateau, which lies east of the study area.

During the Devonian period (350 – 400 million years ago) another tectonic event (the Acadian Orogeny) further compressed and heated the rocks in the region, producing an overprinted series of geologic faults, folds, and fractures and completing the transformation of Stockbridge Formation dolomite and limestone into the marble that underlies the Housatonic valley today. Subsequent dissolution of this marble along fractures and joints has established a network of interconnected fractures and openings, producing a significant groundwater aquifer in the region (Olcott 1995). These marble formations are also important not only because they are the largest economic marble deposits in the State of Massachusetts, but because their character significantly impacts the hydrology, groundwater chemistry, soil composition, and resultant natural communities in the study area.

3.2.3 Glacial Geology

The most recent chapter in the area's geologic history involved extensive glaciation and Quaternary sediment deposition over the past 14,000 years. As in most of New England, continental glaciers advanced and retreated over the study area several times during the last 100,000 years, scouring bedrock and leaving behind discontinuous deposits of sand, silt, clay, and a series of poorly sorted gravels generally referred to as glacial till. Following the last glacial retreat in Wisconsinan time (10,000 – 14,000 years ago) glacial till and sands filled the Housatonic valley locally to depths of 30 m or more.

Within the study area, till is reported to overlie marble bedrock directly under the Housatonic River, with till thickness ranging from 0.6 m to more than 15 m (Blasland, Bouck & Lee 1994b; Roy F. Weston, Inc. 2000). Cobbles of reworked marble within glacial tills suggest that the Stockbridge formation marble was exposed and scoured by the glaciers, contributing significant amounts of carbonate material to the sediments. Subsequent erosion and reworking of these deposits by streams has produced a complex set of surficial deposits that serve as aquifers and exert control over the hydrologic features of the region.

3.2.4 Soils

Six major soil associations are present in the Housatonic River basin (New England River Basins Commission 1980). Three of the associations, Paxton-Woodbridge, Charlton-Hollis, and Lyman-Peru-Marlow-Berkshire, are derived from glacial till and schist. These soils are characterized by shallow depth to bedrock, hardpan, stoniness, or steep slope. Two of the soil associations are derived from limestone and schist. These are called Copake-Groton, found in the Central Valley region, and Stockbridge-Farmington-Amenia-Pittsfield, located in the Taconic Range. They are characterized by deep, well-drained soils. The final soil association is called the Hinckley-Merrimac. This association is located along the valley edges on glacial outwash terraces. It is characterized by deep, sandy, well-drained, acidic soils.

The most common soils in the PSA are sandy loams, silt loams, and organic-rich mucks. At least 17 soil series are represented within the project boundary. Within the PSA, the soils are comparable to the Copake-Groton soil association, which are typically deep, well-drained loamy soils derived from glacial outwash. Housatonic River floodplain soils are derived directly from bedrock (marble or schist), from glacial outwash, or from calcareous glacial till (United States Department of Agriculture 1988). Overwash of silt and fine sand into the floodplain is apparent in much of the low floodplain. Heavier soil particles, such as medium to coarse sands, remain within the channel and are the dominant soils of the riverbanks and bars (Bent 1996).

The regional juxtaposition of more acidic source material (e.g., schists) with more neutral carbonate-rich bedrock (e.g., marble) has created a diverse series of soils that contribute to the richness of the natural communities. Though this contributes to diversity and species richness, it likely does not contribute to rare plants as all known rare plant occurences (except one) occur on calcareous bedrock regions.

PCBs have come to be located in the sediments of the Housatonic River and adjacent riparian areas. It is estimated that the amount of sediment containing PCB concentrations greater than 1 part per million (ppm) between the GE facility and Woods Pond is 600,636 cubic meters (Blasland, Bouck, & Lee, Inc. 1996a). For the same section of river, the estimated volume of sediments containing PCB concentrations higher than 10 ppm and 50 ppm is 374,919 m^3 and 198,171 m^3, respectively (Blasland, Bouck, & Lee, Inc.

1996a). Use of cesium-137 for geochronological dating indicates that peak PCB levels and transport occurred in the early 1960s (Blasland, Bouck, & Lee, Inc. 1996a).

3.3 Hydrology

3.3.1 Ground Water

The calcareous bedrock in the Housatonic Valley is the principal aquifer for the region, and its composition also influences the ground water quality. Ground water from this aquifer generally contains high concentrations of calcium and magnesium compared to water in other rock types, resulting in moderately hard to very hard water (i.e., a neutral pH and relatively high concentration of dissolved solids) (Olcott 1995). Ground water moving through the aquifer may also come in contact with calcareous glacial tills, which can maintain or increase the pH and mineral content of the water.

Regional groundwater in the Housatonic basin originates in upland areas, which consist dominantly of schist, quartzite and marble bedrock locally overlain by thin glacial deposits. Groundwater recharge presumably includes precipitation percolating through the glacial overburden or directly into the carbonate aquifer, and ground water movement is assumed to follow the carbonate bedrock surface down gradient toward the Housatonic River. Ground water entering the study area thus retains its neutral pH and high nutrient content, enhancing the rich soil conditions present along the river and floodplain areas.

3.3.2 Surface Waters

The water resources for the PSA include lacustrine, riverine, and palustrine wetlands. Woods Pond is an impoundment section of the Housatonic River and functions as a lacustrine community.

Berkshire County possesses seven major river systems that drain into three watersheds. The Hoosic River, along with Bash Bish and Kinderhook Brooks, drain into the Hudson River. The Deerfield and Westfield Rivers empty into the Connecticut River. The Housatonic River, which eventually collects waters from the Farmington River, flows into Long Island Sound. Approximately 197 lakes are located in Berkshire County

(McCann and Daly undated). Forty-five percent of these are artificial ponds and reservoirs. A number of the remaining water bodies have been altered or enlarged in some fashion, usually for recreation or water-power purposes.

Because of the varied topography of Berkshire County, there are an abundance of ponds, peatlands, and marshes. An estimated three percent of the county is considered to be occupied by palustrine communities (i.e., wetlands not associated with rivers, lakes, or tidal waterbodies) (Technical Planning Associates 1959). The Housatonic River basin is noted to contain the majority of wetlands in the county.

The PSA includes the Housatonic River, the Woods Pond impoundment, and the downstream portions of Yokum Brook and Willow Creek. Several small brooks, which drain from the west side of October Mountain, enter the Housatonic River south of New Lenox Road. Because of the topographical relief, however, only short sections of these brooks, primarily near their confluence with the Housatonic River, occur within the ten-year-flood zone of the PSA. South of New Lenox Road, the PSA is primarily bounded on the west by the Springfield Terminal railroad line (except where the ten-year-floodplain extends further west at Yokum Brook and Willow Creek) and on the east by October Mountain.

The Housatonic River is the major water feature in the PSA. It is formed by the confluence of the East Branch and West Branch Housatonic River in Pittsfield. The East Branch begins in Dalton and Hinsdale from headwater tributaries. The West Branch starts at Onota and Pontoosuc Lakes in Pittsfield and Lanesborro and is augmented by flows from the Southwest Branch. The Housatonic River ranges in elevation in the PSA from 295 m above mean sea level (msl) near the confluence of the East and West Branch to 292 m above msl at the Woods Pond impoundment. This equates to approximately 15 cm of drop per kilometer of river. Most of this elevation loss occurs in the upstream half of the PSA, particularly between the confluence and the outfall of the Pittsfield WWTF. Average flow rates are 4.0 cubic meters per second (cms) in the upper portion (confluence to New Lenox Road), and 6.3 cms in the downstream portion (New Lenox Road to Woods Pond) (Canonie Environmental 1995). Based on measurements collected from late May to late September 1993, temperature in the Housatonic River ranged from

11 – 32 degrees Celsius, dissolved oxygen ranged from 6.2 – 9.4 mg/L, and pH ranged from 7.9 – 8.3.

Woods Pond is an approximately 24-ha impoundment created in 1890. Most of the pond is less than 2 m deep, with the maximum depth at 4.8 m. In 1989, a new dam for Woods Pond was constructed approximately 55 m downstream of the historic dam (Canonie Environmental 1995). Based on measurements collected from late May to late September 1993, temperature in Woods Pond ranged from 12 – 33 degrees Celsius and dissolved oxygen ranged from 3.2 – 11.2 mg/L (Chadwick & Associates 1994).

Yokum Brook originates in Pleasant Valley, on the east side of Lenox Mountain, in Lenox. Its east and west branches have numerous small ponds and wetland areas along its course. Just before entering the Housatonic River, south of New Lenox Road and west of the Springfield Terminal railroad line, Yokum Brook expands into a large wetland system that is within the ten-year-flood zone of the PSA. This wetland system includes low-gradient stream, deep emergent marsh, shrub swamp, and red maple swamp communities.

Willow Creek is a small stream, approximately 4.2 km long, that originates between two ridges just north of Lenox Village. While most of the stream is narrow and quick-flowing, its final kilometer, before the confluence with the Housatonic River, slows and broadens into an expansive wetland system of deep emergent marshes and shrub swamps.

The volume of the water resources in the PSA is affected by industrial and municipal discharges that contribute significant flow quantities to the Housatonic River. Municipal treatment plants located in Massachusetts add 0.6 cms of wastewater flow to the river, while industrial plants contribute an additional 0.7 cms (Frink *et al*. 1982). The Pittsfield WWTF, which discharges its effluent near the midpoint of the PSA, contributes an average flow of 0.5 cms to the Housatonic River (Harrington Engineering and Construction, Inc. 1996). These discharges represent approximately 20, 24, and 17 percent of the local flow of the river, respectively.

3.4 Natural Communities

Eighteen natural communities occur within the PSA: one is a lacustrine community; ten are palustrine communities primarily associated with the Housatonic River floodplain and shoreline; three are riverine communities either within the channel itself or draining into it; and four are upland communities included within the 10-year flood zone. Full descriptions of the natural communities are provided in Attachment A. Though organic soils do occur in the PSA (primarily as shallow surface layers), all the palustrine communities are considered to be mineral soil systems (i.e., there are no peatlands in the PSA).

Within the PSA, the structure of the palustrine communities are heavily influenced by wetland hydrology and river flooding. Most of the existing landscape is forested, except where disturbance (i.e., forest clearing) or permanent flooding (i.e., river channel and backwater slough) prohibit tree growth. The forests can generally be categorized as one of two types—those areas that receive groundwater discharge and those that do not. Most of the PSA forests do not receive groundwater discharge and are largely classified as transitional floodplain forests. These forests are within the riparian corridor of the Housatonic River and are subject to inundation during spring flooding and other high water events. Vernal pools are common throughout this community and are found in most depressions. At a few locations, the floodplain forests are situated on elevated berms and are referred to as high–terrace floodplain forests. This community does not experience the same frequency of flooding as other floodplain communities, and has floristic similarity to rich, hardwood slopes. In the lower portion of the PSA, the floodplain forests give way to black ash–red maple–tamarack calcareous seepage swamps. These forested communities are low-lying wetlands that are enriched by high-pH groundwater discharge. These discharge areas can be recognized by the occurrence of standing water in depressions and a calciphilic (i.e., calcium-loving) flora. Red maple swamps, another type of forested wetland in the PSA, are primarily found in the transition between the floodplain forests and calcareous seepage swamps.

Portions of the PSA have been cleared for various purposes, primarily agriculture, residences, and various right of ways (e.g., roads, railroads, power lines). Agricultural

disturbances are the major source of forest clearing within the riparian zone of the upper Housatonic River. Several large wet meadows can be found in the PSA in which the species composition is influenced by past farming practices. Shrub swamps are common along pool and river channel borders, but they are especially frequent as an intermediate successional stage in areas where pasture is reverting to forested floodplain. Some transitional floodplain forest areas were farmed in the past century as evidenced by the subcanopy species present (i.e., dotted hawthorn routinely colonizes regenerating pasture land and survives in the subcanopy of floodplain forests for some time after the tree stratum has returned to the site).

Significant portions of the PSA are open palustrine wetlands and riverine systems dominated by submersed, floating-leaved, and emergent herbaceous vegetation. With the exception of Woods Pont, most of the Housatonic River in Pittsfield, Lenox, and Lee is classified as a low-gradient stream. This natural community is characterized by slow-moving water, often with abundant submersed vegetation. Woods Pond and some of the larger backwater areas to the immediate North are considered to be a moderately alkaline lake/pond. This relatively shallow impoundment has a similar flora as the downstream portions of the Housatonic River in the PSA. A short section of the upper PSA and sections of the river downstream of the Woods Pond impoundment are considered medium-gradient streams. High-gradient streams flow off the west slope of October Mountain and enter the ten-year-flood zone as they cross the Woodland Road. This riverine habitat is characterized as having moderately fast flowing water with some riffles and runs, and sparse aquatic vegetation.

Riverine point bar and beaches occur occasionally along the Housatonic River, primarily near bends in the channel. Mud flats of limited size begin to appear later in the season as the water levels decline and expose previously flooded substrate. Deep emergent marshes, which are usually inundated through the growing season and vegetated by robust herbs, are frequent along the river channel and backwater edges. Shallow emergent marshes, which are areas with saturated soil or shallow water and lower herbs, are less frequent in the study area and most commonly observed within the more permanent vernal pools.

Very little terrestrial or upland habitat is found in the PSA. Red oak–sugar maple transition forests are located in a few widely scattered locations. Cultural grasslands, which are open, upland habitats periodically disturbed by mowing or grazing, do occur in near New Lenox Road. A few upland inclusions of northern hardwoods–hemlock–white pine forest also occur north of Yokum Brook. Most of the upland habitats occur adjacent to the PSA as cultural grassland, northern hardwoods–hemlock–white pine forest, and rich mesic forest.

4.0 Reference Areas

Four separate reference areas were utilized during the biological surveys. Reference areas were chosen based on similarity to the PSA in natural communities, area, and land use. Necessary features of the reference areas included emergent, shrub, and forested wetland communities, considerable area occupied by or adjacent to forest land, and lack of extensive residential use. Reference areas could contain some housing and agricultural land, as these features were present in the PSA. The four reference areas included (1) Hinsdale Flats SWMA; (2) October Mountain State Forest; (3) Ashley Lake; and (4) Threemile Pond SWMA.

4.1 Hinsdale Flats State Wildlife Management Area

This reference area occurs in three parcels of property totaling 586 ha (1,454 acres) primarily in the town of Hinsdale (Map II-1). It encompasses a large section of the upper East Branch Housatonic River and borders the north end of Muddy Pond, the primary surveyed feature. This moderately alkaline lake/pond community is found at 440 meters elevation, higher than many other examples of this community in the Central Valley region of Berkshire County (most fall between 221 and 391 m). Muddy Pond covers an approximate area of 13 ha (32 acres) and is the headwater pond for the East Branch Housatonic River. It is a shallow (mostly less than 3.0 m deep), soft-bottomed lake that harbors rare plant species. On the northwest shore of the pond is a calcareous seepage marsh, a rare community in Massachusetts that contains plants of state conservation concern. This emergent, herbaceous-dominated community is supplied by high pH groundwater discharge that supports calciphilic plants. A railroad line passes along the

west shore of Muddy Pond and serves as the primary access way. Though the wildlife management area contains uplands dominated by hardwood and mixed conifer-hardwood stands, substantial portions of the area are wetlands. Shallow emergent marshes, shrub swamps, and red maple swamps are dominant.

4.2 October Mountain State Forest

This state forest is the largest in Massachusetts, covering an area of about 6,451 ha (15,940 acres). It is located primarily in the town of Washington and includes terrain from 294 – 605 m (964 – 1,984 feet) in elevation (Map II-2). October Mountain State Forest includes several lakes and reservoirs, including Washington Mountain Lake, the primary surveyed feature. This reservoir is an acidic brownwater lake/pond community reduced greatly in size from its past impoundment area of approximately 77 ha. The lake basin is now largely filled with shrub swamp and emergent marsh habitat. Several beaver flowages, averaging 1 – 3 ha in size, represent the only ponded conditions presently available. The basin overlies acidic bedrock (gneiss and quartzite) and has darkly stained water from the input of organic acids provided by adjoining peatlands. The state forest contains a diversity of natural communities, including rich mesic forests, northern hardwoods–hemlock–white pine forests, spruce–fir–northern hardwood forests, high–gradient streams, cultural grasslands, woodland vernal pools, and deep emergent marshes that border open water. It also contains a section of the Appalachian National Scenic Trail. A number of rare and uncommon plant species were seen in mature stands of sugar maple, white ash, and basswood (rich mesic forest community) (Attachment A). Woodland vernal pools here were found to be used extensively by wood frogs for breeding.

4.3 Ashley Lake

Ashley Lake is a 38 ha impoundment that serves as a water reservoir for the city of Pittsfield. It is located in the town of Washington in a rural, forested area adjacent to October Mountain State Forest (Map II-3). Ashley Lake is a clear softwater lake/pond community, characterized by clear, acidic water. The lake overlies granite and quartzite bedrock. Aquatic vegetation is generally sparse compared to other lakes in the Central

Valley region. Though a deep emergent marsh is located adjacent to the lake in a cove on the western shore, the majority of the shoreline is gravel or rock, or abruptly rises to the neighboring uplands. Red oak–sugar maple transition forests dominated by American beech and spruce–fir–northern hardwood forests surround the lake. The Ashley Lake area is used by a large number of wildlife species, including larger mammals such as mink, fish, river otter, coyote, and white-tail deer.

4.4 Threemile Pond State Wildlife Management Area

This wildlife management area contains 241 ha of land primarily in the town of Sheffield (Map II-4). It includes upland and wetland habitats in two separate parcels. Most of the shoreline of Threemile Pond, the primary survey feature, is contained in the management area. This impounded, moderately-alkaline pond community lies at 275 m elevation and covers an area of 32 ha. It is a shallow pond that contains dense colonies of submersed and floating-leaved aquatic plants, including a high proportion of non-native and invasive species. To the north of Threemile Pond is a large wetland complex containing deep emergent marshes, shallow emergent marshes, shrub swamps, red maple swamps, and wet meadows. The latter community is unusual in that is possess a number of rare or uncommon calciphilic plants. Much of the uplands surrounding Threemile Pond are hardwood and mixed conifer-hardwood forests, including mature sugar maple stands. The pond is used extensively by waterfowl during open water periods and several species of mustelids, including river otter, were documented during tracking surveys.

5.0 Literature Cited

Bent, G.C. 1996. Suspended-Sediment Characteristics in the Housatonic River Basin, Western Massachusetts and Parts of Eastern New York and Northwestern Connecticut, 1994-1996. U.S. Geological Survey, Water Resouces Investigation Report 00-4059.

Blasland and Bouck Engineers, P.C. 1991. MCP Interim Phase II Report/Current Assessment Summary for Housatonic River. Syracuse, NY, USA.

_____ 1992. Addendum to MCP Interim Phase II Report/Current Assessment Summary for Housatonic River. Syracuse, NY, USA.

_____ 1993. Report on January 1993 Housatonic River Floodplain Property Sampling and Analysis. Syracuse, NY, USA.

Blasland, Bouck, & Lee, Inc. 1994a. Housatonic River Floodplain Properties, Results of Supplemental Site Characterization Sampling. Syracuse, NY, USA.

_____ 1994b. MCP Interim Phase II Report and Current Assessment Summary for East Street Area 2/USEPA Area 4, Volume 1 of 12. Report prepared for General Electric Company, Pittsfield, MA, USA.

_____ 1996a. Supplemental Phase II/RCRA Facility Investigation Report for the Housatonic River and Silver Lake, Vol. 1 or 2. Report prepared for General Electric Company, Pittsfield, MA, USA.

_____ 1996b. MCP Interim Phase II Oxbow Report. Syracuse, NY, USA.

Brooks, R.R. 1953. Williamstown, the First Two Hundred Years. The McClelland Press, Williamstown, MA, USA.

Canonie Environmental. 1995. Proposal for the Preliminary Investigation of Corrective Measures for the Housatonic River and Silver Lake Sediments. Report Prepared for General Electric Company, Pittsfield, MA, USA.

Chadwick & Associates. 1994. Aquatic Ecology Assessment of the Housatonic River, Massachusetts. Prepared for General Electric Company, Pittsfield, MA, USA.

Dwight, T. 1822. Travels; in New England and New York, III. Timothy Dwight, New Haven, CT, USA.

Federal Writer's Project. 1938. The Berkshire Hills. Duell, Sloan, and Pearce, New York, NY, USA.

Fisher, J.T. 1933. New England's Forests: Biological Factors. p. 213-223. In J.W. Wright (ed.) New England's Prospects. American Geography Society, New York, NY, USA.

Foth, H.D. 1951. Fundamentals of Soil Science. John Wiley & Sons, New York, NY, USA.

Frink, C.R., B.L. Sawhney, K.P. Kulp, and C.G. Fredette. 1982. Polychlorinated Biphenyls in Housatonic River Sediments in Massachusetts and Connecticut: Determination, Distribution, and Transport. Connecticut Agricultural Experiment Station Bulletin 800.

Harrington Engineering and Construction Inc. 1996. Report on the Preliminary Investigation of Corrective Measures for Housatonic River and Silver Lake Sediment. Report prepared for General Electric Company, Pittsfield, MA, USA.

MDEP (Massachusetts Department of Environmental Protection). 1995. Revised Public Involvement Plan. MA, USA.

McCann, J.A., and L.M. Daly. Undated. An Inventory of the Lakes, Ponds, and Reservoirs of Massachusetts, Berkshire and Franklin Counties. Publication No. 10-2. Water Resource Research Center, University of Massachusetts, Amherst, MA, USA.

New England River Basins Commission. 1980. Housatonic River Basin Overview. Report prepared for the Water Resources Council, Washington, DC, USA. 199pp.

Olcott, P.G. 1995. Ground Water Atlas of the United States: Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont: Carbonate Rock Aquifers. U.S. Geological Survey Publication HA 730-M.

Roy F. Weston, Inc. 1998a. Upper Reach-Housatonic River Ecological Risk Assessment. Report prepared for USEPA, Boston, MA, USA.

_____ 1998b. Source Area Characterization Report, Technical Support Services, General Electric (GE) Housatonic River Project, Pittsfield, Massachusetts. Prepared for U.S. Army Corps of Engineers, North Atlantic Division, New England District, Concord, MA, USA.

_____ 2000. Supplemental Investigation Work Plan for the Lower Housatonic River, General Electric (GE) Housatonic River Project, Pittsfield, Massachusetts. Volumes 1 and 2. Prepared for U.S. Army Corps of Engineers, North Atlantic Division, New England District, Concord, MA, USA.

Sargent, S.C. 1884. Report on the Forests of North America. Department of the Interior, Government Printing Office. 611pp.

Southern Berkshire Chamber of Commerce. 2001. Towns and History. URL http://greatbarrington.org/towns.html.

TechLaw, Inc. 1999. General Electric II, Pittsfield, Massachusetts: Final Preliminary Ecological Characterization, Newell Street to Woods Pond. Vol. 1 and 2. Prepared for USEPA, Region 1. TechLaw, Inc., Boston, MA, USA.

Technical Planning Associates. 1959. Berkshire County, Massachusetts, A Regional Planning Study, Volume 2. New Haven, CT, USA.

United States Census Bureau. 2001a. Massachusetts: Population of Counties by Decennial Census. URL http://www.census.gov/population/cencounts/ma190090.txt.

_____ 2001b. State and County Quickfacts: Berkshire County, Massachusetts. URL http://quickfacts.census.gov/cgi-bin/county?cnty=25003.

United States Department of Agriculture, Soil Conservation Service. 1988. Soil Survey of Berkshire County, Massachusetts. Amherst, MA, USA.

Veit, R.R., and W.R. Petersen. 1993. Birds of Massachusetts. Massachusetts Audubon Society, Lincoln, MA, USA.

Weatherbee, P.B. 1996. Flora of Berkshire County Massachusetts. The Berkshire Museum, Pittsfield, MA, USA.

Zen, E.A. 1983. Bedrock Geologic Map of Massachusetts. U.S. Geological Survey.

SECTION III ECOLOGICAL CHARACTERIZATION

Chapter 1 Natural Communities and Rare Plants

1.0 Introduction

Surveys for natural communities and rare plants were conducted in the PSA. Natural communities provide detailed landscape descriptions and a framework to discuss animal-habitat associations. Rare species provide a measure of landscape uniqueness, as they occur more frequently in regions with unusual physical aspects (e.g., high elevation, high-pH bedrock) or in transition zones between ecoregions. Furthermore, rare plants are protected from taking by the Massachusetts Endangered Species Act (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00).

A natural community is an assemblage of interacting plants and animals and their common environment, recurring across the landscape, in which the effects of recent human intervention are minimal (Gawler 2000). Natural communities, therefore, include the biota and the physical substrate, and are repeatable units identified by their unique combination of plants and animals. They serve, therefore, as convenient categories for landscape discussion. Some communities are populated by common species with general habitat requirements, while other communities are inhabited by rare species with very specific substrate requirements and habitat.

Rare plants are those species that are considered by the State of Massachusetts to be of conservation concern (MNHESP 1999). Rare species, including plants, are commonly classified according to their rarity. Factors that influence a given species' rarity include number of state occurrences, number of global occurrences, vulnerability to disturbances, rarity of the associated natural community, fecundity, and other aspects of its biology. Definitions of rarity (e.g., endangered, threatened) can be found in Table 1-1.

Table 1-1 State status and ranking definitions.

Term	Definition
Endangered	Native species which are in danger of extinction throughout all or part of their range or which are in danger of extirpation from Massachusetts, as documented by biological research and inventory.
Threatened	Native species which are likely to become endangered in the foreseeable future, or which are declining or rare as determined by biological research and inventory.
Special Concern	Native species which have been documented by biological research or inventory to have suffered a decline that could threaten the species if allowed to continue unchecked, or which occur in such small numbers or with such restricted distribution or specialized habitat requirements that they could easily become threatened within Massachusetts.
Watch List	Rare or uncommon species in Massachusetts that are not formally protected by legislation but are monitored by the MNHESP. This category contains species that may have been dropped from the official rare plant list, are candidate species for listing, may have questions as to taxonomic identity or native range, or have had insufficient collection effort to ascertain rarity in Massachusetts.
S1	Critically imperiled in Massachusetts because of extreme rarity (five or fewer or very few remaining individuals or hectares) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Massachusetts
S2	Imperiled in Massachusetts because of rarity (6 – 20 occurrences or few remaining individuals or hectares) or because of other factors making it vulnerable to further decline.
S3	Rare in Massachusetts (on the order of 20 –100 occurrences).
S4	Apparently secure, but with cause for long-term concern.
S5	Demonstrably secure.
SH	Occurred historically in Massachusetts, and could be rediscovered; not known to have been extirpated.
SX	Apparently extirpated in Massachusetts (historically occurring species for which habitat no longer exists in Massachusetts).
SU	Possibly in peril in Massachusetts but status uncertain; need more information.
S?	Probably rare or historic in Massachusetts, based on status elsewhere in New England, but not yet reviewed or documented by MNHESP.
Global ranks (“G” instead of “S”)	Follow the criteria for state ranks, but refer to the entire range of a species, rather than just its statewide distribution.

2.0 Methods

2.1 Background

Plants and natural communities of conservation concern are those that are rare from a global or state perspective. Species and communities listed as rare follow Maine Natural Heritage and Endangered Species Program (MNHESP) (1999) and Swain and Kearsley (2000). Rare plants and natural communities are defined as those with a state "rank" of S1, S2, S3, SU, S?, SH, or SX, or those with a state "status" of endangered, threatened, special concern, or watch list. These terms follow MNHESP (1999) definitions and are described in Table 1-1.

Plant species and communities are also provided ranks based on the quality of the occurrence. The element occurrence (EO) rank is an average of four individual ranks: EO quality (size/productivity); EO condition (pristineness/ability to recover from impacts); EO viability (long-term existence prospects); and EO defensibility (how protectable the occurrence is). The EO rank is a relative rating system based on range-wide observations. It primarily utilizes four classes of ranks: A (excellent); B (good); C (marginal); and D (poor). A ranking of E is sometimes provided for EOs that are extant but for which information was inadequate to provide a qualitative score.

Landscape analysis, a multi-step process involving information collation, interpretation, and summarization (Lortie *et al.* 1992), was performed to provide a macroscopic view of the PSA's history and ecology. The landscape analysis process identified habitats in the PSA that had moderate to high potential for containing a targeted feature (e.g., rare plants, animals, or natural communities). It involved using available natural resource information such as United States Geological Survey (USGS) 7.5 minute topographic maps, surficial and bedrock geology maps, aerial photographs, soils maps, wetlands maps, land use history information (e.g., fire, cutting, herbicide spraying), and species descriptions to develop a search image of the targeted feature (e.g., a rare plant) or its associated natural community. The PSA was then assessed to determine if areas occurred that could harbor the target feature. Identified areas were field surveyed at the

appropriate time to determine if the rare species and natural communities occurred in the study area.

2.2 Literature review

Available information on rare plants and natural communities was collected from published and unpublished sources. The MNHESP was contacted for rare plant and community information. The locations of known rare features were plotted on PSA base maps. MNHESP botanists and natural community scientists were also consulted regarding the availability of reports on plants and communities for the PSA. Information on rare plant species taxonomy and biology was collected from botanical texts (e.g., Flora of North America Editorial Committee 1993, 1997 and 2000, Gleason and Cronquist 1991, Fernald 1950, Haines and Vining 1998) and herbarium vouchers. Available information on rare plants and communities in and near the PSA was reviewed to predict whether additional rare plant or community sites might occur in the PSA based on species ranges and habitat types.

Taxonomy of vascular plants follows Haines and Vining (1998) and Flora of North America Editorial Committee (1993, 1997, and 2000). Natural community classification largely follows Swain and Kearsley (2000), which represents the most current and comprehensive system for Massachusetts. Many river and lake ecosystems, however, are not described. Classification of these latter communities follows Weatherbee (1996) and Weatherbee and Crow (1992). Gawler (2000) and Swain (pers. comm., A. Haines of Woodlot Alternatives with P. Swain of the MNHESP, several contacts in 1999 and 2000) were referenced for community characterizations.

2.3 Aerial Photograph Interpretation

Color infra-red aerial photographs (1:12000 scale) were used to review the types and locations of natural communities in the PSA. Wetland maps previously prepared by the USEPA (TechLaw, Inc. 1998) were also reviewed to identify the location of riparian forest communities. Natural communities in the PSA that appear to be in a natural state (i.e., not altered by agricultural activities, development, human-induced flooding, or other

factors) were identified on maps and aerial photographs. In addition, based on information collected during the literature review, potential sites to field survey were located on aerial photographs and project maps.

2.4 Field Surveys

Field surveys to verify the existence of rare species or communities were conducted by experienced botanists trained in plant taxonomy. Using the list of rare plant species and natural communities that are known or suspected to occur in the PSA (prepared during landscape analysis), and aerial photographs and base maps showing potential survey sites, field botanists surveyed areas for rare occurrences. Survey efforts focused on areas identified during landscape analysis as having a moderate to high potential for containing a targeted rare plant or natural community. Surveyed sites were carefully examined to identify potential micro-habitats containing the occurrences of interest.

Most of the remainder of the PSA was also surveyed in a less intense manner during other field exercises to determine if potential habitats were missed during landscape analysis. When potential rare plant or natural community habitats were identified during these efforts, they were also carefully surveyed. Surveys were performed during periods when individual species could be positively identified (e.g., in flower or with mature fruit). Multiple site visits were used, as necessary, to ensure plants were observed in an appropriate stage for accurate identification. Taxonomic keys and herbarium specimens were used to verify species identification.

At each extant rare plant or natural community site, information on population size, evidence of reproduction, likely persistence, location, and existing threats (e.g., on an all-terrain vehicle trail), was collected in field notebooks. Photographs were taken of rare plants and their habitats when possible. Areal cover was estimated through use of figures (comparison charts showing various proportions) contained in Color Communications, Inc. (1997). Voucher specimens were collected for many species when sufficient numbers existed such that collection would not harm the population (the number dependent of the species' biology). Locations of rare plant populations were surveyed using Global Positioning System (GPS) equipment. Trimble Pro-XR GPS survey

equipment was used that, depending on conditions, captured locations with 1 – 2 m accuracy. MNHESP Rare Plant Observation Forms were completed for all rare plants observed in the PSA.

3.0 Natural Community Descriptions

Eighteen natural communities occur in the PSA. An additional seven communities located in reference areas were surveyed and described due to their importance in various biological studies. A listing of each community with summary information, including description, example locations, synonyms, and extent in the PSA, can be found in Table 1-2. Detailed narratives of the communities can be found in Attachment A. Map 1-1 provides natural community type and location for the entire PSA. Community data forms are provided in Attachment E. Scientific names for plants referenced in this document are listed in Attachement F.

Beginning from the confluence of the East Branch and West Branch Housatonic River, the floodplain is relatively narrow (ca. 100 – 250 m) and less structurally diverse compared to downstream portions of the PSA. Where the natural communities are intact, the upstream region is primarily vegetated by riparian forests that receive over bank flow during high-water events. Herb- and shrub-dominated, seasonally flooded depressions occured in this area and were found to be utilized by breeding amphibians. The main stem of the Housatonic River in this section has moderately fast water with pool, riffle, and run habitat. The channel walls are vertically cut and bottom substrate is often gravel and sand. Impacts to the floodplain communities are largely residential in nature and include housing lots, manicured lawns, and open rights-of-way for power lines and sewage systems. Non-native and invasive plant species are prevalent in this area. A representative cross-section is provided in Figure 1-1.

Table 1-2 Natural communities in the PSA and reference areas.

Community Name	Brief Description	Example Location	Area in PSA (ha)	State Rank	Synonyms	
					Cowardin *et al.* (1979)	Weatherbee[1]
Lacustrine Communities[2]						
Acidic brownwater lake/pond	Ponds found on the Berkshire Plateau that have stained water resulting from organic inputs from adjacent peatlands.	Washington Mountain Lake.	Not present in PSA	NA	LUB	Acidic brownwater lake/pond
Clear softwater lake/pond	Ponds found on the Berkshire Plateau that are relatively oligotrophic and do not have adjoining peatlands.	Ashley Lake.	Not present in PSA	NA	LOW	Clear softwater lake/pond
Moderately alkaline lake/pond	Ponds located in the central valley region with calcareous bedrock underneath.	Threemile Pond, Woods Pond.	9.2	NA	LAB	Moderately alkaline lake/pond
Riverine Communities[2]						
High-gradient stream	Small streams with swift-flowing sections generally devoid of vegetation except at edges of quiet pools.	Roaring Brook.	0.04	NA	ROW	High-gradient stream
Low-gradient stream	Slow-moving water that may have abundant submersed aquatic plants.	Housatonic River south of Holmes Road.	106.4	NA	RAB	Low-gradient stream
Medium-gradient stream	Streams with moderate flows and some riffles. Vascular vegetation is sparse.	East Branch Housatonic River.	6.7	NA	RUB	Medium-gradient stream
Spring	Occur where groundwater discharge creates small water bodies and rivulets. Often colonized by golden saxifrage.	Pool WML-2.	Not present in PSA	NA	NA	Spring
Palustrine Communities						
Black ash-red maple-tamarack calcareous seepage swamp	Hydric forests dominated by red maple, black ash, and bur oak. Occur in high pH groundwater discharge areas.	Most swamps on west side of Housatonic River south of Yokum Brook confluence.	47.4	S3	PFO	Circumneutral hardwood swamp (in part)

Community Name	Brief Description	Example Location	Area in PSA (ha)	State Rank	Synonyms	
					Cowardin *et al.* (1979)	Weatherbee[1]
Calcareous seepage marsh	Emergent marshes that experience high pH groundwater discharge. Calciphilic indicator plants are present.	Northwest end of Muddy Pond.	Not present in PSA	S2	PEM	Robust emergent marsh (in part).
Deep emergent marsh	Herb dominated wetland community that often remains inundated with water through the growing season. Dominated by robust graminoids grass-like plants or aquatic, broad-leaved herbs.	Many vegetated backwater areas upstream of Woods Pond.	21.5	S4	PEM	Robust emergent marsh (in part)
High-terrace floodplain forest	Riparian forests with a mixture of trees from wetter sites (e.g., silver maple, American elm) and trees from rich, upland sites (e.g., sugar maple, white ash, basswood). Herb layer with characteristic species of high-nutrient forests.	Floodplain forest upstream of WWTF outfall and to some extent around 8-VP-1.	4.4	S2	PFO	Floodplain forest (in part)
Mud flat	Sparsely vegetated, saturated mucky soils that become exposed in the summer as the water level recedes. Occur at the edges of vernal pools and river channels.	Many vernal pools transform to this community when the water completely recedes.	Present in PSA, but seasonal in occurrence	S4	PEM	Not specifically addressed
Red maple swamp	Hydric forests dominated by red maple.	South of New Lenox Road in vicinity of vernal pool 46-VP-1.	61.2	S5	PFO	Circumneutral hardwood swamp (in part)
Riverine point bar and beach	Open sand and mucky sand bars along the edge of river channels.	Accretion bars along Housatonic River.	0.4	S3	RUS	Low gradient stream (in part)
Shallow emergent marsh	Herb dominated wetland community with saturated soils or inundated at some locations. Vegetation diverse, but lacking robust, grass-like herbs characteristic of deep emergent marshes.	Vernal Pool 38-VP-2.	30.3	S4	PEM	Circumneutral graminoid marsh (in part) and robust emergent marsh (in part)

Community Name	Brief Description	Example Location	Area in PSA (ha)	State Rank	Synonyms	
					Cowardin *et al.* (1979)	Weatherbee[1]
Shrub swamp	Hydric shrublands lacking a closed canopy.	Vernal Pool 46-VP-1.	103.8	S5	PSS	Circumneutral shrub swamp
Transitional floodplain forest	Riparian forests dominated by silver maple, box-elder, and American elm.	Most floodplain forests adjacent to river channel north of Yokum Brook confluence.	84.1	S2	PFO	Floodplain forest (in part)
Wet meadow	Shallow emergent mashes that are periodically disturbed by mowing or grazing.	Hydric fields south of New Lenox Road.	18.4	S4	PEM	Graminoid marsh (in part); sloping graminoid fen (in part)
Woodland vernal pool	Small, vernally flooded depressions in upland settings.	October Mountain State Forest.	Not present in PSA	S3	PAB	Not specifically addressed
Terrestrial Communities						
Cultural grassland	Open uplands dominated by grass-like herbs that are periodically disturbed by mowing, grazing, or fire.	Upland fields near New Lenox Road.	22.0	NA	NA	Old field
Northern hardwoods-hemlock-white pine forest	Upland forests dominated by sugar maple, eastern hemlock, red oak, and eastern white pine.	Some forests along east side of Woodland Road.	24.3	S5	NA	Mesic northern hardwood forest (in part)
Red oak-sugar maple transition forest	Mesic upland forest dominated by red oak, and sugar maple, white ash. Flora of this community lacks extreme indicators of northern and southern forests.	Upland forest near Lenox Station on east side of Springfield Terminal rail line.	6.6	S4	NA	Mesic northern hardwood forest (in part)
Rich mesic forest	Mesic upland forest dominated by sugar maple, white ash, and basswood with a characteristic herb flora of high-nutrient sites.	Some forests along east side of Woodland Road.	2.0	S3	NA	Rich mesic forest

Community Name	Brief Description	Example Location	Area in PSA (ha)	State Rank	Synonyms	
					Cowardin *et al.* (1979)	Weatherbee[1]
Spruce-fir-northern hardwood forest	Moderate to high elevation forest dominated by trees adapted to cooler microclimates, such as red spruce, balsam fir, red maple, paper birch, and mountain ash.	Forest surrounding pool WML-3.	Not present in PSA	S4	NA	Mesic northern conifer forest
Successional northern hardwoods	Young forests growing on sites with a recent history of canopy disturbance. Dominant trees include quaking aspen, paper birch, and eastern white pine.	Forests around pools 23b-VP-1 and 23b-VP-2.	2.2	S5	NA	Mesic northern hardwood forest (in part)

1 Weatherbee (1996) and Weatherbee and Crow (1992) are both sources for previous community classification.

2 Lacustrine and riverine communities are not yet classified by Swain and Kearsley (2000); therefore, classification follows Weatherbee (1996) and Weatherbee and Crow (1992).

Moving downstream, the river slows and widens somewhat. Though the stream banks are generally vertically cut, a number of small sand beaches were found. The floodplain varies in width and ranges from ca. 50 – 400 m wide. Riparian forests are still the dominant feature, although in many areas they have been cleared for agriculture (hay and food crop production). This section harbors several rich, forested areas that are home to a number of rare plant species (see Map 1-2 and Attachment A). Vernal pools are common in this section as well. A number of beaver-influenced wetlands occur on the west side of the Housatonic River channel near the Canoe Meadows Wildlife Sanctuary. A representative cross-section is provided in Figure 1-2.

South of the Pittsfield WWTF and in the vicinity of New Lenox Road, significant portions of the riparian forests have been cleared for agriculture. The remaining forest fragments are bordered by wetland and upland fields that were largely fallow during the survey period. Despite the forest clearing, numerous open pools dominated by emergent, herbaceous vegetation occur in the low areas of the field. It was found that these pools were being used by breeding amphibians and wading birds. The Housatonic River channel is highly sinuous in this area and a number of oxbow pools were found. Channel banks are still vertically cut and a number of mucky sand beaches and accretion bars were located that often harbored the rare mudflat spikesedge. A representative cross-section is provided in Figure 1-3.

Nearing the Yokum Brook confluence and below, the floodplain becomes limited on the east side due to the proximity of October Mountain. It is extensive on the west side of the channel, however, and the floodplain commonly exceeds 500 m in width. Here the river channel lacks the well-defined, vertically cut banks of the upper portions of the PSA. Bottom substrate is typically silt and fine organic particles. Numerous, and often large, backwater pools and sloughs occurred in this area. These inundated habitats are vegetated by a diversity of plants (e.g., emergent, floating-leaved, submergent). Floodplain forests are restricted to high banks adjacent to the channel. Most of the forested areas are dominated by swamps. These forested wetlands occur in lower areas that are saturated at or near the surface and frequently enriched with high pH groundwater discharge (pH typically greater than 7.0). These seepage swamps contain

the highest concentration of rare plants in the PSA and show the least amount of influence from non-native plants (see Map 1-2 and Attachment A). They are also the largest forested tracts in the PSA. Although largely intact, portions of the forests in this portion of the PSA have been cleared for railroad lines and power lines. Two major streams enter from the west, with large wetland complexes prior to their confluence. The downstream end of the PSA is comprised of the impoundment creating Woods Pond. This moderately alkaline pond is relatively shallow and contains aquatic vegetation. A representative cross-section is provided by Figure 1-4.

For descriptive purposes, the natural communities occurring in the PSA have been grouped together into systems. Systems are large-scale classification units comprised of different natural communities that share common features, such as hydrology and canopy development. Four systems occur in the PSA: lacustrine (Section 3.1); riverine (Section 3.2); palustrine (Section 3.3); and terrestrial (Section 3.4). Definitions for these systems are found preceding the natural community descriptions in each section.

Figure 1-1 **Representative section of PSA - upper section (Reach 5A).**

Figure 1-2 **Representative section of PSA - middle section (Reach 5A).**

Figure 1-3 **Representative section of PSA - lower section (Reach 5B)**

Figure 1-4 **Representative section of PSA - lower section (Reach 5C).**

3.1 Lacustrine Communities

The lacustrine system is made up of wetlands and deepwater habitats located in topographic depressions and impounded river channels. These communities have limited (less than 30 percent) areal coverage of woody and emergent herbaceous plants and may also have active wave-formed shoreline features (Cowardin *et al.* 1979).

Most of the lacustrine communities in the PSA are impoundment features created either by humans or American beavers. Due to their location and high pH (7.0–9.0), these ponds are considered moderately alkaline lake/pond communities. This community type is found in the Central Valley region of Berkshire County and overlies high-pH bedrock, such as limestone and marble, which creates alkaline, hard water conditions. Alkalinity measurements usually range from 18 – 73 mg/liter HCO_3^- (Weatherbee and Crow 1992). At the downstream end of the PSA is a dam that creates Woods Pond. This 20-ha impoundment was largely less than 2 m deep and contains abundant submerged and floating-leaved vegetation.

3.2 Riverine Communities

The riverine system is made up of wetlands and deepwater habitats with continually or periodically flowing water contained within a channel. They are not significantly dominated by woody or emergent herbaceous vegetation (having less than 30 percent areal cover) and do not have ocean-derived salts exceeding 5 ppt. Riverine systems may occur in natural or created channels, and sometimes are merely connections between two bodies of water (Cowardin *et al.* 1979).

Four riverine communities were identified in the PSA. The majority of the Housatonic River in the PSA is classified as a low-gradient stream, characterized by slow-moving water, fine sediments, and abundant vascular vegetation. The upstream portion of the main stem of the Housatonic River, north of the Pittsfield WWTF outfall, is classified as medium-gradient stream due to moderate-flowing water, courser substrate, and general lack of aquatic vegetation. Several high-gradient streams enter the PSA from the steep slopes of October Mountain State Forest. These fast-moving, low-order streams possess

gravel and cobble substrate and are generally devoid of plants in the channel itself. Spring communities are small, ephemeral or permanent features that resemble spring rivulets or tiny pools. They emerge along or at the base of slopes when groundwater is redirected by an impervious layer. One spring was located in the PSA. It was not mapped, however, due to its small size.

3.3 Palustrine Communities

The palustrine system is made up of various types of non-tidal wetlands that are dominated by plants (Cowardin *et al.* 1979). These communities may occur in topographic depressions and drainage basins, adjacent to lakes and rivers, or anywhere groundwater is discharged, such as at the base of a slope that intersects an impermeable layer. As these communities are wetlands, the soil is inundated or at least saturated at or near the surface during a portion of the growing season.

Eleven palustrine communities were identified in the PSA. These communities are often divided into two groups for classification purposes—those that are forested and those that are open. Transitional floodplain forests are the dominant forested wetland in the PSA. These forests are dominated by silver maple, box-elder, and eastern cottonwood, and are temporarily flooded during high water events. Transitional floodplain forests are the most common wooded community upstream of New Lenox Road. South of this road, this community type is restricted to the edge of the river channel. High–terrace floodplain forests are somewhat similar but are found on elevated banks and berms and possess a flora characteristic of high-nutrient sites. This community is restricted in occurrence and the best examples are found upstream of the Pittsfield WWTF outfall. Red maple swamps were found in the vicinity of the Pittsfield WWTF outfall and south of New Lenox Road. These forested wetlands are dominated by red maple and occur in lower, wetter areas than the floodplain forests. The final type of forested wetland identified in the study area is black ash-red maple-tamarack calcareous seepage swamp. This community is dominated by red maple, black ash, and bur oak and is located in downstream portions of the PSA where high pH groundwater discharge occurs. This

community contains a number of species with affinity to calcareous substrate, and was found to harbor the greatest concentration of state-listed rare plants.

Emergent marshes are open, herb-dominated wetlands in which the vegetation grows upright, above the water level (when standing water is present). Three types of marshes were observed in the PSA. Deep emergent marshes are those wetlands that frequently remain inundated through the growing season and are dominated by robust, often grass-like herbs. Shallow emergent marshes occur in areas with saturated soils or shallow water, and they lack the tall, grass-like plants. Wet meadows are similar to shallow emergent marshes but are periodically disturbed by mowing or grazing, which alters the character and species composition. All of these marsh types become more abundant in the PSA as one moves south of the Pittsfield WWTF outfall.

Four additional wetland communities that lacked closed canopies were observed in the PSA. Shrub swamps are one of the most extensive community types found in the 10-year-floodplain. This community is dominated by a number of short, woody plants and occasionally had scattered trees as well. Shrub swamps are likely common in the PSA due to land use history. Significant portions of the Housatonic River Valley State Wildlife Management Area were farmed at one time, and shrub swamp communities appear to represent a stage of succession from wet meadow to forested wetland. Also observed was the riverine point bar and beach, which is a river shore community comprised of sand or mucky sand substrate in the form of linear beaches and accretion bars. This community is dominated by short-statured, often annual, herbs that are tolerant of submersion. Mud flat is another community that appeared later in the season as the water level receded from vernal pools and shallow water areas of the Housatonic River. It is generally a sparsely vegetated community growing on saturated mud.

3.4 Terrestrial Communities

The terrestrial system is comprised of uplands that lack prolonged inundation or soil saturation. They may have closed canopies or be relatively open and dominated by low herbs. Terrestrial communities occur in a variety of locations with respect to elevation, slope, and aspect.

Four terrestrial or upland communities were identified in the PSA. Only one of the terrestrial communities was an open habitat lacking trees. Cultural grasslands are herb-dominated habitats that are periodically disturbed by mowing, grazing, or burning. Though managed, and not necessarily natural, they are included under the category of natural communities as they are used extensively by wildlife common to minimally managed areas, including rare birds. The community ranges from mesic (e.g., pastures and fields) to xeric (e.g., open barrens and airports). The former type often has a higher percentage of non-native species.

Northern hardwoods–hemlock–white pine forests are located near New Lenox Road where upland inclusions occur within the ten-year-floodplain. This community is dominated by red oak, eastern hemlock, sugar maple, and eastern white pine. Red oak–sugar maple transition forest is limited in extent in the PSA. These forests are transitional in species composition between southern and northern forests. Dominant trees included red oak, sugar maple, American beech, and white ash. Spruce–fir–northern hardwood forests were identified in higher elevation, cooler microsites in October Mountain State Forest. Common canopy trees include red spruce, white spruce, red maple, paper birch, balsam fir, and mountain ash. Successional northern hardwoods are young forest stands growing on sites with a history of past disturbance. Quaking aspen, paper birch, and eastern white pine are common colonizing trees on these sites. This habitat occurs in and around the borrow pits near the Pittsfield WWTF.

3.5 Rare Natural Communities and Plants

3.5.1 Rare Natural Communities

Seven communities of state conservation concern were identified in the PSA: black ash–red maple–tamarack calcareous seepage swamp; transitional floodplain forest; high-terrace floodplain forest; riverine point bar and beach; woodland vernal pool; calcareous seepage marsh; and rich mesic forest. A brief discussion of the rare natural communities and their conservation status follows. Detailed descriptions of the natural communities can be found in Attachment A.

Black ash–red maple–tamarack calcareous seepage swamps are forested wetlands enriched with high-pH groundwater. This community is ranked S3 in Massachusetts and occurrences are restricted to the western portion of the state. It is one of the more common communities in the PSA on the west side of the Housatonic River south of Yokum Brook confluence. Black ash–red maple–tamarack calcareous seepage swamps have been impacted in the PSA by clearing for railroad lines and power line rights-of-way. One area harboring rare species was being inundated by a beaver impoundment in 2000.

Transitional floodplain forests are wooded areas subject to flooding during high water events. This community is ranked S2 in Massachusetts and occurrences are found primarily in the western portion of the state. It can be found adjacent to the river channel nearly throughout the PSA, but it is best developed from the confluence of the East and West Branch Housatonic River to the Yokum Brook confluence area. Extensive clearing and development of this community has occurred in Pittsfield and Lenox for agriculture, residential lot construction, and river channelization. The proximity of urban Pittsfield has led to extensive colonization of non-native species in some areas. Garlic-mustard and dame's rocket are ubiquitous in the floodplain forests of this area, while cuckoo flower, Morrow's honeysuckle, moneywort, and purple loosestrife are common in particular tracts.

High-terrace floodplain forests are wooded areas adjacent to river channels that are positioned on elevated terraces or berms so that they are less frequently flooded than the previous community. This community is ranked S2 in Massachusetts and occurrences are concentrated in the western half of the state. The best example of this community in the PSA is found upstream of the Pittsfield WWTF.

Riverine point bars and beaches are stream shoreline communities created by the accretion of fluvial sediments. This habitat can be found in the PSA upstream of the Yokum Brook confluence. This community is ranked S3 in Massachusetts and occurrences are restricted to the western half of the state.

Woodland vernal pools are temporary bodies of water in upland settings that may be used as breeding habitat by amphibians. This community is ranked S3 in Massachusetts and occurrences are scattered throughout the state. Examples in the PSA can be found in October Mountain State Forest.

Calcareous seepage marshes are herb-dominated wetlands that are supplied with high pH groundwater. This community is ranked S2 in Massachusetts and occurrences are restricted to the western half of the state. This habitat can be found at the Hinsdale Flats SWMA reference area. The single observed occurrence of this community has been impacted by a railroad line. The wetland has been bisected by a large berm of crushed stone and the site's hydrology has likely been affected as well. The unusual aspect of calcareous seepage marshes is provided by the calciphilic flora that is supported by enriched groundwater seepage.

Rich mesic forests are wooded areas that usually occur on or at the base of slopes and are enriched by groundwater seepage or gravity-assisted accumulation of nutrient matter. This community is ranked S3 in Massachusetts and occurrences are scattered throughout the state. Examples in the PSA can be found along the west facing slopes of October Mountain. Canopy clearing is a major threat to this community. Maintenance of forest integrity is an important conservation measure. Limiting disturbance also assists in preventing the colonization of non-native species.

3.5.2 Rare, Threatened, and Endangered Plants

The landscape analysis yielded 32 plants of state conservation concern that are known or suspected to occur in the PSA. These species are presented in Table 1-3. Field surveys documented a total of 20 state-listed species from 37 sites, including 19 from the landscape analysis and 1 additional Special Concern species (pendulous bulrush). These results are summarized in Table 1-4. Discussion of each species from the PSA follows and includes population details, species ecology, and threats. New England state occurrences were gathered from Seymour (1982) and Magee and Ahles (1999). Rare plant listings for New England states were obtained through the The Natural Heritage Network (2001). See Attachment G for rare plant data forms.

Table 1-3 Rare plants known or suspected to occur in the PSA[1]

Species	Historically Present In Area	Found during 1998[2], 1999, or 2000 Surveys	State Status	Communities Present In PSA That Species Is Likely To Occur In
black maple (*Acer nigrum*)	Yes	Yes	Special Concern	High-terrace Floodplain Forests
green dragon (*Arisaema dracontium*)	No	No	Threatened	High-terrace Floodplain Forests
smooth rock-cress (*Arabis laevigata*)	No	No	Threatened	High-terrace Floodplain Forests
foxtail sedge (*Carex alopecoidea*)	Yes	Yes	Threatened	Wet Meadow, Open areas in floodplains
Davis's sedge (*Carex davisii*)	No	No	Endangered	High-terrace Floodplain Forests
Gray's sedge (*Carex grayi*)	Yes	Yes	Threatened	Black Ash-Red Maple-Tamarack Calcareous Seepage Swamps, Transitional Floodplain Forests
Schweinitiz's sedge (*Carex schweinitzii*)	No	No	Endangered	Black Ash-Red Maple-Tamarack Calcareous Seepage Swamps
hairy-fruited sedge (*Carex trichocarpa*)	No	No	Threatened	Transitional Floodplain Forests
cat-tail sedge (*Carex typhina*)	No	No	Threatened	Alluvial Red Maple Swamps
early blue cohosh (*Caulophyllum giganteum*)	No	Yes	Watch List	High-terrace Floodplain Forests, Rich Mesic Forests
Virginia spring beauty (*Claytonia virginica*)	No	No	Threatened	High-terrace Floodplain Forests
hemlock-parsley (*Conioselinum chinense*)	No	Yes	Special Concern	Black Ash-Red Maple-Tamarack Calcareous Seepage Swamps

Species	Historically Present In Area	Found during 1998[2], 1999, or 2000 Surveys	State Status	Communities Present In PSA That Species Is Likely To Occur In
mudflat spikesedge (*Eleocharis intermedia*)	No	Yes	Threatened	Mud Flats
downy wild-rye (*Elymus villosus*)	No	Yes	Threatened	High-Terrace Floodplain Forests
variegated scouring-rush (*Equisetum variegatum*)	No	Yes	Watch List	Disturbed, hydric ground in limestone bedrock regions
Frank's love grass (*Eragrostis frankii*)	No	No	Threatened	Riverine Point Bar and Beaches
fringed gentian (*Gentianopsis crinita*)	No	Yes	Watch List	Wet Meadows
many-fruited false loosestrife (*Ludwigia polycarpa*)	No	No	Threatened	Oxbows in Transitional Floodplain Forests
winged monkey-flower (*Mimulus alatus*)	No	No	Endangered	Mud Flats
bur oak (*Quercus macrocarpa*)	Yes	Yes	Special Concern	Black Ash-Red Maple-Tamarack Calcareous Seepage Swamps
bristly crowfoot (*Ranunculus pensylvanicus*)	Yes	Yes	Threatened	Openings in swamps and floodplains
eastern black currant (*Ribes americanum*)	Yes	Yes	Watch List	Black Ash-Red Maple-Tamarack Calcareous Seepage Swamps, Transitional Floodplain Forests
swamp dock (*Rumex verticillatus*)	No	No	Threatened	Transitional Floodplain Forests
Wapato (*Sagittaria cuneata*)	Yes	Yes	Endangered	Mud Flats, Shallow Emergent Marshes (in depressions within Transitional Floodplain Forests)
hoary willow (*Salix candida*)	Yes	Yes	Watch List	Calcareous Seepage Marshes

Species	Historically Present In Area	Found during 1998[2], 1999, or 2000 Surveys	State Status	Communities Present In PSA That Species Is Likely To Occur In
autumn willow (*Salix serissima*)	No	Yes	Watch List	Wet Meadows, Shrub Swamps
cluster sanicle (*Sanicula odorata*)	No	Yes	Threatened	High-terrace Floodplain Forests
hard-stem bulrush (*Schoenoplectus acutus*)	No	Yes	Watch List	Deep Emergent Marshes, Calcareous Seepage Marshes
oblong bulrush (*Schoenoplectus acutus* X *S. tabernaemontanii*)	No	Yes	not formally listed	Deep Emergent Marshes, Calcareous Seepage Marshes
crooked-stem aster (*Symphyotrichum prenanthoides*)	No	Yes	Special Concern	Red Maple Swamps
Culver's root (*Veronicastrum virginicum*)	Yes	No	Special Concern	High-terrace Floodplain Forests
barren strawberry (W*aldsteinia fragarioides*)	No	No	Threatened	High-terrace Floodplain Forests

[1] List was compiled through landscape analysis and agency consultations.
[2] TechLaw, Inc. 1999

Table 1-4 Summary of rare plants documented in the PSA and reference areas

Common Name	Latin Name	State Status[1]	State Rank	Global Rank	Year First Observed	Number of Sites	Town(s)	Element Occurrence Rank
black maple	*Acer nigrum*	SC	S2	G5	1999	1	Pittsfield	C
foxtail sedge	*Carex alopecoidea*	E	S2	G5	1998	1	Lenox	C
Gray's sedge	*Carex grayi*	T	S2	G4	1998	1	Lenox	B
early blue cohosh	*Caulophyllum giganteum*	WL	S?	G3/G5	2000	3	Pittsfield, Lee, Washington	B-C
hemlock-parsley	*Conioselinum chinense*	SC	S3	G5	1998	1	Lenox	C
mudflat spikesedge	*Eleocharis intermedia*	SC	S2	G5	1998	3	Pittsfield, Lenox	B-C
downy wild-rye	*Elymus villosus*	T	G5	S2	2000	1	Pittsfield	C
variegated scouring-rush	*Equisetum variegatum*	WL	S3	G5	1998	3	Pittsfield, Washington	B-C
fringed gentian	*Gentianopsis crinita*	WL	S4	G4	2000	1	Sheffield	D
bur oak	*Quercus macrocarpa*	SC	S3	G5	1998	1	Lenox	A
bristly crowfoot	*Ranunculus pensylvanicus*	T	S2	G5	1999	1	Lenox	C
eastern black currant	*Ribes americanum*	WL	S4	G5	1998	7	Pittsfield, Lenox	C
wapato	*Sagittaria cuneata*	E	S1	G5	1998	3	Lenox	B-D
hoary willow	*Salix candida*	WL		G5	2000	1	Washington	C
autumn willow	*Salix serissima*	WL	S3	G5	1999	1	Sheffield	B
cluster sanicle	*Sanicula odorata*	T	S2	G5	2000	1	Lenox	C
hard-stem bulrush	*Schoenoplectus acutus*	WL	S?	G5	2000	1	Hinsdale	B
oblong bulrush	*Schoenoplectus acutus* X *S. tabernaemontanii*	NA	NA	G?	2000	2	Washington-Hinsdale, Pittsfield	B-C
pendulus bulrush	*Scirpus pendulus*	SC	S2	G5	1999	3	Lenox, Washington	C-D
crooked-stem aster	*Symphyotrichum prenanthoides*	SC	S3	G4/G5	1998	1	Lenox	C

[1] State status explanation: E=endangered; T=threatened; SC=special concern; WL=watch list.

Black Maple

Black maple is a deciduous tree that can reach a height of 40 m (Figure 1-5). It normally grows in rich, mineral soil of rocky hillsides and floodplains. This species occurs primarily in the eastern half of the United States and adjacent southern Canada. In New England it occurs in all states except Maine and Rhode Island. Black maple is listed as a species of conservation concern in all New England states in which it occurs in. The rarity of this species is likely due to the clearing of its habitat, particularly floodplain areas that are preferred areas for agriculture in most New England states. As well, New England is near the northern limit for this species.

Figure 1-5 Leaves and fruit of black maple.

Black maple was located in the PSA at Canoe Meadows Wildlife Sanctuary, south of the Holmes Road and west of the Housatonic River channel (Map 1-2). This station is a historically known locality that was rediscovered during 1999 field efforts. It occurred as a single individual in a floodplain forest near the base of the upland terrace. The tree had an approximate diameter of 50 cm. No flowers or fruits were observed during the first observation on 27 May 1999. Developing fruits were observed, however, in the spring of 2000. The black maple tree was part of a floodplain forest community, which in this location is merely a narrow strip along the river that likely exwas more extensive prior to clearing for agriculture. Much of the surrounding landscape is open field or early successional forest. Associated species include sugar maple, green ash, false hellebore, wild leek, bloodroot, zig-zag goldenrod, Morrow's honeysuckle, lady fern, and Pennsylvania sedge.

Due to land ownership of the site (Massachusetts Audubon), black maple likely has no short-term threats to its existence in the PSA. Long-term prospects for continued existence are poor. With only a single mature tree known from the area, it will likely be difficult for the population to maintain itself indefinately. This station was provided an EO rank of C on the basis of small population size, relic community size, and public ownership of property.

Mudflat Spikesedge

The mudflat spikesedge is a diminutive, tufted sedge that grows in wet soil of open areas (Figure 1-6). As its name implies, this species frequents muddy areas such as rivershores and tidal flats. It occurs in the eastern United States and adjacent Canada. In New England it is found in all states except Rhode Island. Mudflat spikesedge is also listed as a species of conservation concern in Maine and Vermont. In New England, this species favors soil of high pH, and therefore is usually found in limestone regions. This type of bedrock is relatively scarce in New England and, therefore, so is the mudflat spikesedge. Pittsfield was the first town in Massachusetts found to harbor a population of this plant (date of collection 1902) (Hoffman 1904).

Figure 1-6 Mudflat spikesedge.

Data for mudflat spikesedge occurrences were collected at three locations in the PSA (Map 1-2). A fourth location on the West Branch Housatonic River could not be surveyed in detail due to storm flow conditions. All locations were mucky silt/sand beaches and bars on the rivershore, commonly on the inside of bends where silt and organic particles accumulate. One site on the West Branch Housatonic River was not

documented due to flood flows and heavy siltation, which made locating and counting the plants impossible. Common associates include false pimpernel, common water-purslane, Canada lovegrass, dock-leaved smartweed, false nutsedge, barnyard grass, and common cocklebur. Due to the type of habitat this plant occurred in, most sites were small and limited to 15 m stretches along the accretion bars. EO ranks for the three surveyed sites were B (one site) and C (two sites).

Though mudflat spikesedge populations are small, there are several stations in the PSA and this species also occurs in most Central Valley towns in Berkshire County (Weatherbee 1996). EO ranks for PSA populations range from B (one site) to C (three sites). Threats to this plant include factors that would alter or disrupt channel flows, such as impoundments, continued urbanization of upstream areas (leading to abrupt water level changes after storm events), and natural changes in stream location (e.g., oxbow formation).

Pendulous Bulrush

Pendulous bulrush is a grass-like, perennial herb of wet, open areas such as meadows, fens, and graminoid marshes (Figure 1-7). It has inconspicuous, wind-pollinated flowers, which together with its vegetative morphology, creates a plant that is frequently overlooked. It is found primarily in the eastern half of the United States. In New England, pendulous bulrush occurs in Maine, New Hampshire, Vermont, Massachusetts, and Connecticut and is listed as a species of conservation concern in those states. The rarity of this species in Massachusetts is due, in part, to this state being near the periphery of the plant's range and its preference for higher pH sites, which are naturally scarce. This species was first documented in Massachusetts in the town of Stockbridge (date of collection 1902) (Hoffman 1904).

Figure 1-7 Inflorescence of pendulous bulrush.

Pendulous bulrush was observed in wet gravel of a parking lot near the Housatonic River, at the edge of a managed pond in the October Mountain State Forest, and in damp, open depressions along the Willow Creek Road (Map 1-2). The land adjacent to the parking lot is predominantly open land and is maintained as such due to power line right of ways and agriculture. Much of the open area is wetland, with significant areas of shrub swamp and wet meadow. Due to the highly disturbed nature of the site and a small population, this occurrence was considered to possess an EO rank of D. The pond shore site is a small impoundment with an open, maintained lawn on the west shore. Pendulous bulrush grew in shallow water at the very edge of the shoreline and its flowering stem was cut during mowing of the lawn. This site also consisted of few individuals, but due to public land ownership, it was considered a C-ranked occurrence. The sites along the Willow Creek Road are maintained as openings due to road and power line passage. The main population was the largest observed, consisting of about 15 individuals with a total of approximately 75 flowering stems. Associated species included silky willow, white bedstraw, fox sedge, black bulrush, jointed rush, northern arrowwood, heart-leaved willow, meadowsweet, and pointed broom sedge. Some of the smaller colonies of pendulous bulrush are known to be recent stations as they are now occurring in the center of trails that were essentially devoid of vegetation (due to frequent use) in 1998. This occurrence was given an EO rank of C.

Threats to pendulous bulrush include extensive site disturbance and community succession. Though this species frequents areas that have been modified by past human activity, it is not typically a weed species of exposed soils. It appears to prefer areas that

have been cleared of dense woody vegetation but have had time to recover as wet meadows. However, most sites would not remain open meadows; they would succeed to shrub-dominated and, later, tree-dominated communities, ultimately excluding pendulous bulrush from those sites. This sedge likely inhabits the landscape in a dynamic fashion, colonizing new openings while being extirpated from other areas by canopy formation.

Autumn Willow

Autumn willow is a branched shrub that grows from 1 – 4 m tall (Figure 1-8). Willows are dioecious species, meaning that they have unisexual flowers (i.e., flowers that bear pollen or ovules, but not both) borne on separate plants. Therefore, reproduction in most species requires two individuals of complimentary sex. Autumn willow grows in fens and swamps that are influenced by relatively high-pH groundwater, due to circumneutral or basic bedrock. Autumn willow occurs primarily in the northern United States east of the Rocky Mountains and in mid-western and eastern Canada. In New England, this willow is found in Massachusetts, Connecticut, and Vermont. It is listed as a species of conservation concern in all of those states. This is due to the requirement of high-pH wetlands, a resource that is naturally scarce in New England.

Figure 1-8 Carpellate (i.e., seed-bearing) plant of autumn willow.

Autumn willow was found in a circumneutral shrub swamp that bordered a rich, wet meadow north of Threemile Pond (Map 1-3). The fen-like meadow possesses a number of plants that indicate its unusual character and high pH. These plants included shrubby cinquefoil, grass-of-Parnassus, purple avens, and swamp saxifrage. Autumn willow occurred on the periphery of this meadow, mixed with plants typical of shrubs swamps of

the region, such as pussy willow. Approximately 50 plants were observed, nearly half of these with dehisced capsules and dispersing seeds. The population area was ca. 50 m × 20 m. This station possessed an EO rank of B due to the moderate population size and unsual character of the natural community.

Threats to the autumn willow include cutting and alteration of water level. The wet meadow is a small, low area in a larger agricultural field. It has been cleared in the past during periodic cutting of the field. If attempts are made to reclaim/expand the current field by cutting of adjacent shrubs, the autumn willow could be extirpated from this site. The shrub swamp is immediately north of and hydrologically connected to Threemile Pond. Future adjustments to the pool level of Threemile Pond, which is impounded by an earth dike at the south end, may have adverse effects on the autumn willow population.

Wapato

Wapato is a floating-leaved or, more commonly in Massachusetts, an emergent aquatic plant of shallow, still or slow moving water (Figure 1-9). Due to the extreme variability in type and shape of leaves produced by species of this genus, identification usually depends on flowers or fruits. Wapato occurs over a large portion of northern United States and southern Canada. In New England, this plant is found in all states except Rhode Island. It is also considered a species of conservation concern in Connecticut and New Hampshire. Oddly, it is rare and localized in Massachusetts, absent from many areas with suitable habitat (Sorrie 1987).

Figure 1-9 Leaves and flowers of wapato.

From a vernal pool in the Housatonic River floodplain.

One station of wapato was rediscovered in 1998 and two new stations were discovered in 1999 (Map 1-2). The 1998 location was north of New Lenox Road in a moderate-sized, permanent backwater pool of the Housatonic River. The pool was connected to the river by a narrow channel during high water events, but it becomes separated as water levels fall. About 40 stems of this species were located in wet silt/muck near the periphery of the pool. The edges of the pool were often densely vegetated by shrubs or herbs. Wapato was not located in those areas, however, but was found in a sparsely vegetated area with some exposed substrate. Associated species at this site included common arrowhead, wool-grass, three-way sedge, purple loosestrife, American bur-reed, and pickerelweed. This station was provided an EO rank of B due to moderate population size, fair community condition, and public ownership of property.

One of the stations observed in 1999, found north of New Lenox Road, was located in wet mud of a shaded vernal pool. The site, located within a floodplain forest dominated by silver maple, was inundated for most of the spring season, and one plant was observed in flower after the water level had decreased. Sixteen total plants were observed in an area about 6 m^2. Associated species at that site included false water-pepper, common arrowhead, needle spikesedge, purple loosestrife, and northern water-plantain. This occurrence was provided an EO rank of C based on small population size and public ownership of property. The second station observed in 1999 was south of Willow Creek in a small pool of water at the edge of a black ash–red maple–tamarack calcareous seepage swamp. The plants were located in a seasonally flooded depression that becomes a wet, mucky basin as the water level decreases later in the growing season. Twelve plants were observed in an area about 3 m^2. Four of the wapato plants were in flower and one was in fruit. Associated herbaceous species included northern water-plantain, purple loosestrife, moneywort, sensitive fern, false-nettle, and northern water-horehound. This station was considered to possess an EO rank of C based on factors such as small population size and fair community condition.

Wapato was historically known from the PSA in seven locations. Four of these sites were carefully searched for the species. Only at the site described above (1998 rediscovery) were any plants of this species observed at previously documented stations.

At one historic location, north of New Lenox Road, the backwater area was completely filled with intertangled rhizomes of false water-pepper. There was no available substrate (e.g., exposed, saturated mud) and it is likely that wapato no longer occurs there. At the two remaining historic sites, upstream of the confluence with Yokum Brook and south of the Holmes Road, no wapato plants were observed. Common arrowhead, a closely related species, was observed at both locations.

Threats to wapato in the PSA include alteration of hydrology and invasive plants. Known stations of wapato along the Housatonic River occur in seasonally flooded pools and backwaters that show significant reduction or complete lack of standing water (except after storm events) during the summer growing season. Few plants can tolerate that range of conditions (i.e., from fully aquatic to terrestrial wetland). Changes in hydrology, such as in increase in mean pool elevation of Woods Pond, would alter the specific micro-site for one station of wapato and potentially cause local extirpations. Invasive plants are those species capable of growing at densities that exclude other vegetation. Some vernal pools immediately north of New Lenox Road have been aggressively colonized by false water-pepper. Though native, false water-pepper, which is capable of tolerating the varied seasonal conditions of temporary pools, can supplant other vegetation and form nearly monotypic colonies. Periodic monitoring and careful removal of this species from pools containing wapato could become an important conservation practice in this region.

Bristly Crowfoot

Bristly crowfoot is an annual or sometimes perennial herb of wetlands and shores (Figure 1-10). It, like many other members of its genus, is reported to possess poisonous vegetative parts. Bristly crowfoot occurs throughout northern North America and eastern Asia. This species occurs in all of the New England states. In addition to Massachusetts, it is listed as a plant of state conservation concern in Connecticut and Vermont.

Bristly crowfoot was found in a small, rocky opening along the shore of the Housatonic River north of Woods Pond (Map 1-2). Though historically known from the PSA, this station represented a new location for this species. The opening, approximately 2 m^2 in size, occurred adjacent to the river channel and was surrounded by a circumneutral shrub swamp dominated by red-osier dogwood, American hornbeam, and American hazelnut. Six plants were observed, four in flower and two in fruit. Associated herbaceous plants included sensitive fern, northern three-lobed bedstraw, northern water-horehound, clearweed, virgin's bower, tall meadow-rue, and water-parsnip. This station was considered to possess an EO rank of C based largely on small population size and public ownership of property.

Figure 1-10 Flowers and fruits of bristly crowfoot.

The historic location (i.e., mapped by MNHESP) for bristly crowfoot in the PSA was visited during the 1999 field season. This site was occupied by two crowfoots—creeping crowfoot and swamp crowfoot. Creeping crowfoot is a European species that has been introduced to North America. It is occasionally found in or adjacent to disturbed or cleared areas along the Housatonic River. Swamp crowfoot is a native species of forested wetlands and is a frequent plant of the PSA. It is not known if this location is based on a misidentified voucher specimen or if bristly crowfoot no longer occurs there.

The primary threat to bristly crowfoot is alteration of hydrology. This would include increase in mean pool elevation of Woods Pond. As the known occurrence of this species occurs immediately adjacent to the river channel, a slight increase in water level could

inundate the plants. Though this species is an obligate wetland plant, it does not normally grow in standing water.

Variegated Scouring-Rush

Variegated scouring-rush is a small, colonial, free-sporing vascular plant (Figure 1-11). Closely related to ferns, this species does not produce true flowers, but rather reproduces by spores released from a terminal spore cone. Variegated scouring-rush usually occurs in disturbed, wet areas with high pH, such as ditches, eroding banks, marble quarries, and shores in limestone bedrock regions (Sorrie 1987). This species possesses a circumboreal distribution, occurring as far south in North America as Pennsylvania and Colorado. In New England, this plant can be found in all states except Rhode Island. Variegated scouring-rush is also listed as a species of state conservation concern in Maine and New Hampshire.

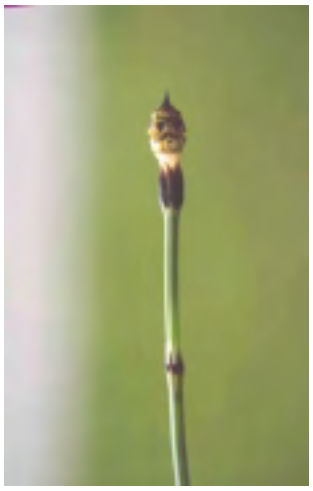


Figure 1-11 Variegated scouring-rush.

Upper stem and strobilus (i.e., spore cone).

Variegated scouring-rush was discovered growing at three locations, including two in the PSA and one in the October Mountain State Forest (Maps 1-2 and 1-4). In 1998, a large population comprised of thousands of stems was discovered on the sloping west shore of a small pool in a gravel pit near the Pittsfield WWTF. The upper part of the population was growing in dry sand, while the lower part was growing in wet sand that was inundated for much of the year. Silky dogwood, common reed, common flat-topped

goldenrod, and purple loosestrife were associated species growing with this rare horsetail. This site possesses an EO rank of B based on large population size and public ownership of property.

The second population was discovered in a small, excavated depression in a field within urban Pittsfield in 1999. The field was a former oxbow and is adjacent to the Housatonic River floodplain. Approximately 1,000 stems were observed during the 1999 field season, with 70 percent of the larger stems bearing spore cones. The plants occurred in a 15 m^2 area. Associated herb species, typical of wet, agricultural fields in New England, included common horsetail, old-field cinquefoil, heart-leaved willow, reed fescue, sensitive fern, tall goldenrod, foxtail sedge, and larger straw sedge. This site possesses an EO rank of C due to fair population size and poor community condition.

The third population was discovered in the October Mountain State Forest in 2000. The plants occurred in an 8 m × 2 m colony along the edge of a gravel road that passed between two small ponds. The shoulder of the road was vegetated with early successional herbs and shrubs including wild strawberry, golden Alexanders, beaked willow, heart-leaved willow, red clover, white bedstraw, and Canada goldenrod. Though this site was adjacent to a road and threatened by vehicle traffic and future road maintenance activities, the location was in an out-of-way area that does not experience high traffic flow. This site possesses an EO rank of C based on factors such as fair population size and public ownership of property.

Variegated scouring-rush is a wetland species that occupies recently disturbed areas of appropriately high pH. The located sites are or have been altered by mowing, grading, or excavation, and these activities have removed woody competitors. Of concern to this species would be drastic alterations to the site, such as topsoil removal, grading, paving, or ditching to lower the local water table. Such changes may eliminate the extant favorable micro-habitat and potentially preclude future opportunities for growth of variegated scouring-rush at the sites.

Eastern Black Currant

Eastern black currant is a small, somewhat colonial shrub of northeastern and north-central United States and adjacent Canada (Figure 1-12). It grows in the understory and in openings of wet-mesic to hydric forests. This species can be somewhat inconspicuous, but it is easily identified once located due to an odd coating of tiny, yellow resin dots on the leaves, flowers, and fruits. Eastern black currant is known from all New England states. No other state reports this plant as a species of conservation concern. In Massachusetts, this species is reported to be locally common along the Housatonic River (Sorrie 1987).

Figure 1-12 Flowers of eastern black currant.

This shrub was found in riparian forests nearly throughout the PSA (Map 1-2). Detailed occurrence data were collected for seven populations along the Housatonic River. Eastern black currant was found in both marginally hydric sites (i.e., high-terrace floodplain forests) and frequently inundated areas (i.e., black ash–red maple–tamarack calcareous seepage swamps). It did not appear to show preference for micro-sites, such as mounds or depressions. Populations were comprised of as few as one individual to as many as 40, although most sites had fewer than 10 individuals. Associated vascular plants varied widely due to major community differences at each site. Box-elder, red maple, silver maple, ostrich fern, drooping woodreed, and bur oak were plants that were found at two or more of the American black currant locations. All observed stations were provided an EO rank of C.

Eastern black currant was often found in and adjacent to small openings within wetland forests along the Housatonic River. The openings were caused by microsite conditions (i.e., a pool of water in which trees could not grow) and anthropogenic disturbance (i.e., forest clearing activity). This suggests that eastern black currant can tolerate, and in some cases benefit from, light canopy disturbance. However, intensive forest clearing that alters multiple community strata would likely extirpate this species. Eastern black currant is a wetland species and alterations to site hydrology would likely impact extant populations.

Bur Oak

Bur oak is a wetland tree well known for its large and conspicuously fringed fruits (Figure 1-13). It is found over much of eastern and central United States and adjacent Canada. It is known to be one of the most cold tolerant oaks and is primarily found in limestone or calcareous clay regions (Nixon 1997). The species is capable of growing to heights of 30 m.

Figure 1-13 Leaf of bur oak.

This tree was found in many locations in the PSA south of New Lenox Road (Map 1-2). In all cases, it occurred in forested swamps. In most areas, it was an infrequent member of the community. In the wetter black ash–red maple–tamarack calcareous seepage swamps, for example, where surface water was often visible in depressions between the mounds, bur oaks were generally scattered subcanopy trees with narrow stems (diameter

at breast height [dbh] less than 25 cm) growing on the mounds. Associated trees in these areas were red maple and black ash. In one area, upstream of Woods Pond in the broad floodplain west of the Housatonic River, this oak was sometimes codominant, with large canopies and thick stems (many stems exceeding 40 cm dbh). Some of the trees in this area exceeded 100 years of age. In this area the ground was relatively level and micro-site differences were not great (i.e., the ground surface lacked pronounced pit and mound topography). Associated tree species at these sites included red maple and American hornbeam. Additionally, bur oak was found as a single stem or a few trees in several areas where the floodplain forest had not been cleared for agricultural purposes. This species was previously reported to occur in the PSA, but several new locations were discovered. The observations of bur oak south of New Lenox Road are considered to have belonged to a single macrosite. The occurrence was provided an EO rank of A. Though forest clearing and non-native species have reduced community condition in this area, the population was large, occurred on publicly owned land, consisted of large and reproductive individuals, and was not likely to be extirpated by extrinsic human factors.

Threats to bur oak include canopy removal and changes in site hydrology. Clearing of floodplain forest along the Housatonic River for any purpose could extirpate bur oak plants. This species can be found in wet-mesic to hydric soils in the PSA. It would be affected by changes in the water table as it was not found in well-drained soils or soils that are inundated for prolonged periods during the growing season. Therefore, preservation of bur oak in the PSA requires both local and watershed level protection of hydrological resources.

Crooked-Stem Aster

Crooked-stem aster is an upright herb of rich, moist, sometimes temporarily flooded soils of eastern United States (Figure 1-14). It is a colonial species that forms loose colonies from its underground, horizontal stem called a rhizome. Like other species of composites, it has small flowers aggregated into larger, false flowers referred to as capitula. This species is found only in Connecticut and Massachusetts in New England and is listed as a species of conservation concern in both states.

Figure 1-14 Crooked-stemmed aster.

This species was discovered growing along the edge of a narrow, single-lane road through a young red maple swamp south of New Lenox Road (Map 1-2). This forested area had been cleared for agriculture in the recent past, as evidenced by the young-aged trees and bordering open fields. Approximately 60 stems of crooked-stemmed aster were observed in 1998. Associated understory species included heart-leaved aster, sensitive fern, lady fern, and choke cherry. Crooked-stem aster was not previously documented to occur in the PSA. The occurrence was provided an EO rank of C based on factors such as moderate population size, community condition, and existence of current threats to the population.

This species is currently threatened by road maintenance. The single lane road that passes by the crooked-stem aster plants is an infrequently used right-of-way to access two fields south of New Lenox Road. In 1998, this population was decimated by vegetation clearing to keep the road open. About 25 percent of the population remained. The colony persisted but did not substantially recover in 1999 or 2000. Other activities that disturb vegetation or site hydrology are also threats to this species.

Foxtail Sedge

Foxtail sedge is a tufted, grass-like herb of wet or temporarily flooded meadows, shores, and open areas. This species produces tiny, wind-pollinated flowers borne in a spike at the summit of a slender, triangular stem (Figure 1-15). It occurs over much of the north-central and northeastern United States and adjacent Canada. Foxtail sedge is reported from all six New England states. In addition to Massachusetts, it is also listed as a species of state conservation concern in Maine, Connecticut, and Vermont.

Figure 1-15 Inflorescence of foxtail sedge.

This species was observed growing in an open power line right-of-way adjacent to the Housatonic River north of New Lenox Road (Map 1-2). The site was located within the annual flood zone of the river channel and, due to vegetation management within the right-of-way, occurred as an ostrich fern meadow. The sedge occurs on level ground in deep fluvial silt deposits. The surrounding, intact community is a transitional floodplain forest. Only two individuals, both with mature fruit, were seen during the field survey. This occurrence was provided an EO rank of C. Though the population was small and within a disturbed right-of-way, it is located in the Housatonic River Valley State Wildlife Management Area where abundant suitable habitat exists. The site was last documented in 1993 by the MNHESP.

Gray's Sedge

Gray's sedge is a grass-like herb of mesic to hydric forests (Figure 1-16). In the northeast, it is frequently found growing in forests that occur on rich floodplains of medium to large rivers. The range of Gray's sedge includes north-central and northeastern United States and adjacent Canada. In New England, this species occurs in Massachusetts, Vermont, and Connecticut and is listed as a species of conservation concern in Massachusetts and Vermont. Though described as occurring "not infrequently in wet woods" by Hoffman (1904), Gray's sedge is rare and possesses a global rank of G4. The cause for concern is that much of its former habitat has been converted to agricultural land.

Figure 1-16 Inflorescence of Gray's sedge.

Approximately 25 fruiting plants of this species were seen over approximately 0.5 ha in a black ash–red maple–tamarack calcareous seepage swamp during 1998 surveys (Map 1-2). The site was west of the Housatonic River channel near the large backwater areas upstream of Woods Pond. Most of the canopies of the forested swamps in this area were dominated by red maple and black ash. However, where Gray's sedge was observed, large bur oak trees were locally common. Other herbs common in the area were brome-like sedge, sensitive fern, and calico aster. The population was provided an EO rank of B based on factors such as moderate population size, public ownership of property, and occurrence with other species of state conservation concern. Site visits in 2000 showed a reduced population due to flooding of the community. The high water levels were the result of a heavy rain year and perhaps also beaver activity, which had increased in area.

Gray's sedge was historically known from the PSA just downstream of the confluence with Yokum Brook. It was last seen in that area in 1920, but field surveys in 1998 and 2000 did not reveal any plants. Assuming the occurrence was accurately mapped, it is not known why plants no longer occur there given that an intact natural community does exist.

Gray's sedge is threatened by activities that change or degrade the quality of local plant community. These activities include forest clearing and changes in site hydrology (e.g., impoundments, ditching). The site containing Gray's sedge was inundated for most of the 2000 growing season. Gray's sedge is a wetland plant, but it does not normally grow in standing water and will likely be affected by prolonged inundation. Though the weather cannot be controlled, beaver dams that may be contributing to the observed increase in water level can be removed.

Hemlock-Parsley

Hemlock-parsley is a temperate and boreal herb of open and forested wetlands (Figure 1-17). In the northeast, it is frequently found in wetlands and stream shores that contain some conifer species in the canopy. This plant has dissected leaves and small, white flowers borne in umbels like many other members of its family (the carrot family). Hemlock-parsely is found in all New England states except Rhode Island, although only Massachusetts lists this plant as a species of state conservation concern. Sorrie (1987) reports that hemlock-parsely is common is some areas of Berkshire County but rare elsewhere in the state.

Figure 1-17 Leaf of hemlock-parsley.

Hemlock-parsley was located in a black ash–red maple–tamarack calcareous seepage swamp adjacent to the west edge of a large power line clearing north of Willow Creek (Map 1-2). This community is considered rare in Massachusetts (S2) and is enriched by calcareous groundwater as evidenced by the occurrence of brome-like sedge and rough-leaved goldenrod. Seven plants of hemlock-parsely were observed, two of which possessed flowers and fruits. In the vicinity of the plants, two conifer species, eastern hemlock and eastern white pine, were locally abundant. Associated herbs included cinnamon fern, purple-stemmed aster, and marsh fern. This species has not previously been documented in the PSA. The site is provided an EO rank of C due to factors such as small population size and good community condition.

Threats to hemlock-parsley include forest clearing and alteration to site hydrology. The seepage swamp it occurs in has been impacted to the east by a wide power line clearing. As well, the swamp is currently being cut on its west edge. If cutting activity continues further into the swamp, it may impinge on the hemlock-parsley population. As this species is a wetland plant, events that alter site hydrology can effect populations. Protecting the site from large-scale disturbances will benefit this EO.

Fringed Gentian

Fringed gentian is an annual, upright herb with showy, blue flowers (Figure 1-18) that are pollinated, in part, by bees (Order Hymenoptera). Like many other members of its family in the northeast, these species flower late in the growing season (as late as October). It

occurs in the northeastern and north-central United States and adjacent Canada. In New England, it is found in all states and is listed as a species of state conservation concern in three (Vermont, New Hampshire, Rhode Island). Additionally, it was listed as rare in Maine in the previous decade. Fringed gentian possesses a global rank of G4. It grows in open and often moist areas, such as meadows, streamsides, and occasionally ditches.

Figure 1-18 Fringed gentian.

Fringed gentian was first identified from the Threemile Pond SWMA reference area on 20 April 2000 (Map 1-3). At this time, the plants were dormant with no living material above ground. However, approximately 15 withered, persistent stems from the previous season were observed. At that time, it was growing in an open field that was adjacent to a wet, circumneutral meadow. Several high-pH indicator plants were known to grow in the vicinity, including shrubby cinquefoil, grass-of-Parnassus, and autumn willow. Other plants growing in the immediate vicinity included tall flat-topped white aster, marsh fern, red clover, male-berry, and palmate hop-clover. The site was again visited on 7 September 2000 to observe the plants in flower and collect population information. The population had moved 50 m from the location observed in the spring, and was occurring in and along an infrequently used single-lane road. Five plants were observed along less than 10 m of road. This appeared to represent a reduction in population size; however, the entire area was not systematically searched for more individuals. Fluctuation in population size and shifting location is not uncommon with annual plants. This site was provided an EO rank of D due to small population size and occurrence in a modified habitat.

As with all plants that possess large, colorful flowers, over collection by wildflower gatherers will be a continuing threat to populations. Drastic changes in site hydrology (draining or inundation) also would threaten fringed gentian. Landscape alterations that change the water level are not uncommon in agricultural areas. Therefore, protecting the site from hydrological alterations would also help preserve fringed gentian at this locality.

Hoary Willow

Hoary willow is a short, dioecious, colonial shrub of high-pH wetlands (Figure 1-19). It typically grows in open or sparsely wooded fens and marshes. Like other willows, it produces tiny unisexual flowers aggregated into an ament (or catkin). Each flower is subtended by one or more glands that function as a nectary to attract potential pollinators. This species' name is derived from the dull white hairs that cover the new stems and leaves, providing a gray cast to the plant. It is found throughout a large part of glaciated Canada and United States. Hoary willow is known from all New England states except Rhode Island. In addition to Massachusetts, Maine and Vermont also list hoary willow as rare.

Figure 1-19 Upper branch of hoary willow.

Hoary willow was seen in the Hinsdale Flats SWMA on 8 September 2000 (Map 1-5). It was growing in a calcareous seepage marsh with high organic soil content at the

northwest end of Muddy Pond. The soil was saturated to the surface or, in areas, had standing water about 1 cm deep. Approximately 110 upright stems were counted in an area less then 10 m^2. Associated plants included oblong bulrush, wire sedge, sweet gale, beaked sedge, marsh cinquefoil, pussy willow, beaked willow, and shrubby cinquefoil, the former two being dominant. Lepidopteran larvae (i.e., caterpillars) were observed on some leaves, but they did not appear to be defoliating the shrubs. This occurrence was provided an EO rank of C based on anthropogenic disturbance near the margin of the community, small population size, and publicly owned property.

Because hoary willow is a wetland shrub, activities that alter the site hydrology could threaten the plants. A large railroad line passes within 10 m of the occurrence, bisecting the wetland that the willow grows in. Crushed stone has been used to create an elevated berm for the tracks, which potentially acts as a hydrologic barrier. Continued expansion or maintenance of the railroad could further impact the wetlands around Muddy Pond. This EO should be brought to the attention of both the rail line company and land managers of the state wildlife management area for discussion of conservation issues.

Hard-Stem Bulrush

Hard-stem bulrush is a robust, grass-like herb of open wetlands (Figure 1-20). Its leaves are extremely reduced and do not perform the majority of the individual's photosynthesis as with most other plants. Instead, hard-stem bulrush photosynthesizes by its green stem. Its flowers are reduced, wind-pollinated, and aggregated together in an inflorescence near the apex of the stem. Hard-stem bulrush is found throughout most of temperate North America and occurs in all New England states except Rhode Island. In addition to Massachusetts, hard-stem bulrush is also listed as rare in Connecticut.

Figure 1-20 Upper stem and inflorescence of hard-stem bulrush.

Hard-stem bulrush was observed on the east shore of Muddy Pond on 28 September 2000 (Map 1-5). The primary occurrence was a large, rhizomatous colony consisting of over 10,000 aerial stems (i.e., above-ground). The plants grew in 30–100 cm of water. Associated plants included yellow water-lily, sweet gale, water-willow, floating pondweed, water shield, and white water-lily. Three other smaller colonies were observed at the southeast end of Muddy Pond in the vicinity of the outlet to the East Branch Housatonic River. This occurrence was provided an EO rank of B based on factors such as large population size, intact natural community, and public ownership of property.

Also located on the shores of Muddy Pond were four colonies of the hybrid between hard-stem and soft-stem bulrush (Map 1-5). This hybrid, referred to as oblong bulrush, is relatively similar to hard-stem bulrush, but it varies subtly in several morphological characters when closely inspected (Figure 1-21). Three of the colonies occurred at the southeast end of the pond and one colony (the larger) occurred at the northwest end of the pond. Those found at the southeast end occurred in relatively similar habitat to the hard-stem bulrush (i.e., shallow water associated with aquatic plants). The colony located at the northwest end, however, grew in soils with high organic matter content and very shallow water (i.e., less than 10 cm deep). Associated plants there included broad-leaved cattail, wire sedge, beaked sedge, hoary willow, shrubby cinquefoil, and marsh cinquefoil. This station of oblong bulrush was provided an EO rank of B due to factors

such as moderate population size, presence of other state-listed species, and public ownership of property.

Figure 1-21 Upper stem and inflorescence of oblong bulrush.

Oblong bulrush is the hybrid of hard-stem bulrush and soft-stem bulrush.

Oblong bulrush was also found along the southeast shore of Silver Lake. It grew in a deep emergent marsh community that has been reduced in size by road construction and several concrete shoreline structures. The population was large, occurring over 90 meters of shoreline and comprised of at least 4,000 aerial stems. Associated species included broad-leaved cattail, red-osier dogwood, northern three-lobed bedstraw, pussy willow, and American willow-herb. Non-native species such as narrow-leaved cattail, purple loosestrife, and yellow iris were also prevalent. Hybrid plants such as oblong bulrush tend to be more prevalent in somewhat disturbed habitats (Smith 1969). Therefore it is not surprising these plants were located where they were. Despite its moderately large population size, this EO was provided a C rank due to the poor community condition (e.g., anthropogenic impacts and non-native species).

Both hard-stem and oblong bulrush normally occur as large, rhizomatous colonies in open habitats and are not often collected by people. Therefore, threats to these plants are similar to those that threaten the community they occur in. Wetland impacts such as filling and ditching are prime examples of activities that can harm populations of these sedges. Protecting the surrounding natural community will serve to protect these two plants.

Downy Wild-Rye

Downy wild-rye is a slender, tufted perennial grass of forests, woodlands, rocky slopes, and riverbanks. It often occurs in mesic soils in limestone bedrock regions but is also found on drier substrates in the western and northern plains (Barkworth and Campbell, in ed.). The tiny flowers of this species are borne in arching to drooping spikes and are concealed by subtending scales that terminate in long bristles (Figure 1-22). Downy wild-rye is found in all New England states except Maine and New Hampshire. It is listed as a species of state conservation concern in Massachusetts, Rhode Island, and Vermont.

Figure 1-22 Inflorescence of downy wild-rye.

Downy wild-rye was discovered in the PSA in a rich, floodplain terrace of the Housatonic River upstream of the Pittsfield WWTF outfall. The high-terrace floodplain forest had been reduced in size due to clearing for agricultural land. Furthermore, the forest community was occupied by many non-native species (e.g., Morrow's honeysuckle, Japanese barberry, common buckthorn, wood bluegrass). The site, nonetheless, possesses qualities that make it a valued occurrence, which included harboring additional state-listed species and being one of few remaining examples of its community type in the Pittsfield area. Downy wild-rye grew under a canopy of basswood, white ash, and black cherry. Fifty-five aerial stems were observed along a 115-m stretch of floodplain. Additional associated species included early blue cohosh, white snakeroot, wild leek, long-beaked sedge, stream bank wild-rye, bottlebrush grass, and American hornbeam. Though the population was of moderate size and occurred on

public property, the community was inhabited by many non-native species and has been greatly diminished in size. Therefore, this population was provided an EO rank of C.

Threats to downy wild-rye include forest clearing and invasive species. The community that currently harbors downy wild-rye has been drastically reduced in size to make space for agricultural purposes (currently for corn). Further clearing would threaten this rare grass. Several non-native shrubs were prevalent at the site and are capable of reducing vigor of, or eliminating, downy wild-rye through competition for space and light. These non-native plants may need to be controlled if preservation of downy wild-rye is considered an important conservation objective.

Early Blue Cohosh

Early blue cohosh is an upright, deciduous, perennial herb of northeastern United States and adjacent southern Quebec. It grows in rich, mesic, hardwood forests and is most common, at least in New England, in limestone bedrock regions. This species possesses somewhat precocious flowers. This means that the flowers mature prior to the expansion and development of mature leaves (Figure 1-23). Early blue cohosh has unusual seeds. As the ovules develop, they soon rupture the ovary wall and mature as naked, bright blue seeds. This species is found in New England only in New Hampshire, Vermont, and Massachusetts.

Figure 1-23 Flowering stem of early blue cohosh.

Early blue cohosh was discovered in three locations: two in the PSA and one in the October Mountain State Forest reference area (Maps 1-2 and 1-4). One site adjacent to the Housatonic River was located in Pittsfield upstream of the WWTF. The physical and

biological details of this site are discussed under downy wild-rye. Associated spring-emerging species included trout lily, wild leek, and Dutchman's breeches. The early blue cohosh population was comprised of 55 aerial stems in a 50 m × 30 m area. This site was provided an EO rank of C based on moderate population size and marginal community condition (i.e., prevalence of invasive species).

The second site adjacent to the Housatonic River was in Lenox along the Woodland Road. The plants were located near the upland edge of the river floodplain in a rich mesic forest. The canopy was dominated by white ash and black cherry. Choke cherry, hazelnut, and Morrow's honeysuckle were common shrubs. Associated herbs included Virginia waterleaf, trout lily, Christmas fern, purple trillium, wild ginger, bellwort, false Solomon's seal, and long-stalked sedge. The population of early blue cohosh was moderately large, comprised of over 800 stems. This EO is provided a rank of B due to population size, good community condition, and publicly owned property.

The third site for early blue cohosh was in the October Mountain State Forest. It was located in a mesic, hardwood forest southeast of Washington Mountain Lake. The young canopy was dominated by sugar maple, white ash, and paper birch. Common shrubs were sugar maple and balsam fir seedlings. Dominant herbs included trout lily, Christmas fern, marginal wood fern, wild leek, and white wood aster. The population was comprised of over 150 aerial stems. This population is provided an EO rank of C based on moderate population size and young age of canopy trees.

The prime threat to early blue cohosh populations is forest clearing. Extensive canopy removal for any purpose will modify the understory habitat and be detrimental to this species. Policies that protect forest stands will serve to also protect early blue cohosh.

Cluster Sanicle

Cluster sanicle is a perennial herb of the carrot family with palmately divided leaves (Figure 1-24). It possesses unisexual flowers borne in separate portions of the inflorescence on the same plant. Its carpellate (i.e., ovule-bearing) flowers appear as burs due to the abundant prickles borne on the ovary. This species occurs in the eastern United States and adjacent southern Canada. Cluster sanicle is found in every New

England state except Rhode Island. It is listed as a species of state conservation concern in Massachusetts, Maine, and New Hampshire.

Figure 1-24 Upper stem and fruits of cluster sanicle.

Cluster sanicle was observed growing along a historic railroad line north of Willow Creek (Map 1-2). The site is located in a mixed hardwood-conifer forest adjacent to a large, red maple swamp complex. Eastern hemlock was observed as a locally dominant canopy tree in the area. Other species of herbs that favor rich mesic sites were present, such as lopseed. This colony of cluster sanicle was provided an EO rank of C based on factors such as moderate population size and occurrence in a disturbed community.

Threats to cluster sanicle include forestry activity and recreational traffic. Though it may utilize small openings and edges, cluster sanicle is a species of forests and would likely be extirpated from areas of widespread canopy clearing. The railroad bed this plant occurs along was infrequently used by motor vehicles and was being used as a horse-riding trail. Trampling of stems or road maintenance may have an adverse affect on the plants. Locating the occurrence and diverting activity away from the plants could be achieved through landowner contact.

4.0 Developed Communities

Developed communities are those areas that have recent and on-going human modification. These communities, such as residential and business lots, roadways, and intensely managed fields, are substantially different from regionally pristine sites.

Absence of forest canopy, large areas of impervious surface, and prevalence of non-native, colonizing plants serve to identify developed communities in the absence of obvious indicators such as buildings, paved roads, and recreational fields.

4.1 Agricultural Lands

Significant portions of the Housatonic River floodplain in Pittsfield and Lenox have been used for food and hay production. Those areas that are still in use, such as upstream of the Pittsfield WWTF outfall, are considered here. Areas no longer managed for food or hay production, although sometimes mowed on an annual basis, are described as wet meadow or cultural grassland, depending on site hydrology. Corn is a major crop plant in the Housatonic River valley, along with pumpkin and squash. This community generally resembles a monoculture of the planted food species, with non-native species occupying the edge of the tilled ground. Horse-nettle, oak-leaved goosefoot, pigweed, and alfalfa are common species seen near agricultural fields and rarely elsewhere in the PSA. Use of agricultural fields has affected the condition of remaining natural communities. Non-native species that become established in agricultural fields are able to colonize disturbed areas in natural communities. Pumpkins, for example, can be observed growing on riverine point bars and beaches upstream of New Lenox Road. Animals can be directed away from natural communities during certain seasons based on the availability of refuse crops. American crows, gray squirrels, and Canada geese, in particular, utilize agricultural fields during fall and winter rather than exclusively using natural communities.

4.2 Residential, Commercial, and Public Development

Urban Pittsfield represents the largest tract of public development in and adjacent to the PSA. This community is characterized by homes, lawns, buildings, and paved lots. Its influences on the natural communities of the Housatonic River are apparent. Much of the public development is relatively impervious to precipitation. This causes storm water to rapidly enter the East Branch Housatonic River and quickly alter the water level. Many species of ornamental shrubs have escaped and now occur as a non-native presence in the riparian forests. These plants include European spindle-tree, Chinese spindle-tree,

Morrow's honeysuckle, goutweed, and common privet. Clearing of floodplain forests, channelization of the river, and filling former oxbow ponds are additional impacts of public development on local natural communities. Accumulation of trash and discarded debris are apparent in some areas of the PSA.

4.3 Transportation

Transportation-related development in the PSA largely consists of roads (both paved and gravel) and rail lines. Both of these features form bisecting paths through riparian and upland communities in the study area. Maintenance of these passages disturbs soil and provides a colonization site for non-native species. Morrow's honeysuckle, for example, is most common, and sometimes dominant, in October Mountain State Forest within 100 m of the main gravel roads. Beyond this distance, the species becomes scarce or absent. The rail line system has a characteristic flora that grows on the xeric, crushed stone substrate. Spotted knapweed, thyme, purple lovegrass, common mullein, and tower-mustard are commonly observed along railroad systems but not in undisturbed communities in the PSA.

4.4 Recreational Facilities

Several types of outdoor enthusiasts utilize the Housatonic River and the associated riparian communities. Paddlers are frequent on the downstream sections of the river and the Joe Decker Canoe Launch (off New Lenox Road) was constructed, in part, for this purpose. Hunters and anglers also use this boat launch, as well as an informal landing at Woods Pond, to access waterfowl and fish resources. Several trails, including those off the Brunswick Road near the confluence, the Woodland Road, and the Springfield Terminal rail line are used by people for walking and birding. The Woodland Road (October Mountain State Forest) also experiences extensive use by runners and mountain bikers.

5.0 Literature Cited

Barkworth, M.E., and J.J.N. Campbell. In ed. Elymus in Flora of North America Editorial Committee. Flora of North America. Oxford University Press, NY, USA.

Color Communications Inc. 1997. Earth Colors Soil Color Book. NY, USA.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Fernald, M.L. 1950. Gray's Manual of Botany. Eighth ed. Van Nostrand Company, New York, NY, USA.

Flora of North America Editorial Committee. 1993. Flora of North America. Vol. 2. Oxford University Press, NY, USA.

_____ 1997. Flora of North America. Vol. 3. Oxford University Press, NY, USA.

_____ 2000. Flora of North America. Vol. 22. Oxford University Press, NY, USA.

Gawler, S. 2000. Natural Communities of Maine: Keys and Descriptions, field draft review. Maine Natural Areas Program, Augusta, ME, USA.

Gleason, H.A., and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. Second ed. The New York Botanical Garden, NY, USA.

Haines, A., and T.F. Vining. 1998. Flora of Maine. V.F. Thomas Company, Bar Harbor, ME, USA.

Hoffman, R. 1904. Notes on the flora of Berkshire County, Massachusetts. Rhodora 6:202-206.

Lortie, J.P., S.C. Rooney, and J. McMahon. 1992. Landscape Analysis and Inventory of the Nahmakanta Management Unit. Report to the Bureau of Public Lands, Augusta, ME, USA.

Magee, D.W., and H.E. Ahles. 1999. The Flora of the Northeast. University of Massachusetts Press, MA, USA.

MNHESP (Massachusetts Natural Heritage and Endangered Species Program). 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

The Natural Heritage Network. 2000. U.S. Natural Heritage Programs. URL http://www.heritage.tnc.org/nhp/us/usmap.html.

Nixon, K.C. 1997. Quercus in Flora of North American Editorial Commitee. Flora of North America, Vol. 3. Oxford University Press, New York, NY, USA.

Seymour, F.C. 1982. The Flora of New England. Phytologia Memoirs V.

Smith, S.G. 1969. Natural hybridization in the Scirpus lacustris complex in north central United States. p. 175-199. In J.E. Gunckel (ed.) Current Topics in Plant Science. Academic Press Inc., NY, USA.

Sorrie, B.A. 1987. Notes on the rare flora of Massachusetts. Rhodora 89:113-196.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

TechLaw, Inc. 1998. Preliminary Report: Wetland Characterization and Function-Value Assessment, Housatonic River from Newell Street to Woods Pond. TechLaw, Inc., Boston, MA, USA.

_____ 1999. Preliminary Report, Housatonic River Ecological Characterization. Massachusetts.

Weatherbee, P.B. 1996. Flora of Berkshire County Massachusetts. The Berkshire Museum, Pittsfield, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

Chapter 2 Macroinvertebrates

1.0 Introduction

Components of the invertebrate community in the PSA were studied over a three-year period, from 1998 to 2000. The goal of the invertebrate investigations was to gather qualitative information on invertebrates in the PSA. This was not a complete, comprehensive survey of all taxa because of the immense diversity that naturally occurs in a local or regional invertebrate community. Instead, several species groups were selected that were relatively easy to sample with specific methods, targeted for tissue analysis as part of ongoing ecological and human health risk investigations, or easy to sample in conjunction with the other targeted invertebrate and vertebrate studies. The invertebrate groups selected included freshwater mussels, dragonflies, vernal pool invertebrates, earthworms, and terrestrial litter invertebrates.

2.0 Methods

2.1 Incidental Observations

The presence of certain invertebrate taxa within the PSA was documented during year-round field investigations in 1998, 1999, and 2000. Many of those field investigations were detailed studies in support of ecological risk assessment surveys, and consisted of specific methods targeted at collecting animals from a variety of taxonomic groups to sample their tissues. Those investigations also provided an opportunity to confirm the presence of some invertebrate populations within the PSA and reference areas through incidental observations of any species. During the course of the field investigations, observations and opportunitic captures of certain invertebrates (i.e., freshwater mussels and dragonflies) within the PSA and reference areas were recorded, along with the habitat that they occurred in. When appropriate, other notes were recorded, including activity, interactions with other species, and general health.

2.2 Mussel Survey

Freshwater mussel surveys were undertaken in 1998 to: 1) determine the historic distribution of mussels in the Housatonic River drainage; 2) determine the historic and current distribution of mussels within the PSA, as well as upstream and downstream; 3) identify the host fish, if known,

for the mussels that occurred or still exist within the PSA; and 4) identify the wildlife species that are known or expected to prey upon the mussel species found in the PSA.

To accomplish the survey objectives, a literature study and a field study were conducted. Dr. Doug Smith of the University of Massachusetts at Amherst was retained to determine the historic distribution of mussels in the Housatonic River drainage system. This was accomplished by summarizing scientific and technical literature on historic and recent freshwater mussel surveys in the region, and by reviewing collections at regional museums including the Museum of Zoology at the University of Massachusetts, Amherst, MA, the American Museum of Natural History in New York, the Museum of Comparative Zoology at Harvard University in Cambridge, MA, and the National Museum of Natural History in Washington, D.C. In addition, regional guides on the distribution and ecology of freshwater mussels (Clarke 1981, Fichtel and Smith 1995, Smith 1995, Strayer and Jirka 1997, Nedeau *et al.* 2000) and various scientific journals were reviewed to identify the ecology, habitat requirements, and natural history of mussel species occurring in Massachusetts, particularly any found within the PSA.

Field surveys incorporating largely qualitative search methods commonly used for freshwater mussel surveys were conducted within the PSA, as well as at upstream and downstream sites. Surveys were conducted in areas that were shallow enough to observe the river bottom through viewing scopes or glass-bottomed viewing buckets. This was generally limited to water that was less than 1 m (3 ft.) deep, depending on clarity, and included a nearly continuous search from the upstream end of the PSA to just upstream of the Pittsfield WWTF. In downstream portions of the PSA, deeper water and soft sediments restricted the work to shorelines and shallow areas that were surveyed with viewing buckets from a canoe.

Similar surveys were conducted in representative habitats upstream and downstream of the PSA. In general, representative habitats for freshwater mussels include stable substrates of coarse sand or sand-gravel mixtures, although some species (particularly the genus *Pyganodon*) use soft, silty sediments (Pennak 1978, McMahon 1991). Upstream surveys extended up the East Branch Housatonic River to Hinsdale and included five sites, while downstream surveys were conducted at six sites that extended down the main stem of the Housatonic River to Great Barrington (Map 2-1). In addition, mussel observations were also recorded from the reference areas used for other

ecological surveys in 1999 and 2000 (Muddy Pond, Ashley Lake, Washington Mountain Lake, and Threemile Pond).

At all sites where mussels were found, the total number of each species (both live and relic shells) was recorded. Any observations on the condition of the mussels such as gravid females or gross shell deformities were also recorded. Finally, habitat characteristics such as substrate, water depth, and water velocity were recorded on data sheets at all survey sites, regardless of the presence or absence of mussels. Mussel locations within the study area were also located by GPS survey.

2.3 Dragonfly Surveys

2.3.1 Exuvia Collection

When larval dragonflies (also called nymphs) leave the water to transform into their adult form, they shed their exoskeletons and transform into their first flight-capable stage, called the teneral stage. Tenerals then mature to become adult dragonflies. These shed exoskeletons that are left behind are called exuvia. Dragonfly surveys in the PSA consisted of exuvia collection along the riverbanks and the opportunistic aerial netting of teneral and adult dragonflies. Exuvia surveys were conducted along nine 200-m transects (Maps 2-2, 2-3, and 2-4), which are characterized in Table 2-1. Transect locations were based on the diversity of communities to ensure the maximum number of habitat types were represented from the confluence of the East and West Branch Housatonic River downstream to the inlet of Woods Pond. Each transect was surveyed five times between May and September 1999. Two observers slowly walked or canoed each transect and collected exuvia from vegetation, rocks, logs, and exposed substrates. Because larvae rarely travel more than 2 m from the water when they shed their exuviae, surveys were conducted by foot in the shallow upstream portions of the PSA and by canoe in the deeper downstream areas along the immediate shoreline of the river. Exuviae were placed in round paperboard containers, cataloged, and sent to a contracted lab for identification.

Table 2-1 Exuviae transect habitat descriptions.

Transect Number	Bank Morphology	Adjacent Communities	Channel Width (m)	Flow Characteristics	Substrate	Water Depth (m)
1	Vertically cut bank with exposed roots; accretion bar at abrupt turn.	Transitional floodplain forest.	16	Quick-flowing water; pool, riffle, and run habitats.	Sand and cobble.	0.6–2.5
2	Vertically cut bank with exposed roots; accretion bar at abrupt turn.	Transitional floodplain forest.	16–25	Quick-flowing water; pool, riffle, and run habitats.	Sand, cobble, and soft muck.	1.3
3	Vertically cut bank with exposed roots; accretion bar at abrupt turn.	Transitional floodplain forest.	20–25	Slow-flowing water; run habitats.	Sand, cobble, and soft muck.	1.3
4	Vertically cut bank with exposed roots; accretion bar at abrupt turn.	High-terrace floodplain forest.	25–33	Slow-flowing water; pool and run habitats.	Sand, cobble, and soft muck.	1.3–2.0
5	Sloping bank; accretion bar at abrupt turn.	High-terrace floodplain forest.	25–33	Slow-flowing water; pool and run habitats.	Sand, cobble, and soft muck.	1.3–2.0
6	Vertically cut bank with overhanging vegetation.	Shrub swamp, wet meadow, and transitional floodplain forest.	23–26	Slow-flowing water; run habitat.	Soft muck.	>2.0
7	Vertical bank with emergent herbaceous and woody vegetation.	Shrub swamp, wet meadow, and transitional floodplain forest.	25–30	Slow-flowing water; run habitat.	Soft muck.	>2.0
8	Sloping bank consisting of shrub vegetation; narrow peninsula dominated by reed canarygrass.	Shrub swamp, shallow emergent marsh, and transitional floodplain forest.	25–33	Slow-flowing water; run habitat.	Soft muck.	>2.0
9	Sloping bank with emergent herbaceous and woody vegetation.	Shrub swamp, deep emergent marsh, and transitional floodplain forest.	25–150	Still and slow-flowing water.	Soft muck.	>2.0

Figure 2-1 Dragonfly exuvia on reed canarygrass.

Abandoned exoskeletons of the larvae are known as exuviae and are as useful in identification to species as are the larvae themselves (Brunelle 1999).

Exuviae were also collected opportunistically, when observed, from throughout the PSA and reference areas. Reference areas included Muddy Pond in Hinsdale Flats SWMA, Washington Mountain Lake in October Mountain State Forest, and Threemile Pond SWMA (Maps II-1, II-2, and II-4).

2.3.2 Adult Collection

Opportunistic aerial netting for dragonflies and damselflies was also conducted during the course of exuviae collections and other field surveys. The opportunistic collection period was between early June and late September, coinciding with the exuviae surveys. Teneral and mature adult dragonflies and damselflies were netted, given a preliminary identification, euthanized in a killing jar if needed, cataloged as reference specimens, and sent to a contracted lab for verification. Since this method was more destructive to the individual dragonflies, it was limited to a maximum of two specimens for each common species and one specimen for rare species. Dragonflies and damselflies were also collected from reference areas including Threemile Pond SWMA, Washington Mountain Lake in October Mountain State Forest, and Muddy Pond is the Hinsdale Flats State Wildlife Management Area. Field identification was aided by the use of Walker (1953, 1958), Needham and Westfall (1954), Walker and Corbet (1975), Holder (1996), and Legler *et al*. (1998).

2.4 Vernal Pool Invertebrate Survey

Seventeen vernal pools in the PSA were surveyed for aquatic macroinvertebrates during 1998 (Map 2-5). Each pool was surveyed twice, once in May and once in June. Ten aquatic funnel traps were randomly placed in each of the 17 pools selected for sampling by establishing a transect line along the long axis of the pool, selecting random distances along the transect, and then selecting random distances laterally from the transect, into the pool. Traps were placed in the pools either in the evening, and collected the following morning, or in the early morning, and collected several hours later. The time and date when traps were placed in the pool were recorded on data sheets. Water quality data, such as water temperature, pH, conductivity, and dissolved oxygen, were also recorded. When traps were collected, all aquatic invertebrates in the aquatic funnel traps were collected and preserved in 90 percent ethyl alcohol and submitted to an identification laboratory (Lotic, Inc. of Unity, ME). In addition, all 68 vernal pools identified within the PSA in 1998 were visited and presence of common invertebrates (e.g., fairy shrimp, water beetles, mayflies) was noted.

2.5 Earthworm Sampling

Earthworms were collected from three sites in the PSA for toxicological analysis. These collection sites were co-located with small mammal collection sites (Sites 13, 14, and 15) (Map 6-7). Two sites occurred in transitional floodplain forest communities and one in a black ash–red maple–tamarack calcareous seepage swamp community. Earthworms were collected from the soil surface to 15 cm below the surface. Reference earthworms were collected from each site and shipped to an earthworm taxonomist at Ohio State University for identification, which followed Dindal (1990).

2.6 Terrestrial Litter Invertebrate Survey

Terrestrial litter invertebrates were collected in conjunction with the earthworm collection. Invertebrates were collected by hand from the leaf litter and beneath decaying woody debris. Invertebrates were identified to order, and percentages of total mass per order were estimated.

3.0 Macroinvertebrate Community Descriptions

3.1 Aquatic Macroinvertebrates

3.1.1 Mussels

Twelve species of freshwater mussels are known to occur in Massachusetts, and all of these are historically or presently known to occur somewhere in the Housatonic River drainage (Table 2-2). However, five species have not been seen in the drainage since the mid-1800s or early 1900s (Smith 1999). Of the remaining seven species, only five are known from the portion of the Housatonic River drainage that is in Massachusetts and none are known from within the PSA.

Field surveys within the PSA resulted in the location of three freshwater mussel species, including eastern elliptio, eastern floater, and triangle floater. Of these, the eastern floater was the most abundant and occurred in the lower portion of the PSA, from the mouth of Yokum Brook to the north end of Woods Pond in Lenox and Lee (Map 2-6). Eighteen live individuals and fourteen relic shells were found on shallow flats less than 0.6 m deep or near the surface on steep riverbanks. Three of the live individuals were gravid females ranging from 98 – 122 mm long. Several of the relic shells found had indications of predation such as cracked or chewed shells.

Eastern floater sites were mostly soft silt and muck substrates near Woods Pond and firmer silt loam banks with occasional rocks and gravel deposits at upstream sites. Host fish for eastern floater include common carp, white sucker, threespine stickleback, bluegill sunfish, and pumpkinseed sunfish (Clarke 1981, Martin 1997, Nedeau *et al.* 2000). All but the stickleback are known to occur within the PSA.

Table 2-2 Freshwater mussels of the Housatonic River drainage.

Scientific Name	Common Name	State/Fed Status*	Observed at 1998 Survey Sites?	Notes**
Alasmidonta heterodon	Dwarf wedgemussel	E/E	No	Known only from 1840s records from CT.
Alasmidonta undulata	Triangle floater	SC/NL	Yes	Extant population in PSA. Shells found at Reference Site 11.
Alasmidonta varicosa	Brook floater	E/NL	No	Known only from 1920s records from CT.
Anodonta implicata	Alewife floater	NL	No	Known only from 1840s records from CT.
Elliptio complanata	Eastern elliptio	NL	Yes	Relic shell found in PSA. Population found at Reference Site 9 and shells found at Reference Site 11. Also found at Muddy Pond, in the Hinsdale Flats reference area.
Lampsilis cariosa	Yellow lampmussel	E/NL	No	Known only from 1840s records from CT.
Lampsilis radiata	Eastern lampmussel	NL	No	Extant populations in drainage in CT and NY.
Leptodea ochracea	Tidewater mucket	SC/NL	No	Known only from 1840s records from CT.
Ligumia nasuta	Eastern pondmussel	SC/NL	No	Extant populations in the drainage in NY.
Margaritifera margaritifera	Eastern pearlshell	NL	No	A population at Reference Site 9 was reported in 1998 but was not verified during field investigations.
Pyganodon cataracta	Eastern floater	NL	Yes	Extant population in PSA. Also found at Muddy Pond, in the Hinsdale Flats reference area.
Strophitus undulatus	Creeper	SC/NL	Yes	Shells found at Reference Site 11.

Sources: Strayer and Jirka 1997, Smith 1995

* E = Endangered, SC = Special Concern, NL = Not Listed

** See Map 2-1 for Reference Site Locations.

The triangle floater (also known as the heavy-toothed wedgemussel) was the next most abundant mussel found in the PSA during field surveys. It is listed as a Special Concern species (MNHESP 2000). A small population of eight live mussels was found just downstream of the Holmes Road bridge in Pittsfield (Map 2-6). These mussels ranged from 25 – 54 mm long and one was a gravid female 45 mm long. Substrates at the site consisted of soft, fine, shifting sands in the western half of the river channel and packed, algae covered gravel in the eastern half of the channel. Individual mussels, however, were found only in the packed gravel substrate. Water depths in the area ranged from 7.6 – 50.8 cm deep. Known host fish for this species include the common shiner, longnose and blacknose dace, white sucker, pumpkinseed sunfish, fallfish, largemouth bass, and slimy sculpin (Martin 1997, Strayer and Jirka 1997, Nedeau *et al.* 2000). All except the slimy sculpin are known to occur in the PSA.

One relic shell of an eastern elliptio was found in the PSA. This specimen was found just downstream of a gravel riffle, between Dawes and Pomeroy Avenues (Map 2-6). Known host fish for the eastern elliptio include yellow perch, largemouth bass, and banded killifish, which have been historically documented in the Housatonic River, and several species of sunfish (Clarke 1981, Martin 1997, Strayer and Jirka 1997).

Table 2-3 lists the results of mussel surveys conducted at the upstream and downstream reference sites. In general, four species were found. These included the three species found in the PSA in addition to the creeper. Mussels were only found at two sites, both of which occurred in the Stockbridge-Great Barrington area, well downstream of the PSA.

Reference sites upstream of the PSA were largely dominated by cobble habitats while downstream sites generally had packed gravel and sand habitat with occasional gravel and cobble riffles. Site 11 had the greatest species richness, with shells of four species being found. Of the four species found, triangle floater shells were the most abundant (15 shells), followed by the creeper (8), eastern floater (2), and eastern elliptio (1).

Table 2-3 1998 freshwater mussel survey results at reference sites.

Site Number*	Town	Species	Notes
Upstream Sites			
1	Hinsdale	None	Cobble/gravel.
2	Dalton	None	Cobble/boulder.
3	Dalton	None	Packed gravel.
4	Dalton	None	Cobble/boulder.
5	Pittsfield	None	Packed gravel.
Downstream Sites			
6	Lee	None	Cobble.
7	Lee	None	Gravel and cobble/gravel.
8	Lee	None	Packed gravel and sand.
9 (Konkapot Brook)	Stockbridge	Eastern elliptio	Packed gravel and sand. >50 live elliptios found.
10	Great Barrington	None	Cobble and cobble/gravel.
11	Great Barrington	Eastern elliptio Eastern floater Creeper Triangle floater	Packed gravel and sand. Only relic shells were found.
*See Map 2-1 for site location map.			

The creeper is another species of Special Concern in Massachusetts. Its known host fish include the creek chub, largemouth bass, yellow perch, fallfish, spotfin shiner, golden shiner, common shiner, plains killifish, fathead minnow, longnose dace, bluegill, green sunfish, walleye, slimy sculpin, and the black and yellow bullhead (Clarke 1981, Strayer and Jirka 1997, Nedeau *et al.* 2000). However, it is believed that the creeper is one of the few species of freshwater mussel that has a free-living larval stage that is not dependent on a host fish (Strayer and Jirka 1997).

Site 9, Konkapot Brook (Map 2-1), was the only other downstream reference site where mussels were found. Konkapot Brook is a small tributary to the Housatonic River in Stockbridge that averages 1 - 1.5 m wide and 15 – 40 cm deep. A group of over 50 live elliptio was found approximately 450 m from the confluence of the river and Konkapot Brook, and relic shells were found in the brook within 45 m of the confluence. A population of eastern pearlshells was reported at this site in 1998, the first confirmed record of this species within the Housatonic River drainage in Massachusetts (D. Smith, University of Massachusetts, Amherst, pers. comm.). However, this species was not found during these field investigations.

Of the reference areas used during other 1999 and 2000 field investigations, only Muddy Pond in Hinsdale Flats SWMA was found to contain freshwater mussels. Large populations of eastern elliptio and eastern floaters were found in the soft substrate of the pond. No estimate of population size was made, although well over 100 live individuals of each species was observed.

Historical records indicate that the Housatonic River drainage once had a relatively diverse assemblage of 12 freshwater mussel species (Table 2-2). However, seven of these species were only known from the lower part of the drainage in Connecticut and New York. Furthermore, five of those species—the dwarf wedgemussel, brook floater, yellow lampmussel, tidewater mucket, and alewife floater—have not been found since their original documented reports by Linsley and Jacot in the mid-1800s and early 1900s (Smith 1999). More recent surveys have documented only five species within the

Massachusetts portion of the drainage (Smith 1982), and no information is available on historical mussel surveys in PSA.

Because of a lack of historical (i.e., pre-1900s) mussel information from within the PSA itself, it is difficult to speculate if current low mussel richness and abundance has always occurred or is due to natural factors or human-induced impacts. Suitable mussel habitats do occur in the PSA, particularly the upper half, which was dominated by fast water over packed gravel and sand substrates with riffles of cobble/gravel substrates. These habitats are suitable for adults of most species and for the establishment of juvenile mussels (Neves and Widlak 1987). Despite this, only one relic elliptio shell and one small, localized triangle floater population were found. The eastern floaters that were found in the lower portions of the PSA were in softer sediments, which is typical habitat for that species (Clarke 1981).

Many natural factors can limit the occurrence and distribution of freshwater mussels. Rivers of the North Atlantic Slope (i.e., Housatonic River to Atlantic Canada) have low mussel diversity compared to those of southern Atlantic and interior (Mississippian) watersheds, due to limited refugia during the last glaciation (Smith 1982, Strayer 1990, Strayer and Jirka 1997). The Taconic Mountains and the southern Green Mountains form the divide between the species-depauperate northeastern watersheds and the species-rich Mississippian watersheds (Smith 1982).

Mussel diversity also tends to decrease in low order (i.e., upstream) portions of a watershed (Strayer 1983, Mackie and Topping 1988), and rivers that are hydrologically unstable (i.e., prone to frequent flooding) typically have fewer species than river systems that are more stable (Strayer 1993, Di Maio and Corkum 1995). This helps explain some of the present distribution of mussels in the Housatonic River drainage. For example, the PSA is located far upstream in the drainage (Map 2-1), and rich species assemblages in the drainage were historically known only from high order (downstream) portions of the watershed (Smith 1999). In addition, the PSA is prone to periodic flooding in spring, and during summer and fall storm events.

A number of natural predators of are known to feed on freshwater mussels including muskrats, raccoons, river otters, and birds (Strayer and Jirka 1997). Among these, muskrat predation can have the greatest effect on local mussel populations (Neves and Odom 1989). Muskrats were the most commonly observed mussel predator in the PSA, and some shells had indications of predation such as shell fractures at the abductor muscle locations. However, large shell middens often made by muskrats were not observed, indicating that muskrats are not preying on large numbers of mussels in the study area, middens have been periodically washed downstream during high flows, or that large populations of mussels are simply not available for muskrats.

While any of these natural factors could have affected the freshwater mussel community in the area, human-induced impacts have also occurred. River channelization and realignment is common in urban areas and has the potential to destroy individual mussels and create unsuitable habitats such as well-armored banks of boulders, rubble, and other hard materials. Floodplain clearing and conversion to agricultural lands can increase erosion and sedimentation into a river because of less stable banks, and the decrease in bank shading tends to increase water temperature (Strayer and Jirka 1997). In addition, construction of dams can flood riffle habitats, accumulate soft sediments, impede the movement of suitable host fish, and scour suitable habitats below the dam (Strayer 1993, Martin 1997). All of these types of disturbances can be detrimental to mussel populations and have occurred in the PSA.

Also associated with past land uses and urban development is decreased water quality from biological and chemical pollutants. Freshwater mussels are filter feeders and have the ability to filter large amounts of water. Strayer *et al.* (1994) found that some freshwater mussel beds can filter anywhere from 0.1 - 2.0 m^3 of water per m^2 of substrate per day. Uptake of biological or chemical pollutants in the water, such as agricultural herbicides and pesticides, sewage and wastewater treatment effluent, and industrial pollution, can occur during the course of normal feeding and can significantly affect mussel populations (Metcalfe and Charlton 1990, Goodreau *et al.* 1993).

It is likely that many of these environmental and anthropogenic factors identified above have helped shape the freshwater mussel community within the PSA and the Housatonic

River watershed as a whole. The results of the 1998 surveys indicate that some mussels, including gravid females, exist within the PSA and may represent populations that have been maintaining themselves. Conversely, they could also represent populations that are beginning to reestablish in the area. However, there are large areas of suitable habitat in the PSA that are uninhabited by mussels. Definitive reasons for the lack of mussels in these areas are unknown.

3.1.2 Dragonflies

There are currently 164 Odonate species recorded in Massachusetts, with 97 species documented for Berkshire County. The 164 Odonates in Massachusetts include 115 species of dragonflies and 49 species of damselflies. In Berkshire County, the 97 species of Odonates include 70 species of dragonflies and 27 species of damselflies (Leahy *et al*. 2000). A total of 40 species were identified during the 1999 dragonfly surveys. This included 38 species from the PSA and two species found only in the reference areas (Table 2-4).

A total of 628 dragonfly exuviae, representing 21 species, were collected from within the PSA. The results of the exuviae collection surveys are summarized in Table 2-5. Three State-listed species were collected: arrow clubtail, zebra clubtail, and riffle snaketail. The zebra clubtail has a state status of endangered, while the arrow clubtail and riffle snaketail both have a state status of threatened (MNHESP 1999). Zebra clubtail exuviae were collected from eight transect locations, while arrow clubtail and riffle snaketail exuviae were collected from six and two transect locations, respectively (Table 2-5). The lance-tipped darner was the only species identified during opportunistic exuviae collections that was not observed during transect collection, bringing the total number of dragonfly species for which exuviae were collected in the PSA to 22.

Opportunistic aerial netting of adult and teneral dragonflies collected 44 specimens from the PSA and reference areas, representing 24 confirmed species. Two arrow clubtails were collected, one along an exuviae survey transect, and the other at the Threemile Pond SWMA reference area. Opportunistic aerial netting of adult and teneral damselflies collected 19 specimens from the PSA, representing six confirmed species (Table 2-6).

Opportunistic collection of exuviae and adult dragonflies from the reference areas resulted in 12 confirmed species from Threemile Pond, five species from Washington Mountain Lake, and six species from Hinsdale Flats (Table 2-4). The delta-spotted spiketail and Williamson's emerald were the only two species observed in the reference areas that were not observed in the PSA. Due to taxonomic uncertainty within the scientific community concerning the status of the meadowhawks, specimens collected during this study were grouped at the genus level. This grouping represents a potential of three separate meadowhawk species. Similar difficulty occurred in trying to separate the spine-crowned clubtail from the mustached clubtail (Jeremiah Trimble pers. com.), so these specimens were also grouped at the genus level. Six damselfly species were identified during opportunistic adult and teneral collections within the PSA, while four additional species were collected at two reference areas (Threemile Pond and Hinsdale Flats SWMAs). Some exuviae and adult dragonfly specimens were damaged by floodwater flows and other natural conditions. While these specimens were identified to the genus level when possible, some could not be identified.

Table 2-4 1999 dragonfly survey results.

Common Name	Scientific Name	Housatonic River (PSA)	Threemile Pond SWMA	Muddy Pond in Hinsdale Flats SWMA	Washington Mountain Lake in October Mountain State Forest
Canada darner	*Aeshna canadensis*	X			X
lance-tipped darner	*Aeshna constricta*	X			
variable darner	*Aeshna interrupta*	X			X
shadow darner	*Aeshna umbrosa*	X			
common green darner	*Anax junius*	X	X		X
lilypad clubtail	*Arigomphus furcifer*	X			
unicorn clubtail	*Arigomphus villosipes*	X			
fawn darner	*Boyeria vinosa*	X			
calico pennant	*Celithemis elisa*	X			X
halloween pennant	*Celithemis eponina*	X	X		
delta-spotted spiketail	*Cordulegaster diastatops*		X		
racket-tailed emerald	*Dorocordulia libera*	X	X	X	
black-shouldered spinyleg	*Dromogomphus spinosus*	X			
beaverpond baskettail	*Epitheca canis*	X			
common baskettail	*Epitheca cynosura*	X			
prince baskettail	*Epitheca princeps*	X		X	
eastern pondhawk	*Erythemis simplicicollis*	X			
spine-crowned clubtail[1] or mustached clubtail	*Gomphus abbreviatus* *Gomphus adelphus*	X			
lancet clubtail	*Gomphus exilis*	X			
ashy clubtail	*Gomphus lividus*	X			
dusky clubtail	*Gomphus spicatus*	X			
dragonhunter	*Hagenius brevistylus*	X			
crimson-ringed whiteface	*Leucorrhinia glacialis*	X		X	
dot-tailed whiteface	*Leucorrhinia intacta*	X			
slaty skimmer	*Libellula incesta*	X		X	

Common Name	Scientific Name	Housatonic River (PSA)	Threemile Pond SWMA	Muddy Pond in Hinsdale Flats SWMA	Washington Mountain Lake in October Mountain State Forest
chalk-fronted skimmer	*Libellula julia*	X	X	X	
widow skimmer	*Libellula luctuosa*	X	X		
common whitetail	*Libellula lydia*	X	X		
twelve-spotted skimmer	*Libellula pulchella*	X	X		
riffle snaketail[2]	*Ophiogomphus carolus*	X			
rusty snaketail	*Ophiogomphus rupinsulensis*	X			
blue dasher	*Pachydiplax longipennis*	X			
eastern amberwing	*Perithemis tenera*	X	X		
forcipate emerald	*Somatochlora forcipata*	X		X	
Williamson's emerald	*Somatochlora williamsoni*		X		
zebra clubtail[3]	*Stylurus scudderi*	X			
arrow clubtail[2]	*Stylurus spiniceps*	X	X		
saffron-winged meadowhawk	*Sympetrum costiferum*	X			X
cherry-faced meadowhawk[1] ruby meadowhawk Jane's meadowhawk	*Sympetrum internum* *Sympetrum rubincundulum* *Sympetrum janae*	X	X		
yellow-legged meadowhawk	*Sympetrum vicinum*	X	X		
	Species Richness =	38	13	6	5

[1] Questionable taxonomy of this group precluded accurate determination (Leahy *et al.* 2000).

[2] State threatened

[3] State endangered

Table 2-5 1999 dragonfly exuviae collection results.

Common Name	Scientific Name	Transect								
		1	2	3	4	5	6	7	8	9
shadow darner	*Aeshna umbrosa*									2
darner spp.[1]	*Aeshna* spp.									1
common green darner	*Anax junius*						1			3
lilypad clubtail	*Arigomphus furcifer*									1
fawn darner	*Boyeria vinosa*	6	14	58	35	13	12	6		
racket-tailed emerald	*Dorocordulia libera*								1	
black-shouldered spinyleg	*Dromogomphus spinosus*						1		1	
beaverpond baskettail	*Epitheca canis*								4	
common baskettail	*Epitheca cynosura*			1					1	12
prince baskettail	*Epitheca princeps*									1
eastern pondhawk	*Erythemis simplicicollis*								1	7
spine-crowned clubtail[2] or mustached clubtail	*Gomphus abbreviatus* *Gomphus adelphus*							1		
lancet clubtail	*Gomphus exilis*			1				7		
ashy clubtail	*Gomphus lividus*			1	3	1		1		
dusky clubtail	*Gomphus spicatus*							3		
dragonhunter	*Hagenius brevistylus*					1				
dot-tailed whiteface	*Leucorrhinia intacta*								3	
common whitetail	*Libellula lydia*								4	

Common Name	Scientific Name	Transect								
		1	2	3	4	5	6	7	8	9
skimmer spp.[1]	*Libellula* spp.									1
riffle snaketail[3]	*Ophiogomphus carolus*	1	1							
rusty snaketail	*Ophiogomphus rupinsulensis*	1			1					
snaketail spp.[1]	*Ophiogomphus* spp.			1						
blue dasher	*Pachydiplax longipennis*									1
zebra clubtail[4]	*Stylurus scudderi*	3	4	85	57	4	13	23	1	
arrow clubtail[3]	*Stylurus spiniceps*			12	35	6	88	69	5	
cherry-faced meadowhawk[1] ruby meadowhawk Jane's meadowhawk	*Sympetrum internum* *Sympetrum rubincundulum* *Sympetrum janae*								1	7
	Total Number of Exuvia =	11	19	159	131	25	115	110	22	36

[1] Identification limited to genus level because of partial specimen.

[2] Questionable taxonomy of this group precluded accurate determination (Leahy *et al.* 2000).[3] State threatened

[4] State endangered

Table 2-6 1999 damselfly survey results.

Common Name	Scientific Name	Housatonic River	Threemile Pond	Muddy Pond
variable dancer	*Argia fumipennis*	X		
river jewelwing	*Calopteryx aequabilis*	X		
ebony jewelwing	*Calopteryx maculata*	X		
familiar bluet	*Enallagma civile*		X	
skimming bluet	*Enallagma geminatum*	X	X	
orange bluet	*Enallagma signatum*	X		
fragile forktail	*Ischnura posita*			X
eastern forktail	*Ischnura verticalis*	X	X	X
elegant spreadwing	*Lestes inaequalis*			X
slender spreadwing	*Lestes rectangularis*		X	
	Species Richness =	6	4	3

3.1.3 Vernal Pool Invertebrates

A variety of aquatic invertebrates were collected in the aquatic funnel traps at the 17 surveyed vernal pools. Major groups collected were crustaceans, arthropods, mollusks, annelids, roundworms, and flatworms. The common orders collected included water fleas (Cladocera), scuds (Amphipoda), mayflies (Ephemeroptera), beetles (Coleoptera), flies and midges (Diptera), and bivalves (Bivalvia). Table 2-7 lists invertebrates that were collected in the 17 intensively surveyed vernal pools in 1998. Unless otherwise noted, the data presented in the text refers to the intensive funnel-trap sampling of the 17 pools in 1998. Other data were also collected in 1998, 1999, and 2000 on an incidental basis in the entire set of 68 pools located in the PSA. These data, some of which are also presented in the text, refer to overall…

Table 2-7 1998 aquatic funnel trap results from 17 vernal pools.

GROUP	FAMILY	GENUS	COMMON NAME	VERNAL POOL IDs																
				5-VP-2	5-VP-3	8-VP-1	8-VP-4	18-VP1	18-VP-2	23A-VP-1	23B-VP-1	23B-VP-2	40-VP-3	42-VP-1	46-VP-1	46-VP-2	46-VP-5	61A-VP-1	61A-VP-2	66A-VP-1
COELENTERATA	Hydridae		Hydras											X				X		
TURBELLARIA			Flatworm								X									
TRICLADIDA	Planariidae		Flatworm	X				X	X	X		X	X	X	X		X			X
NEMATODA			Roundworm							X				X		X				
GASTROPODA			Snails								X				X					
GASTROPODA	Hydrobiidae		Little pond snail																X	
GASTROPODA	Hydrobiidae	*Amnicola*	Little pond snail															X	X	
GASTROPODA	Lymnaeidae		Pond snail						X	X										
GASTROPODA	Lymnaeidae	*Fossaria*	Pond snail			X	X	X			X			X					X	
GASTROPODA	Lymnaeidae	*Stagnicola*	Pond snail					X	X	X	X	X	X	X						X
GASTROPODA	Physidae		Pouch snail						X	X			X	X						
GASTROPODA	Physidae	*Aplexa*	Pouch snail			X	X	X	X	X			X							
GASTROPODA	Physidae	*Physa*	Pouch snail						X	X			X	X						
GASTROPODA	Physidae	*Physella*	Pouch snail	X	X	X		X					X	X			X	X	X	X
GASTROPODA	Planorbidae		Orb snail	X	X				X	X			X	X					X	
GASTROPODA	Planorbidae	*Gyraulus*	Orb snail								X	X					X			
GASTROPODA	Planorbidae	*Planorbella*	Orb snail										X							
GASTROPODA	Planorbidae	*Promenetus*	Orb snail					X	X	X	X		X							
GASTROPODA	Valvatidae	*Valvata*	Pond snail																X	
BIVALVIA	Sphaeriidae		Clams		X			X	X	X	X		X	X		X		X	X	X
BIVALVIA	Sphaeriidae	*Musculium*	Clams	X	X						X	X	X	X		X	X	X	X	
BIVALVIA	Sphaeriidae	*Pisidium*	Pill clams								X									
BIVALVIA	Sphaeriidae	*Sphaerium*	Sphere clams				X												X	
OLIGOCHAETA	Lumbriculidae		Aquatic earthworm												X					
OLIGOCHAETA	Lumbriculidae	*Lumbriculus*	Aquatic earthworm	X		X					X								X	

GROUP	FAMILY	GENUS	COMMON NAME	VERNAL POOL IDs																
				5-VP-2	5-VP-3	8-VP-1	8-VP-4	18-VP1	18-VP-2	23A-VP-1	23B-VP-1	23B-VP-2	40-VP-3	42-VP-1	46-VP-1	46-VP-2	46-VP-5	61A-VP-1	61A-VP-2	66A-VP-1
OLIGOCHAETA	Naididae		Aquatic earthworm																X	
OLIGOCHAETA	Naididae	*Pristina*	Aquatic earthworm	X										X					X	
OLIGOCHAETA	Tubificidae		Sludge worm	X							X			X					X	
OLIGOCHAETA	Tubificidae	*Limnodrilus*	Sludge worm											X						
GNATHOBDELLIDA	Hirudinidae	*Haemopis*	Leech								X		X							X
PHARYNGOBDELLIDA	Erpobdellidae	*Erpobdella*	Leech				X	X	X	X			X	X						
RHYNCHOBDELLA	Glossiphoniidae		Leech					X	X				X					X		
RHYNCHOBDELLA	Glossiphoniidae	*Alboglossiphonia*	Leech					X	X											
RHYNCHOBDELLA	Glossiphoniidae	*Helobdella*	Leech						X	X	X					X				
ACARIFORMES	Eremaeidae		Water mite							X										
ACARIFORMES	Hydrachnidae	*Hydrachna*	Water mite																X	
ACARIFORMES	Hydryphantidae	*Pseudohydryphantes*	Water mite								X		X							X
ACARIFORMES	Pionidae		Water mite											X						
ACARIFORMES	Pionidae	*Tiphys*	Water mite	X																
ACARIFORMES	Sperchonidae	*Sperchon*	Water mite			X														
ORIBATEI	Eremaeidae		Mite										X							
COLLEMBOLA			Springtail	X				X	X											
COLLEMBOLA	Sminthuridae	*Bourletiella*	Globular springtail	X												X				
EPHEMEROPTERA	Baetidae	*Callibaetis*	Mayfly															X		
EPHEMEROPTERA	Baetiscidae	*Baetisca*	Mayfly											X						
EPHEMEROPTERA	Caenidae	*Caenis*	Mayfly																X	
EPHEMEROPTERA	Ephemerellidae		Mayfly																X	
EPHEMEROPTERA	Ephemerellidae	*Ephemerella*	Mayfly														X			
EPHEMEROPTERA	Ephemerellidae	*Eurylophella*	Small mayfly	X	X						X	X		X						X
EPHEMEROPTERA	Leptophlebiidae	*Leptophlebia*	Small mayfly	X																
EPHEMEROPTERA	Siphlonuridae	*Siphlonurus*	Mayfly	X	X		X	X			X		X	X	X	X	X	X	X	X
ODONATA	Aeshnidae	*Aeshna*	Mosaic Darner										X	X						

GROUP	FAMILY	GENUS	COMMON NAME	VERNAL POOL IDs																
				5-VP-2	5-VP-3	8-VP-1	8-VP-4	18-VP1	18-VP-2	23A-VP-1	23B-VP-1	23B-VP-2	40-VP-3	42-VP-1	46-VP-1	46-VP-2	46-VP-5	61A-VP-1	61A-VP-2	66A-VP-1
ODONATA	Corduliidae	*Epitheca*	Baskettail																X	
ODONATA	Gomphidae	*Stylurus*	Hanging clubtail		X															
ODONATA	Libellulidae	*Libellula*	King Skimmer																	
ODONATA	Libellulidae	*Sympetrum*	Meadowhawk								X	X			X					
ODONATA	Coenagrionidae	*Coenagrion*	Broad-winged Damselly															X		
ODONATA	Coenagrionidae	*Enallagma*	Bluet															X		
ODONATA	Lestidae	*Lestes*	Spread-winged Damselfly	X	X				X	X			X	X				X	X	
HEMIPTERA	Belostomatidae	*Lethocerus*	Giant water bug										X							
HEMIPTERA	Corixidae		Water boatman		X	X		X	X						X	X		X	X	
HEMIPTERA	Corixidae	*Callicorixa*	Water boatman	X																
HEMIPTERA	Corixidae	*Hesperocorixa*	Water boatman	X	X			X	X	X	X		X	X		X	X	X	X	
HEMIPTERA	Corixidae	*Ramphocorixa*	Water boatman											X						
HEMIPTERA	Gerridae	*Limnogonus*	Water strider		X															
HEMIPTERA	Notonectidae		Backswimmer															X	X	
HEMIPTERA	Notonectidae	*Notonecta*	Backswimmer	X	X	X			X	X			X	X						
HEMIPTERA	Pleidae	*Neoplea*	Pigmy backswimmer															X	X	
TRICHOPTERA	Limnephilidae	*Limnephilus*	Northern caddisfly	X		X	X	X	X	X		X				X	X			X
COLEOPTERA			Beetles			X										X				
COLEOPTERA	Curculionidae		Weevil										X							
COLEOPTERA	Curculionidae	*Emphyastes*	Weevil		X															
COLEOPTERA	Curculionidae	*Lixus*	Weevil										X	X		X	X			
COLEOPTERA	Dytiscidae	*Acilius*	Predaceous diving beetle	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X
COLEOPTERA	Dytiscidae	*Agabetes*	Predaceous diving beetle	X			X					X			X					X
COLEOPTERA	Dytiscidae	*Agabus*	Predaceous diving beetle	X		X	X	X	X	X	X	X		X		X	X		X	X
COLEOPTERA	Dytiscidae	*Celina*	Predaceous diving beetle								X									
COLEOPTERA	Dytiscidae	*Colymbetes*	Predaceous diving beetle								X		X	X						
COLEOPTERA	Dytiscidae	*Copelatus*	Predaceous diving beetle	X																X

GROUP	FAMILY	GENUS	COMMON NAME	VERNAL POOL IDs																
				5-VP-2	5-VP-3	8-VP-1	8-VP-4	18-VP1	18-VP-2	23A-VP-1	23B-VP-1	23B-VP-2	40-VP-3	42-VP-1	46-VP-1	46-VP-2	46-VP-5	61A-VP-1	61A-VP-2	66A-VP-1
COLEOPTERA	Dytiscidae	*Copotomus*	Predaceous diving beetle					X	X				X	X						
COLEOPTERA	Dytiscidae	*Dytiscus*	Predaceous diving beetle		X	X	X	X			X		X	X		X	X	X		X
COLEOPTERA	Dytiscidae	*Hydaticus*	Predaceous diving beetle					X	X				X			X	X		X	
COLEOPTERA	Dytiscidae	*Hydroporus*	Predaceous diving beetle	X	X	X		X	X	X	X		X	X		X		X	X	
COLEOPTERA	Dytiscidae	*Hydrovatus*	Predaceous diving beetle								X		X			X			X	
COLEOPTERA	Dytiscidae	*Hygrotus*	Predaceous diving beetle		X		X	X	X	X	X		X	X		X		X	X	X
COLEOPTERA	Dytiscidae	*Ilybius*	Predaceous diving beetle	X					X	X		X	X				X			X
COLEOPTERA	Dytiscidae	*Laccophilus*	Predaceous diving beetle	X	X	X	X	X	X	X		X	X	X		X			X	X
COLEOPTERA	Dytiscidae	*Laccornis*	Predaceous diving beetle				X	X	X											
COLEOPTERA	Dytiscidae	*Lioporius*	Predaceous diving beetle				X													
COLEOPTERA	Dytiscidae	*Neoscutopterus*	Predaceous diving beetle	X				X												
COLEOPTERA	Dytiscidae	*Oreodytes*	Predaceous diving beetle				X										X			
COLEOPTERA	Gyrinidae	*Gyrinus*	Whirligig beetle												X					
COLEOPTERA	Haliplidae	*Haliplus*	Crawling water beetle		X		X	X	X		X		X	X		X		X	X	
COLEOPTERA	Haliplidae	*Peltodytes*	Crawling water beetle															X	X	
COLEOPTERA	Helophoridae	*Helophorus*	Water scavenger beetle	X		X								X						
COLEOPTERA	Hydrophilidae		Water scavenger beetle			X														
COLEOPTERA	Hydrophilidae	*Berosus*	Water scavenger beetle										X			X				
COLEOPTERA	Hydrophilidae	*Enochrus*	Water scavenger beetle							X										
COLEOPTERA	Hydrophilidae	*Helochares*	Water scavenger beetle									X								
COLEOPTERA	Hydrophilidae	*Hydrochara*	Water scavenger beetle	X		X	X	X	X	X			X	X	X	X				
COLEOPTERA	Hydrophilidae	*Tropisternus*	Water scavenger beetle				X	X			X		X	X		X			X	
COLEOPTERA	Noteridae	*Hydrocanthus*	Burrowing water beetle					X						X				X		
COLEOPTERA	Scirtidae	*Cyphon*	Marsh beetle																	X
COLEOPTERA	Scirtidae	*Scirtes*	Marsh beetle										X					X		
MEGALOPTERA	Corydalidae	*Chauliodes*	Fishfly																	X
MEGALOPTERA	Sialidae	*Sialis*	Alderfly					X	X	X										

GROUP	FAMILY	GENUS	COMMON NAME	VERNAL POOL IDs																
				5-VP-2	5-VP-3	8-VP-1	8-VP-4	18-VP1	18-VP-2	23A-VP-1	23B-VP-1	23B-VP-2	40-VP-3	42-VP-1	46-VP-1	46-VP-2	46-VP-5	61A-VP-1	61A-VP-2	66A-VP-1
DIPTERA	Chaoboridae	*Chaoborus*	Phantom midge				X								X	X			X	
DIPTERA	Chironominae	*Chironomus*	Midge		X		X	X				X	X	X			X	X	X	
DIPTERA	Chironominae	*Endochironomus*	Midge	X												X				
DIPTERA	Chironominae	*Glyptotendipes*	Midge										X							
DIPTERA	Chironominae	*Parachironomus*	Midge													X			X	
DIPTERA	Chironominae	*Paratendipes*	Midge	X																
DIPTERA	Culicidae		Mosquito						X	X										X
DIPTERA	Culicidae	*Aedes*	Mosquito	X		X					X	X		X						
DIPTERA	Dolichopodidae		Midge											X						
DIPTERA	Orthocladiinae	*Camptocladius*	Midge																	X
DIPTERA	Orthocladiinae	*Cricotopus*	Midge								X			X						
DIPTERA	Orthocladiinae	*Euryhapsis*	Midge																	X
DIPTERA	Stratiomyidae	*Hedriodiscus/ Odontomyia*	Soldier flies																X	
DIPTERA	Tanypodinae	*Natarsia*	Midge								X									
DIPTERA	Tanypodinae	*Procladius*	Midge											X						
DIPTERA	Tanypodinae	*Psectrotanypus*	Midge		X						X			X						
DIPTERA	Tanypodinae	*Tanypus*	Midge																X	
DIPTERA	Tanypodinae	*Thienemannimyia*	Midge								X									
DIPTERA	Tipulidae		Cane fly	X																
CLADOCERA			Water flea	X	X	X	X	X					X	X	X	X	X	X	X	
COPEPODA			Copepod	X		X					X		X	X	X	X	X	X	X	X
CONCHOSTRACA			Clam shrimp								X	X						X		
AMPHIPODA			Scuds		X		X						X	X		X			X	
AMPHIPODA	Crangonyctidae		Scuds													X				
AMPHIPODA	Crangonyctidae	*Crangonyx*	Scuds	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X
AMPHIPODA	Hyalellidae	*Hyalella*	Scuds													X		X	X	

GROUP	FAMILY	GENUS	COMMON NAME	VERNAL POOL IDs																
				5-VP-2	5-VP-3	8-VP-1	8-VP-4	18-VP1	18-VP-2	23A-VP-1	23B-VP-1	23B-VP-2	40-VP-3	42-VP-1	46-VP-1	46-VP-2	46-VP-5	61A-VP-1	61A-VP-2	66A-VP-1
DECOPODA	Cambaridae		Crayfish		X											X				
ISOPODA	Asellidae	*Caecidotea*	Aquatic sow bug											X		X		X	X	X
OSTRACODA			Seed shrimp	X				X	X	X	X	X	X	X		X	X	X	X	X
Total Number of Taxa per Pool:				36	25	21	23	34	34	29	37	18	45	50	13	35	20	29	45	26

Crustaceans

Crustaceans were the most abundant group of aquatic invertebrates recorded from vernal pools in the PSA. Crustacea is a subphylum of Arthropoda, which contains 80 percent of all known species in the animal kingdom (Peckarsky *et al.* 1990). Four major crustacean classes were collected from the PSA vernal pools, including Branchipoda, Malacostraca, Copepoda, and Ostracoda.

Seed shrimp (Ostracoda) were the most abundant of all the invertebrates, with over 3,000 individuals captured. They were recorded from all but 5 of the 17 pools sampled with funnel traps. Most seed shrimp species are not free-swimming and thus are less likely to be captured in aquatic funnel traps, suggesting that the true abundance of this invertebrate is likely even greater than reported here Seed shrimps have a bivalve carapace and resemble tiny clams, typically less than 1 mm long (Pennak 1978). These tiny crustaceans can be found in nearly every aquatic habitat, tolerating a wide range of temperature and water chemistry. They are commonly found among aquatic vegetation and in the decaying matter on the pool bottom where they feed on detritus, algae, bacteria, and molds. Small fish and other invertebrates such as midges, worms, and copepods prey upon seed shrimp (Thorp and Covich 1991).

Copepods were the second most abundant invertebrate; however, more than 90 percent of the individuals were collected from one pool. Copepods are microcrustaceans made up of seven orders, four of which are parasitic and three are free-living. Copepods captured during aquatic funnel trapping were made up of the free-living orders: Calanoda, Cyclopoida, and Harpacticoida. Free-living freshwater copepods range in size from 0.5 – 2.0 mm in length (Thorp and Covich 1991). They are found in a variety of habitats, with Calanoda being associated primarily with plankton and Cyclopoida and Harpacticoida being primarily littoral and benthic. Copepods are extremely abundant, often making up the major portion of biomass and secondary production in a wide variety of aquatic habitats (Thorp and Covich 1991). Copepods play an important role in the food chain as intermediates between microscopic plankton and larger carnivores, such as

fish. Within vernal pools, copepods are likely preyed upon by other aquatic invertebrates and larval amphibians.

Branchiopods included water fleas (Cladocera), clam shrimp (Conchostraca), and fairy shrimp (Anostraca). Water fleas were collected from 70 percent of the sampled pools, while clam shrimp were found in only three pools; however, they were very abundant in those three pools. Like copepods, these microcrustaceans play an important role in food chains as intermediates between microscopic plankton and larger carnivores (Thorp and Covich 1991). Fairy shrimp are common microcrustacean in vernal pools and were observed in approximately one-third of the 68 pools within the PSA; however, none were caught in aquatic funnel traps during 1998. Fairy shrimp are obligate vernal pool species and were documented in 5 of the 17 pools sampled with aquatic funnel traps and 20 of the 68 pools surveyed overall in 1998.

Taxa in the Malacostraca were dominated by three orders: scuds (Amphipoda), sow bugs (Isopoda), and crayfish (Decopoda). Scuds were one of the most universal invertebrates, being collected from all but one of the funnel-trapped vernal pools. Scuds, like the water fleas and clam shrimp, are important intermediates in aquatic food webs (Thorp and Covich 1991). Aquatic sow bugs (Isopods) were the least common crustaceans captured in aquatic funnel traps and were found in small numbers in only four pools. Isopods are scavengers and detrital feeders and are most commonly found on the pool bottoms beneath stones and woody debris (Thorp and Covich 1991), which indicates that they were probably under-represented in the aquatic funnel trap samples.

Crayfish were the only group of macrocrustaceans found in the PSA, and several small crayfish were collected in aquatic funnel traps in 1998. Crayfish were more common in the river channel, but they were occasionally seen in vernal pools. Interestingly, many adult crayfish were observed undertaking overland travel from vernal pools to the river as the pools began drying, and were captured in pit traps during 1999 and 2000 wood frog and leopard frog studies. In addition, crayfish were captured for toxicological analysis from the river channel throughout the PSA during 2000. Nearly all the crayfish collected were *Orconectes virilis*. A small number of *Cambarus robustus* were collected from rocky medium-gradient stream communities near Dalton, MA, upstream of the PSA.

Crayfish are omnivorous, feeding on vegetation (mainly detritus) and a variety of animals (mainly invertebrates). Crayfish play a role in several trophic levels; they are important decomposers of detritus as well as herbivores and carnivores. Crayfish are preyed upon by many aquatic or semi-aquatic organisms, including fish, turtles, mink, otter, and raccoons.

Arthropods

A wide variety of arthropods were commonly found during aquatic funnel trapping. The largest classes of arthropods observed, excluding crustaceans, were the insects. Insects are the most widespread class of arthropods, and include mayflies (Ephemeroptera), caddisflies (Trichoptera), fishflies and alderflies (Megaloptera), midges and mosquitoes (Diptera), dragonflies (Odonata), beetles (Coleoptera), and true bugs (Hemiptera). Mayflies, caddisflies, fishflies, alderflies, midges, mosquitoes, and dragonflies are aquatic only during their larval stages, while aquatic beetles and bugs can be found in the water during all of their life stages. Aquatic beetles and true bugs typically utilize vernal pools during the breeding season, fly to more permanent water to overwinter, and return to the pools in the spring. Spiders and mites (Arachnids) were another common class of arthropod found within vernal pools, consisting primarily of mites. Springtails were the final class of arthropods found within the vernal pools.

Mayflies were recorded from 88 percent of the 17 surveyed pools. Mayflies were the most abundant insects with 847 individuals of 8 genera captured, representing 7 mayfly families. The Siphlonuridae was the most abundant and widespread family, making up more than 80 percent of the individuals collected, and were found in 82 percent of the sampled pools. Ephemeridae was another common family, being found in approximately half of the vernal pools. Mayflies are ephemeral in that they emerge in mass, form large swarms, mate, deposit eggs, and die all within a few hours to a few days. Eggs may hatch soon after being laid or the eggs may diapause over winter, with the nymphs developing rapidly after hatching in the spring. The nymph stage may last from two weeks to two years depending upon the pecies, but most mayflies utilizing permanent habitats overwinter as nymphs, and metamorphose into adults the following spring. Most mayfly nymphs are grazers feeding on algae and detritus, and a few are predaceous,

especially *Siphlonurus.* (Merrit and Cummins 1978, Peckarsky *et al.* 1990, Thorp and Covich 1991)

Beetles were the second most abundant insects recorded from the funnel-trapped vernal pools. Two suborders of beetles were recorded, Adephaga and Polyphaga. Water beetles (Adephaga) are aquatic during all of their life stages and include the predaceous diving beetle, the most abundant beetle collected. Polyphaga includes some species with aquatic adult stages but most are terrestrial.

The predaceous diving beetle is the largest family of water beetle, with about 30 genera occurring in the northeastern United States. Eighteen of these genera were recorded during the funnel trap survey. These beetles are highly adapted to the aquatic environment. Adults range from 1 – 40 mm in length and have elongated, flattened hind legs, which serve as oars to propel them through the water (Pennak 1978). One generation is produced each year. Adults mate and lay eggs in the spring on aquatic vegetation near the surface. Larvae typically develop over a few weeks time, during which they are voracious feeders taking a variety of aquatic insects, tadpoles, and even small fish. Larvae leave the water and burrow into nearby soil to pupate, which typically lasts 5 – 14 days. Adults emerge and re-enter the aquatic habitat, taking similar prey as the larvae. Adults will fly from pool to pool and typically fly to permanent water to overwinter. Most predaceous diving beetles live for one year, dying after mating in the spring, but a few species have been known to live for two or three years (Peckarsky *et al.* 1990, Thorp and Covich 1991).

The crawling water beetle (Haliplidae) was another commonly observed water beetle. Crawling water beetles are small (2.5–5.0 mm) and despite their name are adapted to swim (Thorp and Covich 1991). These beetles are herbivorous and are commonly found on aquatic vegetation and in filamentous algae mats. The larvae are not able to swim and spend the 3 – 5 weeks of this life stage crawling on aquatic vegetation. Pupation occurs in moist soil near the larval development site, lasting 2 – 3 weeks. Adults emerge and re-enter the water. Most adults overwinter in the water, but a few species are known to overwinter in terrestrial sites adjacent to the water (Peckarsky *et al.* 1990).

Whirligig beetles and burrowing water beetles were also recorded from the funnel-trapped vernal pools but in smaller numbers than other water beetles. The life histories of these beetles are similar to predaceous diving beetles. Both are predators of small invertebrates or scavengers. Larval burrowing water beetles are somewhat omnivorous, living and pupating among the submerged roots of vegetation. Whirligigs pupate in cocoons on emergent vegetation. They fly to, and overwinter in, permanent bodies of water, returning to the pools to mate in the spring (Peckarsky *et al.* 1990, Thorp and Covich 1991).

Water scavenger beetles are the most abundant of the Polyphaga beetles in the surveyed vernal pools. The eggs of the aquatic species are deposited in cocoons attached to aquatic vegetation or, in some species, carried by the adult. Larvae are herbivorous, crawling and feeding on vegetation. A few species have terrestrial larvae. Adults of the genera mostly crawl along vegetation, but a few species have adaptations for swimming. Adults often consume decaying vegetation, giving them the name scavenger beetles, but they also consume large amounts of living plant material, mainly algae. The life cycle is similar to other beetles with the larval stage lasting a few weeks and adults overwintering in either permanent water or moist terrestrial sites (Thorp and Covich 1991, Merritt and Cummins 1978).

Weevils were not commonly collected in the aquatic funnel traps. They are likely more common on emergent vegetation than in the water. Weevils are herbivorous during all life stages and are known to commonly occur on arrowhead, pickerelweed, water lilies, bulrushes, and sedges. A few marsh beetles were collected from the vernal pools. Adult marsh beetles are terrestrial but the larval stage is aquatic. The larvae are found on vegetation in shallow ponds, marshes, and swamps. Larvae are detritivores but little else is known about their aquatic habits (Merritt and Cummins 1978).

Flies (Diptera), including mosquitoes and midges, were another abundant order of insects observed. Two suborders of Diptera were recorded during vernal pools surveys. The first is Brachycera, which includes most true flies (e.g., horseflies, deer flies, soldier flies, drone flies), and the second was Nematocera, which includes midges and mosquitoes. True flies were uncommon in vernal pools, with only two individuals being collected.

Mosquitoes and midges were both abundant in the PSA. Phantom midges and crane flies were also recorded from the vernal pools, but they were much less common than other Nematocera.

Mosquitoes (Culicidae) were the most abundant flies, making up almost half of all Diptera collected. Mosquitoes in the PSA vernal pools are from the genus Aedes. These mosquitoes lay their eggs in moist ground depressions during the late summer and the eggs remain dormant until they are flooded the following spring. Mosquito larvae are abundant in pools during the early spring and are an important food source for many aquatic organisms. The larval stage typically lasts seven to ten days during which they feed on detritus. Mosquito larvae molt four times with the final molt producing the pupa. The pupal stage last three or four days during which the pupa floats at the surface of the pool and does not feed. The adult develops within the pupa and emerges by splitting the dorsum. The adult then uses the pupal skin as a float until wings dry (Thorp and Covich 1991). Adult mosquitoes feed on plant juices to meet their energy requirements. Females require a blood meal to obtain the needed protein for egg production, making them vectors for many human and animal diseases (Merritt and Cummins 1978). Mosquitoes were not collected from a large number of pools during funnel trapping. This is likely due to the timing of the surveys; many mosquitoes may have already emerged by the time surveys were conducted. Mosquito larvae were observed in nearly all of the 68 pools during the early spring.

Midges (Chirononmidae) were also abundant in the vernal pools. Midges from three subfamilies and thirteen different genera were collected from 65 percent of the sampled vernal pools. Tanypodinae and Chironominae subfamilies were the most common, as they prefer lentic, warm-water habitats. The Orthocladiinae were less common and typically prefer cold-water habitat with rock and gravel substrate. Like other flies, midges have four life stages: egg, larvae, pupa, and adult. The eggs hatch within a few days of being laid and the larval stage lasts from several weeks to years, largely dependent upon water temperature. The pupal stage lasts only a few days after which adults emerge, swarm, mate, and die typically within a few days time. Most midges feed only during the larval stage and most are opportunistic omnivores, feeding on a variety of

algae, diatoms, detritus, and small invertebrates (Thorp and Covich 1991). The most abundant midge genera in the PSA vernal pools were the *Chironomus*. These midges burrow into the substrate or build small tubes to protect themselves and are primarily herbivorous, as are most Chironominae and Orthocladiinae. Tanypodinae, especially the common *Psectrotanypus*, are primarily predaceous. They are free swimming and actively search for prey, which is often water fleas, scuds, and other midges (Merritt and Cummins 1978, Peckarsky *et al.* 1990, Thorp and Covich 1991)

True bugs (Hemioptera) such as water boatman, backswimmers, water striders, and giant water bug were commonly collected during aquatic funnel trapping. Most are adapted to swimming by having fringes of long hair on the flattened legs. Water striders are found on the surface of water where they use the surface tension to stay above the water. Metamorphosis in true bugs is gradual, with several molts occurring and the final molt producing the adult form. Eggs are deposited in the spring and the larvae develop over several weeks, and adults emerge in the late summer and fall. These bugs are mainly predaceous, feeding on small invertebrates, with the exception of water boatman, which feed mainly on detritus, algae, and protozoans. Merritt and Cummins 1978, Thorp and Covich 1991)

Caddisflies (Tricoptera) were found in over 65 percent of the pools surveyed. Only one genus, the northern caddisfly (*Limnephilus*) was collected. Tricoptera is a large order of insects that have aquatic larvae. Many of the species that inhabit temporary pools lay gelatinous egg masses in the fall. The larvae remain within the gelatinous mass until the pools flood. After they break out of the egg masses they construct cases of sticks, leaves, and sand. Larvae consume vegetation and detritus and play an important role processing large particulate organic matter. Larvae seal off the ends of their cases and pupate within them. After 2 – 3 weeks, pupa chew out of their cases and the adults emerge (Peckarsky *et al.* 1990, Thorp and Covich 1991).

A few fishflies and alderflies (Megaloptera) were collected from vernal pools. Fishflies larvae, known as hellgrammites, commonly occur in well-oxygenated streams but are occasionally found in pools. Alderfly larvae require muddy or silty bottoms and accumulated detritus. Some species utilize temporary steams and pools by burrowing

into the substrate during dry periods. Larvae of both families are predaceous, feeding on a variety of small aquatic invertebrates.

Springtails (Collembola) were traditionally placed in the insect class, but recent taxonomy treats springtails as a separate class. Springtails were uncommon, with only three individuals being collected, each from different pools. Springtails are found on the waters surface, relying on their small body size (0.5 – 2.2 mm) and hydrophobic body surface to keep them from breaking through the surface (Peckarsky *et al.* 1990). They feed on particulate organic matter, algae, and bacteria found on the water's surface. Springtails inhabiting vernal pools are only semi-aquatic and are found in the soil and leaf litter when the pools dry. Springtails do not metamorphose, but rather undergo a series of molts that continue after the adult stage has been reached. The adult stage is reached within a few weeks of hatching and adults only live for a few weeks to a few months.

Arachnids were the final class of arthropods found in the PSA vernal pools. Mites were the only arachnids collected during aquatic funnel trapping; however, several aquatic spider species can typically be found in vernal pools. Fisher spiders (*Dolomedes* spp.) were commonly seen in many of the study area vernal pools. They are commonly found on the water surface or among emergent vegetation, but they will dive underwater for prey and can remain submerged for long periods of time. This spider feeds on a variety of aquatic insects, amphibian larvae, and small fish (Reid 2001).

Mites were commonly collected from nearly half of the vernal pools surveyed, but they were not abundant in any of the pools. The majority of water mites belong to the order Acari, commonly call acariforms. Eggs are laid in gelatinous masses attached to plants, wood, or stones. One family, Hydranchnidae, uses an elongated ovipositor to deposit eggs singularly in the stems of aquatic plants (Thorp and Covich 1991). Larvae emerge from the eggs masses one to three weeks later. Larval water mites are parasitic, with each genus preferring different hosts. Common hosts of the four genera present in the PSA are beetles, true bugs, mosquitoes, midges, dragonflies, and caddisflies. The engorged larvae usually drop off the host and metamorphose into nymphs. Some species, especially those that use long-lived hosts, undergo this metamorphosis while still attached

to the host. This allows the larvae to remain on the host for longer periods of time and to utilize temporary habitats by avoiding pools during the dry period. The nymph stage may last from several weeks to several months depending upon the species. Nymphs are predaceous often feeding on the eggs and larvae of their host species. After reaching an adult size, the nymphs become inactive and prepare to transform into adults. Many of the species utilizing temporary pools, particularly Pionidea, have a long nymph stage surviving the dry period burrowed into the pool bottom in the inactive stage. Adult males typically live for a few days to a few weeks and die soon after mating. Mating occurs in the fall, but fertilization is delayed until the following spring. Females live longer, typically overwintering and laying eggs the following spring. In contrast, species inhabiting vernal pools lay their eggs soon after mating to ensure that offspring will reach a life-history stage capable of surviving the dry period.

Mollusks

Two major classes of mollusks were collected from the PSA vernal pools. They are snails and clams. Clams collected from the vernal pools were fingernail clams, pill clams, and sphere clams, all of which are small (less than 1.2 cm in diameter) (Reid 2001). Clams made up approximately 2.5 percent of the total invertebrate population, with fingernail clams being the most abundant. Clams are filter feeders, consuming detritus, plankton, and microscopic invertebrates. All of the clam species collected during this survey are hermaphroditic and self fertilize. Young are contained within the gills until they are fully formed. An adult can contain anywhere from 1 – 60 young in various stages of development. These clams survive dry periods by burrowing into the substrate and remaining inactive until the habitat floods again.

Snails made up just over four percent of the relative abundance of aquatic invertebrates collected during this survey. Snails were observed in nearly all of the 68 vernal pools, and their abundance is likely greater than suggested by funnel trapping surveys because they are not free swimming and, thus, are less likely to be captured in funnel traps than other invertebrates. All of the snails collected had spiral shell architecture except for the orb snails. Snails within the vernal pools were found on submerged and emergent

vegetation, on woody debris, rocks, or floating on the surface. Snails feed mainly on detritus, periphyton, and algae; some will also consume carrion.

Annelids

Annelids are segmented worms including aquatic earthworms, sludge worms, tubifex, and leeches, and make up less than two percent of the total invertebrate abundance collected in the aquatic funnel traps. Leeches were the most common annelid found in the vernal pools. Leeches are considered to be aquatic, but some, such as Haemopis, commonly crawl across land, feeding on living and dead invertebrates, especially earthworms. Leeches have a wide variety of hosts including waterfowl, reptiles, amphibians, and other invertebrates. Many leeches will also consume decaying carrion.

Aquatic earthworms, sludge worms, and tubifex are similar in structure and life histories to terrestrial worms. They are commonly found burrowing in the substrate and among dense mats of filamentous algae. These species feed by ingesting the substrate and extracting the organic component, or on filamentous algae, diatoms, and detritus.

Nematodes

Nematodes, or roundworms, are abundant in aquatic systems, but they were not commonly collected during the funnal trap survey. Most nematodes are parasites, although some are free-living. Most of the free-living species feed on decaying matter and some may be herbivorous, carnivorous, or omnivorous. Parasitic species can be found in nearly all animals, with individual species having specific hosts.

Flatworms

Flatworms are mainly free-living, but some, such as tapeworms and flukes, are parasitic. Freshwater flatworms can be found in nearly every aquatic habitat, usually associated with the substrate. Planarians were the genera found during the funnel trapping surveys and were abundant in many of the vernal pools. Planarians are common laboratory specimens and are studied in many science classrooms. Planarians consume dead and decomposing animal matter and small invertebrates. Flatworms can reproduce sexually

or asexually through budding, and utilize both methods depending upon ecological conditions.

Hydra

Hydras belong to the same phylum as jellyfish and have a similar body structure. Only one hydra was collected during funnel trapping surveys. Hydras can be found clinging to the stems of submerged aquatic plants, sticks, and stones. Hydras consume a wide variety of invertebrates. They capture prey by grasping them with their tentacles, stunning them by stinging, and then engulfing them alive. The tentacles move the prey to the mouth and into the coelenteron, a sack-like internal space, where digestive juices break it down. Food particles are carried by vacuoles through the endodermal cells and into body tissues. After the digestion process, the indigestible remains are returned to the coelenteron and regurgitated. Hydra reproduce by budding and by gametes produced from the ectoderm.

3.2 Terrestrial Macroinvertebrates

3.2.1 Earthworms

Three species of earthworms were collected during earthworm sampling at three of the small mammal trap sites: *Aporrectodea longa*, *Aporrectodea trapezoids*, and *Eisenoides carolinensis*. *A. longa* and *A. trapezoids* were collected from Site 13 (see Map 6-7). *A. trapezoids* and *E. carolinensis* were collected from Sites 14 and 15. Because the earthworm survey was designed to target species that would likely be consumed by American robins, woodcocks, and other birds, collection was done only within the first 15 cm of the soil. It is also likely that some *Lumbicus* species are present; however, these species dwell deeper than 15 cm below the surface (McKeegan per. comm.).

3.2.2 Litter Invertebrates

Litter invertebrates were collected from the litter and woody debris on the forest floor during the earthworm collection work. Table 2-8 identifies the Orders collected and the percentage of total mass for each. Slugs and snails made up the greatest amount of mass.

Sow bugs were the most abundant group, but due to their smaller size, they did not make the greatest mass. A cicada from Site 15 made up the greatest amount of mass due to it large size. Beetles, spiders, harvestman spiders ("daddy long legs"), centipedes, and millipedes were all common. Earwigs and caterpillars were also collected.

Table 2-8 2000 terrestrial litter invertebrate collection results.

Common name	Class	Order	Percent of total mass		
			Site 13	Site 14	Site 15
Millipede	Diplopoda	N/D[1]	1	6	< 1
Centipede	Chilopoda	N/D	< 1	1	5
Sow bug	Crustacea	Isopoda	5	16	12
Spider (general)	Arachnida	Araneida	< 1	1	1
Harvestman spider	Arachnida	Phalangida		1	1
Earwig	Insecta	Dermaptera			5
Cicada	Insecta	Homoptera			40
Beetle	Insecta	Coleoptera	2	3	5
Caterpillar	Insecta	Lepidoptera		1	
Snail	Gastropoda	N/D	30	3	
Slug	Gastropoda	Opisthobrachia	61	68	25
Unknown Larvae		N/D	< 1		5

[1]Order not determined.

4.0 Rare, Threatened, and Endangered Macroinvertebrates

Seven species of freshwater mussels historically known from the Housatonic River drainage are currently species of conservation concern in Massachusetts (Table 2-2). Five of these species, however, were only ever known from Connecticut and four of them have not been seen since they were first documented in the mid-1800s and early 1900s. Two species of concern, the triangle floater and the creeper, were observed in the PSA or at reference sites.

A small population of triangle floater, a species of Special Concern in Massachusetts, was found in the PSA (Map 2-6), and many relic shells were found at the most downstream reference site in Great Barrington, MA (Map 2-7). The triangle floater is found in most Atlantic Coast drainages from North Carolina to Nova Scotia, west to the tributaries of the lower St. Lawrence River. It occurs in every New England state and is also listed as Special Concern in Maine (Nedeau *et al.* 2000). The triangle floater has relatively broad habitat requirements and can occur in slow to fast rivers, in lakes, and on substrates ranging from fine shifting sands to mixed aggregates of boulders, cobble, and gravel (Clarke 1981, Fichtel and Smith 1995, Strayer and Jirka 1997). In the PSA, triangle floaters were found on packed, algae-covered gravel in the eastern half of the channel, but they were not found on fine, shifting sands in the western half of the channel. Water depths in the area ranged from 8 – 50 cm. At the downstream reference site, the substrate was mostly packed gravel. Only relic shells were found in shallow water (i.e., less than 50 cm) deep. No live aniamls were observed, as most areas were too deep to survey with viewing buckets.

Eight creeper shells were found at a downstream reference site near the mouth of the Green River in Great Barrington, MA. Though listed as a species of Special Concern in Massachusetts, the creeper is the most widely distributed species in the United States, occurring throughout the Mississippi, Great Lakes, and St. Lawrence drainages and all major Atlantic Coast drainages. It occurs in every New England state and is listed as Special Concern in Maine (Nedeau *et al.* 2000). The creeper typically occurs in streams and rivers but also occasionally in lakes. It occurs in variable substrates, although it is

usually most common in aggregates of gravel and sand (Clarke 1981, Fichtel and Smith 1995, Strayer and Jirka 1997). At the reference site where it was found, the substrate was mostly packed gravel with moderate flows.

Dragonflies

Six state-listed dragonfly species were historically known from Berkshire County, including one Endangered and five Special Concern species (MNHESP 2000). The species of Special Concern are the skillet clubtail, brook snaketail, ringed emerald, slender emerald, and beaverpond clubtail. The Endangered species is the harpoon clubtail. While none of the six species were collected during the surveys, three additional state-listed species, arrow clubtail, zebra clubtail, and riffle snaketail, were found. All three species have not been recorded as occurring in Berkshire County by the MNHESP (2000). Literature searches, however, revealed that individual observers have recorded these species in the county (Leahy *et al*. 2000).

The arrow clubtail (Figure 2-2) is a moderate-sized dragonfly of eastern North America that normally measures 57–68 mm in length (Needham *et al*. 2000). It prefers high-order rivers, usually with sandy bottoms, although it is rarely found in streams or. It is found along the Atlantic Seaboard as far south as Tennessee, and occurs in the north from Quebec and New England west to the Great Lakes States (Dunkle 2000). This species has been recorded in all New England states except Maine and Rhode Island (Needham *et al*. 2000). In New England, the arrow clubtail is also a species of conservation concern in Connecticut (The Natural Heritage Network 2000).

Emergence periods for the arrow clubtail have been recorded from 23 June to 15 September in Connecticut (Wagner and Thomas 2000), and as late as 18 October in Virginia (Needham *et al*. 2000). Adults perch on grass, shrubs, and treetops while away from the water (Dunkle 2000). Males are most active from late afternoon to dark, and males can be seen patrolling low over the river late in the day during August and September (Nikula 1998, Dunkle 2000).

Figure 2-2 Adult female arrow clubtail.

Arrow clubtail exuviae were collected from Transects 3–8 along the Housatonic River (Maps 2-2, 2-3, 2-4, and 2-8). These transects contain slow-flowing water with sand or soft muck substrate. This dragonfly was also collected from the Threemile Pond SWMA reference area (Map 2-9). This species was ubiquitous during our surveys. Associated dragonfly species are presented in Table 2-4 and Table 2-5. This species has been recorded in six counties in Massachusetts (four in western Massachusetts), including Berkshire County (Leahy *et al*. 2000). In western Massachusetts, the arrow clubtail has been observed along the Connecticut River in Sunderland and Northfield (Nikula and Sones 1998).

The zebra clubtail (Figure 2-3) is a moderate-sized dragonfly that usually measures 57–58 mm in length (Needham *et al.* 2000). It prefers forest streams with slight to moderate current, intermittent rapids, a sand or muck bottom and also, occasionally, lakes (Walker 1958, Dunkle 2000). This species occurs in eastern North America from Nova Scotia to South Carolina, and in the north it occurs west to the Great Lakes States (Dunkle 2000). In the southern part of its range, it occurs inland along the Appalachian Mountains (Dunkle 2000). In Massachusetts, the zebra clubtail is apparently the most widespread of

its genus (Nikula 1998). This species has been recorded in all the states of New England (Needham *et al*. 2000).

Figure 2-3 Adult male zebra clubtail.

Emergence periods for the zebra clubtail have been recorded from late July through August in Maine (Brunelle 1999), 10 August to 11 September in Connecticut (Wagner and Thomas 2000), and as early as 11 June in New York (Needham *et al*. 2000). Unlike most dragonflies, the zebra clubtail may transform from larva to adult during daylight (Legler *et al*. 1998, Needham 1901). The zebra clubtail forages along forest edges and clearings. Males perch on sand, logs, and hanging leaves (Dunkle 2000).

Zebra clubtail were collected from Transects 1–8 along the Housatonic River (Map 2-8). These transects contain fast- and slow-flowing water with sand, cobble, or soft muck substrate. This species was ubiquitous during our surveys; associated species are presented in Table 2-4 and Table 2-5. No collections were made in the reference areas. This species has been recorded in four counties in Massachusetts (three in western Massachusetts), including Berkshire County (Leahy *et al*. 2000). In western Massachusetts, this species has also been found along Hop Brook in Tyringham, the Connecticut River in Sunderland, and the Fort River in Amherst (Nikula and Sones 1998, 1999).

The riffle snaketail (Figure 2-4) is a small-sized dragonfly that usually measures 40–45 mm in length (Needham *et al.* 2000). It inhabits shallow, stony riffles in low order woodland streams (Needham and Westfall 1954), and clear, rapid, sandy, streams and

rivers (Walker 1958, Dunkle 2000). Since the larvae burrow shallowly into the substrate in streams and rivers, they are vulnerable to flood scouring (Dunkle 2000). This species occurs in eastern North America (Dunkle 2000). It is found along the Atlantic Seaboard as far south as Virginia and in the north as far west as the Great Lakes States (Dunkle 2000, Bick and Mauffray 2001). In New England, it is known from all states except Connecticut and Rhode Island (Needham *et al*. 2000).

Emergence periods for riffle snaketails have been recorded for mid-June to mid-July in Maine and as early as 1 May in New York (Brunelle 1999, Needham *et al.* 2000). In Wisconsin, emergence of exuviae occurs on rocks from mid-May to mid-August (Legler *et al*. 1998). Nymphs burrow in silt beds and basins, and upon transformation, they leave their cast exoskeletons flat on sloping banks at the edge of the water (Needham and Westfall 1955). Males perch on exposed tops of boulders (Needham *et al.* 2000) and vegetation along the shore (Legler *et al*. 1998). Away from water, they perch on the tips of plants, broad leaves in clearings and tree crowns, or if the air is cool, on the ground (Dunkle 2000).

Figure 2-4 Adult female riffle snaketail.

Riffle snaketails were collected from Transects 1 and 2 (Map 2-8). No collections were made at any reference areas. Both transects contain riffle and run habitats with sand and cobble substrate. Associated species collected along Transect 1 include the fawn darner and zebra clubtail. Associated species collected along Transect 2 include the fawn

darner, rusty snaketail, and zebra clubtail. In Massachusetts, the riffle snaketail has been observed in three counties in the western part of the state, including Berkshire County (Leahy *et al*. 2000). This species has been found in recent years in Massachusetts on the Green, Westfield, and Farmington Rivers (Nikula 1998).

5.0 Literature Cited

Bick, G.H., and B. Mauffray. 2001. Distribution Summary of North American Anisoptera. URL http://www.afn.org/~iori/nalist.html#Gomphidae.

Brunelle, P.M. 1999. Distribution of damselflies and dragonflies (Odonata) of Maine, United States. Northeastern Naturalist 6(2):95-118. (N)

Clarke, A.H. 1981. The Freshwater Mollusks of Canada. National Museum of Natural Sciences/National Museums of Canada, Ottawa, Ontario, Canada.

Di Maio, J., and L. Corkum. 1995. Relationship between the spatial distribution of freshwater mussels (Bivalvia: Unionidae) and the hydrological variability of rivers. Canadian Journal of Zoology 73:663-671.

Dindal, D.L. 1990. Soil Biology Guide. John Wiley & Sons, Inc., New York, NY, USA.

Dunkle, S.W. 2000. Dragonflies Through Binoculars: A Field Guide to Dragonflies of North America. Oxford University Press, New York, NY, USA.

Fichtel, C., and D.G. Smith. 1995. The Freshwater Mussels of Vermont. Technical Report 8. Vermont Fish and Wildlife Department. Nongame and Natural Heritage Program.

Goodreau, S.E., R.J. Neves, and R.J. Sheehan. 1993. Effects of wastewater treatment plant effluents on freshwater mollusks in the upper Clinch River, Virginia, USA. Hydrobiologia 252:211-230.

Holder, M. 1996. The Dragonflies and Damselflies of Algonquin Provincial Park. Algonquin Park Technical Bulletin Number 11. The Friends of Algonquin Park, Whitney, Ontario, Canada.

Kenney, L.P. 1995. Wicked Big Puddles: A Guide to the Study and Certification of Vernal Pools. 2nd ed. Reading Memorial High School and the Vernal Pool Association, Reading, MA, USA.

Leahy, C., R. Forster, B. Nikula, J. Sones, and J. Trimble. 2000. Massachusetts Odonata County List. URL http://www.capecod.net/~bnikula/County1.htm.

Legler, K., D. Legler, and D. Westover. 1998. A Color Guide to Common Dragonflies of Wisconsin. Copyright K. Legler, Sauk City, WI, USA.

Mackie, G.L., and J.M. Topping. 1988. Historical changes in the unionid fauna of the Sydenham River watershed and downstream changes in shell morphometrics of three common species. Canadian Field Naturalist 102:617-626.

Martin, S.M. 1997. Freshwater mussels (Bivalvia:Unionoida) of Maine. Northeastern Naturalist 4(1):1-34.

MNHESP (Massachusetts Natural Heritage and Endangered Species Program). 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

McMahon, R.F. 1991. Mollusca: Bivalvia. p. 315-399. In J.H. Thorp and A.P. Covich (ed.) Ecology and Classification of North American Freshwater Invertebrates. Academic Press, Boston, MA, USA.

Merritt, R.W., and K.W. Cummins. 1978. An Introduction to the Aquatic Insects of North America. Kendall/Hunt Publishing Company, Dubuque, IA, USA.

Metcalfe, J.L., and M.N. Charlton. 1990. Freshwater mussels as biomonitors for organic industrial contaminants and pesticides in the St. Lawrence River. The Science of the Total Environment 97/98(1990):595-615.

The Natural Heritage Network. 2000. U.S. Natural Heritage Programs. URL http://www.heritage.tnc.org/nhp/us/usmap.html.

Nedeau, E.J., M.A. McCollough, and B.I. Swartz. 2000. The Freshwater Mussels of Maine. Maine Department of Inland Fisheries and Wildlife, Augusta, ME, USA.

Needham, J.G. 1901. Odonata. In Aquatic Insects in the Adirondacks. New York State Museum Bulletin 47:429-540.

Needham, J.G., and M.J. Westfall Jr. 1954. A Manual of the Dragonflies of North America (Anisoptera). University of California Press, Berkeley, CA, USA.

Needham, J.G., M.J. Westfall Jr., and M.L. May. 2000. Dragonflies of North America. Scientific Publishers, Inc., Gainesville, FL, USA.

Neves, R.J., and M.C. Odom. 1989. Muskrat predation on endangered freshwater mussels in Virginia. Journal of Wildlife Management 53:934-941.

Neves, R.J., and J.C. Widlak. 1987. Habitat and ecology of juvenile freshwater mussels (Bivalvia:Unionidae) in a headwater stream in Virginia. American Malacological Bulletin 5(1):1-7.

Nikula, B. 1998. In focus: The Clubtails (Family Gomphidae) - Part 2. Ode News 5(1). Harwich Port, MA, USA.

Nikula, B., and J. Sones ed. 1998. 1998 Massachusetts Highlights. Ode News 5(2). Harwich Port, MA, USA.

_____ 1999. 1999 Massachusetts Highlights. Ode News 6(2):1-5. Harwich Port, MA, USA.

Peckarsky, B.L., P.R. Fraissinet, M.A. Penton, and D.J. Conklin Jr. 1990. Freshwater Macroinvertebrates of Northeastern North America. Comstock Publishing, Cornell University Press, Ithaca, NY, USA.

Pennak, R.W. 1978. Freshwater Invertebrates of the United States. John Wilesy & Sons, New York, NY, USA.

Reid, G.K. 2001. Pond Life. St. Martin's Press, New York, NY, USA.

Smith, D.G. 1982. The zoogeography of the freshwater mussels of the Taconic and southern Green Mountain regions of northeastern North America (Mollusca: Pelecypoda: Unionacea). Canadian Journal of Zoology 60:261-267.

_____ 1995. Keys to the Freshwater Macroinvertebrates of Massachusetts. Privately published by D.G. Smith, Sunderland, MA, USA.

_____ 1999. A brief history of the freshwater mussels (Unionidae) of the Housatonic River System. Unpublished report submitted to Roy F. Weston, Inc.

Strayer, D.L. 1983. The effects of surface geology and stream size on freshwater mussel (Bivalvia, Unionidae) distribution in southeastern Michigan, USA. Freshwater Biology 13:253-264.

_____ 1990. Freshwater Mollusca. p. 335-372. In B.L. Peckarsky, P.R. Fraissinet, M.A. Penton and D.J. Conklin (ed.) Freshwater Macroinvertebrates of Northeastern North America. Cornell University Press, Ithaca, NY, USA.

_____ 1993. Macrohabitats of freshwater mussels (Bivalvia:Unionacea) in streams of the northern Atlantic Slope. Journal of the North American Benthological Society 12(3):236-246.

Strayer, D.L., and K.J. Jirka. 1997. The Pearly Mussels of New York State. New York State Museum, Albany, NY, USA.

Strayer, D.L., D.C. Hunter, L.C. Smith, and C.K. Borg. 1994. Distribution, abundance, and roles of freshwater clams (Bivalvia, Unionidae) in the freshwater tidal Hudson River. Freshwater Biology 31:239-248.

Thorp, J.H., and A.P. Covich. 1991. Ecology and Classification of North American Freshwater Invertebrates. Academic Press, San Diego, CA, USA.

Wagner, D.L., and M.C. Thomas. 2000. County and Flight Records for Odonata of Connecticut. Unpublished data. Storrs, CT, USA.

Walker, E.M. 1953. The Odonata of Canada and Alaska. Vol. 1. University of Toronto Press, Toronto, Ontario, Canada.

_____ 1958. The Odonata of Canada and Alaska. Vol. 2. University of Toronto Press, Toronto, Ontario, Canada.

Walker, E.M., and P.S. Corbet. 1975. The Odonata of Canada and Alaska. Vol. 3. University of Toronto Press, Toronto, Ontario, Canada.

Chapter 3 Fish

1.0 Introduction

Fish are found at the upper trophic levels of the aquatic food web, functioning as predators, foragers, and bottom feeders. Given this trophic status, as well as their role as prey for certain mammals and birds, fish are an important component of the modeling study of PCB contamination in the Housatonic River (Beach *et al*. 2000).

Fish populations were qualitatively and quantitatively sampled within the PSA during 1998-2000. Additional surveys (see McCabe 1943, Bergin 1971, Stewart Laboratories 1982, Blasland and Bouck Engineers, P.C. 1991, and Chadwick & Associates 1993, 1994) have also included areas within the PSA. The results of these surveys will be summarized and used to describe the composition of the fish community in the PSA.

2.0 Methods

The fish community within the PSA has been characterized using several methods, including:

- Developing a species:habitat association matrix
- Review of existing fisheries data
- Site-specific electrofishing, trot-line, and netting data from 1998-2000

The PSA has been broken down into reaches, which are described by Beach *et al*. (2000). Using the methods described below, the fish community in the PSA was characterized, with specific reference to reaches. Species-specific biomass estimates are being developed for each reach as part of ongoing investigations in the PSA (Woodlot Alternatives, Inc. *in prep*).

2.1 Species:Habitat Association

Natural communities have been identified and mapped as part of ongoing investigations of the PSA. There are three major communities, or habitat types, in the riverine portions

of the PSA: medium-gradient stream; low-gradient stream; and moderately alkaline lake/pond. Medium-gradient streams can be generally described as moderate-flowing water with sand and gravel substrate and sparse aquatic vegetation, while low-gradient streams can be generally described as slow-moving water with silt and muck substrate, often with abundant aquatic vegetation. Moderately alkaline lake/pond communities include open water, lacustrine habitat with water pH ranging from 7.0 – 9.0 occuring in calcareous bedrock regions. Submergent floating leaved vegetation may be abundant in this community (see Section III, Chapter 1, Natural Communities). Additionally, high-gradient streams, characterized by steep slopes, high water velocity, and course substrates, flow into the river and Woods Pond on the lower slopes of October Mountain in Lee. The fish species known or expected to occur within each of these communities are identified in Attachment C, a species:habitat matrix that also includes a list of special habitat requirements for each species.

2.2 Existing Fisheries Data

Hartel *et al*. (1996) have annotated a working list of the inland fishes of Massachusetts that references both historic and recent scientific investigations of the distribution of fish in the state and within the Housatonic drainage. Some studies (e.g., McCabe 1943, Bergin 1971) have included the Housatonic River. Other fisheries investigations in the PSA have been conducted for the General Electric Company (see Stewart Laboratories 1982; Blasland and Bouck Engineers, P.C. 1991; and Chadwick & Associates 1993, 1994). These existing fisheries data were reviewed as part of the effort to characterize the fish community in the PSA.

2.3 Electrofishing and Netting

Four separate fish collection events occurred within the PSA during 1998-2000. The principle method employed to collect fish was electro-shocking fish (electrofishing) from one or two boats operated by the United States Fish and Wildlife Service (USFWS). Limited use of trot-lines and gill nets also occurred in areas inaccessible to the shock boats. Sample sites for these studies are shown on Maps 3-1, 3-2, 3-3, and 3-4.

In September and October 1998, electrofishing was conducted to collect fish community characterization data and fish tissue. Timed (30-minute) surveys to collect community composition data were conducted between river miles 3 and 4 and between river miles 8 and 11. During each timed event the total number of all fish per species observed was estimated and recorded. In addition, target species within different taxonomic fish groups (e.g., largemouth bass, yellow perch, brown bullhead, common carp) were collected for tissue analysis. These collections occurred along river miles 3 and 7–11, and at Woods Pond. Each fish was weighed and measured prior to processing for analysis. A sample of otoliths and scales were collected from largemouth bass to estimate ages of specimens (USFWS 1999).

In May 1999, largemouth bass and bluegill were collected to support fish toxicology studies. The collection locations for this survey included Woods Pond and the "deep reach" upstream of Woods Pond (modeling Reaches 5C and 5B, in part), to New Lenox Road bridge. Morphometric data collected from specimens included total weight and total length. In addition, otoliths were collected to estimate ages of largemouth bass.

In October 1999, common carp, goldfish, and white suckers were collected from Woods Pond and one backwater north of Woods Pond to support a mink reproductive study. Morphometric data collected from specimens included total weight and total length.

Most recently, sampling efforts to obtain fish biomass data from the PSA were conducted during August and October of 2000 (Woodlot Alternatives, Inc. *in prep*). The objective of this study was to estimate biomass for largemouth bass, goldfish, common carp, bluegill sunfish, pumpkinseed sunfish, cyprinids (golden shiner, common shiner, spottail shiner, or others from family Cyprinidae), brown bullhead, yellow perch, and white sucker in each modeling reach of the Housatonic River (Roy F. Weston, Inc. 2000).

3.0 Fish Community Description

There are 32 families, encompassing 98 species, of native and introduced inland fishes known to currently occur in Massachusetts (Hartel *et al*. 1996). Since the early 1940s, 41 species of fish have been reported from the Housatonic River in Massachusetts (Table

3-1). These surveys have included portions of the PSA, as well as upstream and downstream reaches.

Table 3-1 Fishes of the Housatonic River system.

Species	McCabe	Bergin	Stewart	Chadwick	1998–2000 Surveys
Brook trout	•	•	•		•
Brown trout*	•	•	•	•	•
Rainbow trout*	•	•	•		•
Bluegill*	•	•	•	•+	•
Black crappie*		•	•	•+	•
White crappie*				•	
Green sunfish*			•		
Largemouth bass*	•	•	•	•+	•
Smallmouth bass*	•	•		•	•
Pumpkinseed sunfish	•	•	•	•+	•
Redbreast sunfish	•				
Redear sunfish*			•		
Rock bass*	•	•	•	•+	•
Chain pickerel	•	•	•	•+	•
Redfin pickerel	•				•
Northern pike*				•+	•
Muskellunge*			•		
Tessellated darter		•		•	•
Yellow perch	•	•	•	•+	•
Trout perch[1]	•				
Brown bullhead	•	•	•	•+	•
Yellow bullhead*				•	•
Longnose sucker	•	•		•	
White sucker	•	•		•+	•
Creek chubsucker	•	•			
Blacknose dace	•	•		•+	•
Bluntnose minnow				•+	
Bridle shiner	•				
Common carp*				•+	•
Common shiner	•	•		•+	•
Creek chub	•	•		•+	
Fallfish	•	•		•+	•
Fathead minnow*				•	
Golden shiner	•	•		•+	•
Goldfish*		•		•+	•
Longnose dace	•	•		•+	•
Spottail shiner		•		•+	•
Killifish sp.		•			
Banded killifish				•	
Burbot		•			
Slimy sculpin	•	•			
Species Richness	25	27	14	28	25

References: Bergin (1971); Chadwick & Associates (1993 and 1994); McCabe (1943); Stewart Laboratories (1982)

*Species introduced to Massachusetts; +Chadwick & Associates collections from primary study area (20 species)

[1] The trout-perch (*Percopsis omisomaycus*) was collected at the mouth of the Green River in the Housatonic River drainage (Great Barrington) by Britton McCabe in 1940-42. Surveys between 1978-1990 failed to locate this species and it is presumed extirpated from Massachusetts (Hartel *et al.* 1996).

Surveys in the PSA have generally been conducted for specific purposes, such as obtaining biomass estimates or tissue samples, and were not intended to be exhaustive taxonomic inventories. The most recent surveys by Chadwick & Associates (1993, 1994) and the present study resulted in the collection of 28 and 25 species, respectively. The Chadwick & Associates collections from within the PSA, however, included only 20 species. The results of the Chadwick & Associates collections from within the PSA and the present study were combined to develop a list of the 27 fish species recently confirmed to occur in the PSA. An additional 10 species potentially occur based on the range of the species and the habitat in the PSA. These 37 species are indicated in the species:habitat matrix in Attachment C.

The lake chub (*Couesius plumbeus*) is an endangered species (state-listed) that could hypothetically occur in the upper reaches of the PSA. The likelihood of this occurrence, however, is so low that the species is not included on the species:habitat matrix. It is not known at this time if the American eel (*Anguilla rostrata*) historically occurred in the PSA or if the American brook lamprey (*Lampetra appendix*) currently exists in the Housatonic River watershed. Considering this, these two species are not included on the species:habitat matrix.

Surveys conducted in 2000 illustrate the composition of the fish communities within each reach of the PSA. Table 3-2 documents the composition of the fish community based on biomass (total grams of fish caught) and is summarized by feeding strategy (i.e., predators, forage fish, and bottom feeders).

Pooling all sample reaches, the five dominant fish species were white sucker, largemouth bass, yellow perch, bluegill, and common carp. Largemouth bass and yellow perch can be classified primarily as predators, bluegills are forage fish, and white suckers and common carp are bottom feeders. The dominant five species, therefore, encompass all three major feeding strategies.

White suckers are clearly the dominant fish species in Reaches 5A and 5B. They still represent the greatest component of the sample biomass in Reach 5C, but decline to a smaller component of the fish community in the Backwaters and Woods Pond (Figure

3-1). In Reach 5C, as well as in the Backwaters and Woods Pond, common carp become a more common member of the bottom-feeding guild. Goldfish and brown bullhead also represent significant proportions of the bottom-feeding guild in the Backwaters and Woods Pond.

Bluegills, pumpkinseed, cyprinids, and rock bass share dominance of the forage fish group, which comprised 11 – 24 percent of the overall fish community (based on biomass) in Reaches 5A – 5C and the Backwaters. Bluegills, however, were abundant in Woods Pond, where they represented 30 percent of the total biomass sample, and where forage fish as a group comprised 40 percent of the overall fish community. Largemouth bass and yellow perch were the predominant predators in all reaches.

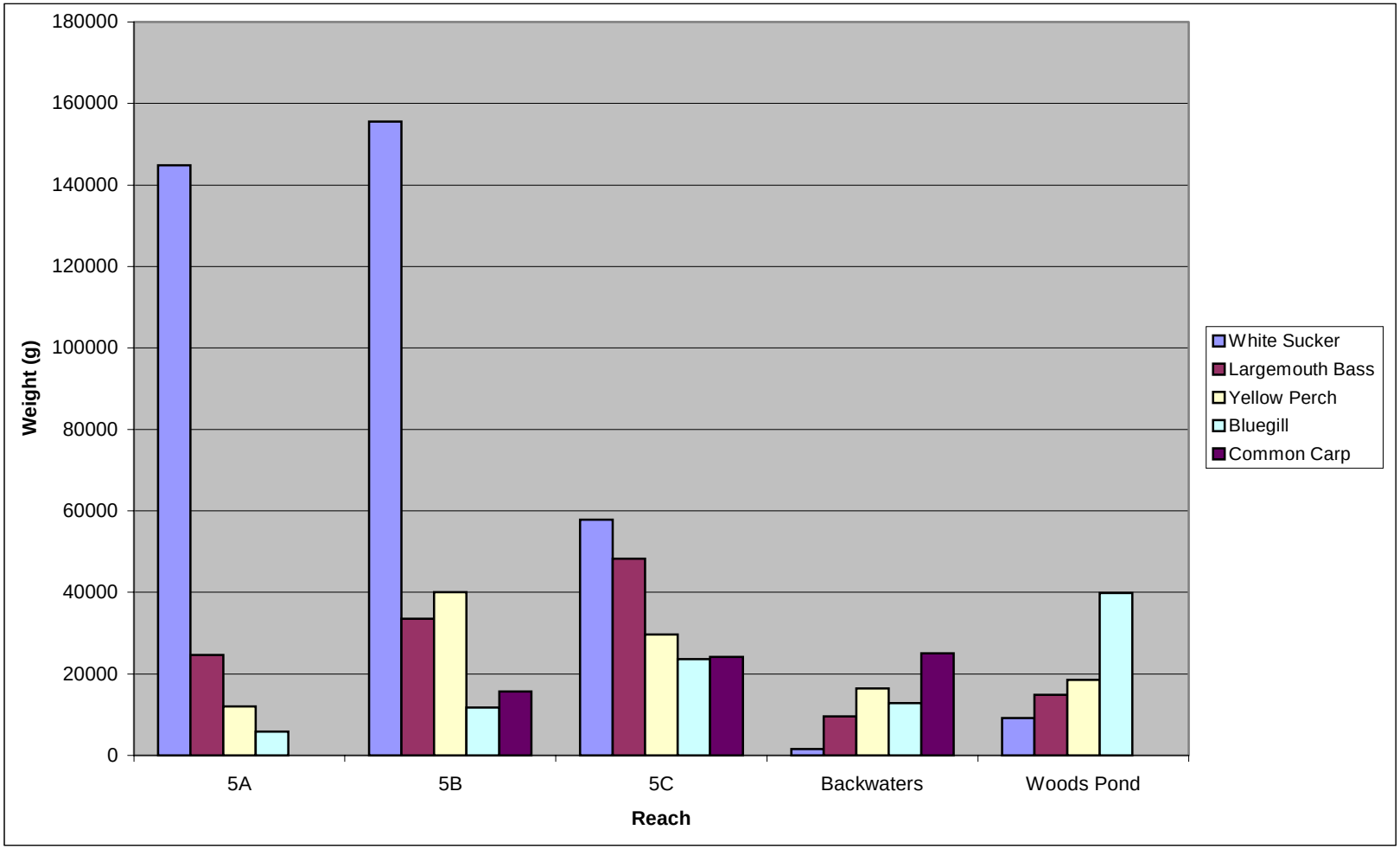
Table 3-2 2000 fish biomass sampling results.

Feeding Strategy and Species	Reach									
	5A		5B		5C		Backwaters		Woods Pond	
	Total Weight (g)	% of Total Sample	Total Weight (g)	% of Total Sample	Total Weight (g)	% of Total Sample	Total Weight (g)	% of Total Sample	Total Weight (g)	% of Total Sample
Predators										
Largemouth Bass	24,701.5	11.1	33,471.5	11.6	48,302.7	21.0	9,558.1	9.2	14,899.2	11.2
Smallmouth Bass	894.8	0.4	458.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Yellow Perch	12,070.0	5.4	40,048.3	13.9	29,683.2	12.9	16,405.7	15.7	18,576.9	14.0
Northern Pike	6,268.0	2.8	8,038.0	2.8	6,526.5	2.8	3,401.2	3.3	6,671.6	5.0
Chain Pickerel	492.0	0.2	701.5	0.2	2,315.1	1.0	371.5	0.4	134.5	0.1
Redfin Pickerel	633.5	0.3	1,130.5	0.4	667.6	0.3	0.0	0.0	26.6	0.0
ChainxRedfin Hybrid	0.0	0.0	0.0	0.0	432.5	0.2	0.0	0.0	0.0	0.0
Brown Trout	225.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rainbow Trout	1,006.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Predator Subtotal	*46,290.8*	*20.8*	*83,848.3*	*29.0*	*87,927.6*	*38.2*	*29,736.5*	*28.5*	*40,308.8*	*30.4*
Forage Fish										
Bluegill	5,764.5	2.6	11,665.2	4.0	23,642.4	10.3	12,874.9	12.4	39,783.8	30.0

Feeding Strategy and Species	Reach									
	5A		5B		5C		Backwaters		Woods Pond	
	Total Weight (g)	% of Total Sample	Total Weight (g)	% of Total Sample	Total Weight (g)	% of Total Sample	Total Weight (g)	% of Total Sample	Total Weight (g)	% of Total Sample
Bluegill Hybrid	45.0	0.0	356.0	0.1	14.0	0.0	25.8	0.0	137.0	0.1
Pumpkinseed	709.1	0.3	5,014.5	1.7	8,213.2	3.6	6,132.5	5.9	7,632.9	5.8
Cyprinids	11,611.3	5.2	3,609.6	1.2	1,582.1	0.7	110.9	0.1	259.0	0.2
Black Crappie	301.5	0.1	1,110.5	0.4	2,629.6	1.1	3,574.7	3.4	712.0	0.5
Rock Bass	12,533.0	5.6	11,432.8	4.0	18,776.0	8.2	0.0	0.0	3,974.1	3.0
Forage Fish Subtotal	*30,964.4*	*13.9*	*33,188.6*	*11.5*	*54,857.3*	*23.9*	*22,718.8*	*21.8*	*52,498.8*	*39.6*
Bottom Feeders										
White Sucker	144,843.8	65.2	155,596.2	53.8	57,845.0	25.2	1,557.0	1.5	9,205.8	6.9
Brown Bullhead	0.0	0.0	0.0	0.0	4,234.1	1.8	9,582.5	9.2	17,866.3	13.5
Yellow Bullhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	113.5	0.1
Common Carp	0.0	0.0	15,649.2	5.4	24,172.1	10.5	25,079.0	24.1	10.0	0.0
Goldfish	0.0	0.0	827.0	0.3	897.5	0.4	15,505.0	14.9	12,523.0	9.4
Bottom Feeder Subtotal	*144,843.8*	*65.2*	*172,072.4*	*59.5*	*87,148.7*	*37.9*	*51,723.5*	*49.6*	*39,718.6*	*30.0*
Total	***222,099.0***	***100.0***	***289,109.3***	***100.0***	***229,933.6***	***100.0***	***104,178.8***	***100.0***	***132,526.2***	***100.0***

Note: Sample sizes in each reach were roughly equal.

Figure 3-1 Weight of dominant fish captured during 2000 biomass sampling.



3.1 Reach 5A and 5B Fish Community – Confluence to Roaring Brook

Reach 5 includes the area from the confluence of the East and West Branches of the Housatonic to the backwaters of Woods Pond. In this 13-km (8.0-mile) reach the channel slope is very shallow (0.31 m/km), and the riverbed elevation drops 3.96 m to the confluence of Woods Pond. Reach 5 is characterized by two flow regimes; one is relatively free flowing (Reaches 5A and 5B) and the other (Reach 5C) is subject to the backwater influences of Woods Pond Dam.

Reach 5A, downstream of the confluence of the East and West Branches to the WWTF, and Reach 5B, downstream from the WWTF to the confluence with Roaring Brook, are characterized as a free-flowing river that is oriented roughly NNW–SSE. These reaches include a wide floodplain, numerous meanders and remnant oxbows, and riverbanks that are generally scoured and eroded. The width of the meandering river in the free-flowing section is about 15 – 36 m with depths up to 3 m. Reflecting the generally slow current velocity of this flat reach, the sediment bed consists of coarse to fine sands with approximately ten percent silts and clay.

Fourteen species of fish were captured in Reach 5A during the 2000 biomass sampling events. Fifteen were collected in Reach 5B. White suckers, a bottom feeder, and largemouth bass, a predator, accounted for over 75 percent of the biomass in the samples from Reach 5A (Table 3-2). In Reach 5B, white suckers, yellow perch (a predator), and largemouth bass represented greater than 75 percent of the biomass. These reaches, which are dominated by two or three species, are less structurally balanced when compared to the downstream sub-reaches (i.e., 5C, the Backwaters, and Woods Pond), which are dominated by five or six species that include predators, forage fish, and bottom feeders.

3.2 Reach 5C Fish Community – Roaring Brook to Backwaters

Reach 5C, downstream of the confluence with Roaring Brook, is the section of Reach 5 where flows begin to be influenced by a backwater effect from the Woods Pond Dam. The river, oriented approximately N–S, is characterized by a broad wetland floodplain

(approximately 243 – 915 m wide) on the west bank with numerous backwater areas, channels and meanders. The inundated remnant floodplain is easily visible in this section of the river as broad and shallow backwater "embayments" with stands of emergent vegetation, submerged aquatic vegetation, and surface algal mats. The steep slopes of October Mountain confine the narrow floodplain on the east bank of the river, and the width of the river channel ranges approximately 18 – 48 m with depths of 1.2 – 2.4 m. Under high flow conditions, the numerous backwater areas are hydrologically connected to flow in the main river channel; under low flow conditions, however, the backwater areas are largely isolated from the influence of flows in the main river channel. The depositional sediment bed (in the river channel) is characterized by fine sands and silt.

Sixteen species of fish were captured in Reach 5C during the 2000 biomass sampling events. Five species, however, accounted for more than 75 percent of the biomass in the 2000 sampling in Reach 5C: white sucker (bottom feeder), largemouth bass (predator), yellow perch (predator), common carp (bottom feeder), and bluegill (forage fish).

3.3 Reach 6 Fish Community – Woods Pond and Backwaters

Woods Pond is a broad, shallow 24-ha impoundment of the Housatonic River formed by the construction of the Woods Pond Dam in the late 1800s. The adjacent upstream deep channel (Reach 6A) and backwater areas (Reach 6B) account for an additional 25 ha. The remnant river channel on the eastern and southern shores of Woods Pond is considerably deeper (maximum depth approximately 5 m) than the shallower depths (approximately 0.3 – 0.9 m) of the remnant floodplain that is characterized by stands of submerged and emergent macrophytes and dense surface algal mats. A deep hole, characterized by a depth of 4.8 m, is located in the southeastern area of the remnant stream channel (Reach 6C). The hole is further characterized by a thick deposit (approximately 4.9 m) of soft silt-clay sediments that has accumulated over the past +/- 100 years or so since construction of the Woods Pond Dam. In the shallow remnant floodplain areas of Woods Pond (Reach 6D), the sediments are characterized as silt with a high organic content. Although the broad, shallow areas of Woods Pond are well mixed, the region defined by the hole exhibits thermal stratification during the summer.

Fourteen species of fish were captured in the Backwater Reach during the 2000 biomass sampling events. Sixteen were collected from Woods Pond. Six species accounted for more than 75 percent of the biomass in the Backwaters: common carp (bottom feeder), yellow perch (predator), goldfish (bottom feeder), bluegill (forage fish), brown bullhead (bottom feeder), and largemouth bass (predator). In Woods Pond, five species accounted for more than 75 percent of the biomass, including bluegill (forage fish), yellow perch (predator), brown bullhead (bottom feeder), largemouth bass (predator), and goldfish (bottom feeder).

4.0 Rare, Threatened, and Endangered Fish

No rare, threatened, or endangered fish species listed by MNHESP (1999) have been confirmed to exist in the PSA by recent investigations. Two species—bridle shiner and longnose sucker—hypothetically could occur in the PSA. The trout-perch has recently been declared extirpated from Massachusetts, but it was last found at the confluence of the Green River and the Housatonic in Great Barrington, downstream of the PSA (Hartel *et al*. 1996).

The bridle shiner is a small warm-water minnow of creeks, ponds, rivers, and lakes with clear to moderately stained water. In Massachusetts it is listed as a species of Special Concern (MNHESP 1999). The bridle shiner is discontinuously distributed along the middle Atlantic coastline, from Virginia to southern Maine and inland through New York, where its range extends to Lake Ontario and the upper St. Lawrence River (Page and Burr 1991). Much of Massachusetts is within a large gap in this range, although this species can be found in extreme southwestern portions of the state. McCabe (1943) documented the bridle shiner in the Housatonic, Westfield, Chicopee, and southern Connecticut Rivers. It has not been found in subsequent fisheries surveys in the Housatonic River in the vicinity of the PSA (Bergin 1971, Stewart Laboratories 1982, Chadwick & Associates 1993, 1994). Whitworth (1996), however, states that it is found in all major drainages of Connecticut, including the Housatonic River. It should therefore be considered to potentially occur in the PSA.

The longnose sucker is listed as a species of Special Concern in the State of Massachusetts. They are similar to the white sucker, but extensive surveys during 1998 – 2000 in the PSA failed to locate this species. Longnose suckers in Massachusetts are found in cool upper sections of streams and rivers in the western part of the state, specifically in the main channels and tributaries of the Hoosic River, Housatonic River, and sections of the Connecticut River (MNHESP 1994a).

The trout-perch was known from two sites in western Massachusetts: (1) the Hoosic drainage in Williamstown; and (2) the Housatonic River at the mouth of the Green River in Great Barrington. The last time they were captured on the Housatonic was in the early 1940s, and surveys from 1978 – 1990 have failed to locate this species (Hartel *et al.* 1996).

5.0 Literature Cited

Beach, R.B., P.M. Craig, R. DiNitto, A.S. Donigian, G. Lawrence, R.A. McGrath, R.A. Park, A. Stoddard, S.C. Svirsky, W.D. Tate, and C.M. Wallen. 2000. Modeling Framework Design: Modeling Study of PCB Contamination in the Housatonic River. Prepared for the U.S. Army Corps of Engineers, New England District, and the U.S. Environmental Protection Agency, Region 1.

Bergin, J. 1971. Coldwater Fisheries Investigations - Surveys and Inventories of Streams. Massachusetts Division of Fisheries and Game.

Blasland and Bouck Engineers, P.C. 1991. MCP Interim Phase II Report/Current Assessment Summary for Housatonic River. Syracuse, NY, USA.

Chadwick & Associates. 1993. Fisheries Investigation of the Housatonic River, Massachusetts. Prepared for General Electric Company by Chadwick & Associates, Littleton, CO, USA.

_____ 1994. Aquatic Ecology Assessment of the Housatonic River, Massachusetts. Prepared for General Electric Company, Pittsfield, MA, USA.

Hartel, K.E., D.B. Halliwell, and A.E. Launer. 1996. An Annotated Working List of the Inland Fishes of Massachusetts. Comparative Museum of Zoology, Harvard University, Cambridge, MA, USA.

MNHESP (Massachusetts Natural Heritage and Endangered Species Program). 1994a. Massachusetts Species of Special Concern - Longnose Sucker (*Catostomus catostomus*). Fact sheet prepared by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Westborough, MA, USA.

_____ 1994b. Endangered Species of Massachusetts - Lake Chub (*Couesis plumbeus*). Fact sheet prepared by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Westborough, MA, USA.

_____ 1994c. Threatened Species of Massachusetts - American Brook Lamprey (*Lampetra appendix*). Fact sheet prepared by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Westborough, MA, USA.

_____ 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

McCabe, B.C. 1943. An analysis of the distribution of fishes in the streams of western Massachusetts. Copeia 1943:85-89.

Page, L.M., and B.M. Burr. 1991. A Field Guide to Freshwater Fishes. Houghton Mifflin Company, Boston, MA, USA.

Roy F. Weston, Inc. 2000. Supplemental Investigation Work Plan for the Lower Housatonic River, General Electric (GE) Housatonic River Project, Pittsfield, Massachusetts. Volumes 1 and 2. Prepared for U.S. Army Corps of Engineers, North Atlantic Division, New England District, Concord, MA, USA.

Stewart Laboratories. 1982. Housatonic River Study - 1980 and 1982 Investigations, Final Report, Volumes I and II. Prepared for General Electric Company by Stewart Laboratories, Knoxville, TN, USA.

United States Fish and Wildlife Service. 1999. Age Determination of Largemouth Bass (*Micropterus salmoides*) from the Housatonic River Watershed. Prepared by the Office of Fishery Assistance, U.S. Fish and Wildlife Service, Laconia, NH, USA.

Whitworth, W.R. 1996. Freshwater Fishes of Connecticut. Connecticut Department of Environmental Protection. State Geological and Natural History Survey of Connecticut Bulletin 114.

Woodlot Alternatives Inc. *in prep*. Housatonic River Fish Biomass Estimates. Prepared for U.S. Army Corps of Engineers, New England District, and U.S. Environmental Protection Agency, Region 1, by Woodlot Alternatives, Topsham, ME, USA.

Chapter 4 Reptiles and Amphibians

1.0 Introduction

The reptiles and amphibians (hereafter called herptiles) in the PSA were studied over a three-year period, from 1998 to 2000. To conduct this work, several work plans were prepared that either targeted specific species or the herptile community as a whole (Roy F. Weston, Inc. 2000). A community-wide assessment, culminating in this report, was designed to characterize the herptile community in the PSA by mapping available habitats, assessing the quality of those habitats, and conducting surveys to document the presence of herptiles and their use of the available habitats. Some of the targeted surveys were conducted to collect specific species for tissue analysis or for off-site reproduction assessments (Roy F. Weston, Inc. 2000). Another study investigated reproductive indices of amphibians breeding in pools within the PSA (Woodlot Alternatives, Inc. *in prep*).

To characterize the community, a literature review of local species and populations was conducted along with the collection of field data. Field data collected as part of the targeted species surveys were used to supplement data collected for community-wide characterization purposes.

2.0 Methods

2.1 Species:Habitat Association

The goal for the characterization of the study area herptile community was to identify all species that could reasonably be expected to occur, the habitats they would use, and the timing of that use. The foundation of this work included a review of relevant literature on the reptile and amphibian populations in western Massachusetts. Local and regional references on herptile communities in the PSA were first used to identify the species whose range encompassed the study area (DeGraaf and Rudis 1983, Conant 1986, Klemens 1993, DeGraaf and Yamasaki 2001). General and technical references on the habitat requirements and use, seasonality of occurrence, and relative abundance in the region were then used to refine the list and build a matrix to include only those species

whose preferred habitats occur within the PSA (Wright and Wright 1949, Bishop 1943, Pfingsten and Downs 1989, Ernst *et* al. 1994, Petranka 1998, Hunter *et al.* 1999, DeGraaf and Yamasaki 2001).

As part of this effort, local and regional experts were consulted to obtain unpublished records regarding the historic occurrence of some species in the area. For example, the Massachusetts Natural Heritage and Endangered Species Program and the Massachusetts Division of Fisheries and Wildlife (MDFW) were contacted to identify historic or recent occurrences of rare reptiles and amphibians in the vicinity of the PSA.

Field surveys were then conducted to compliment the information compiled on the species matrix (Attachment C). Field surveys largely focused on determining species' presence, although several methods were used to more quantitatively document species and their relative abundance or to sample animal tissues, and are described below. Observations recorded in the field were used to refine the matrix to accurately depict habitat use and seasonality of occurrence for all herptiles species expected to occur in the primary and reference study areas.

2.2 Incidental Observations

Herptile presence in the PSA was documented during year-round field investigations in 1998, 1999, and 2000. Many of those field investigations supported ecological risk assessment surveys. Those investigations provided an opportunity to confirm the presence of reptiles and amphibians within the PSA by recording incidental observations of any species seen. During the course of those other investigations, herptiles observed within the PSA and reference areas were recorded, along with the habitat that they occurred in. When appropriate, other notes were recorded, including activity, interactions with other species, and general health.

2.3 Visual and Acoustic Surveys

General, reconnaissance-level surveys of the herptile community were conducted using a method often referred to as visual encounter surveys (Crump and Scott 1994). These types of surveys consist of traveling through a site and searching for herptiles. The exact search method used varied with the habitat and species. For example, the shoreline and shallow water of backwater habitats were searched in spring for basking frogs and turtles and frog and salamander egg masses. In wooded areas, rocks and logs were overturned to located terrestrial salamanders and snakes. When animals were observed, notes on location, species, habitat, and activity were recorded and used to modify the species matrix.

2.4 Breeding Pool Surveys

More detailed surveys were also conducted to document the occurrence of spring breeding habitats (i.e., vernal pools) and to document use of those habitats by various herptiles. Aerial photographs and topographic maps of the PSA were reviewed to identify areas that could potentially provide spring breeding habitat for herptiles. Efforts were made to identify isolated, temporary pools (vernal pools) in well-vegetated habitats (Figure 4-1). These types of temporary aquatic areas can be important breeding habitat for a number of frogs and salamanders, and some species may require these habitats exclusively (Kenney 1995). However, other breeding habitats, including open backwater areas associated with Woods Pond, were also identified.

Sixty-eight potential breeding areas were visited (Map 4-1) and MNHESP Vernal Pool Data Sheets, defining the site conditions and species use, were filled out for each area (Attachment E). Not all pools met the definition of a vernal pool as defined by Kenney (1995). For example, spotted salamander egg masses were observed in some backwaters of the river. Because these areas, while not meeting the strict vernal pool definition, represented suitable breeding habitats for some amphibians, including vernal pool species, data sheets were completed. To document species occurring in the pools, the shoreline of each area was searched and species observed were recorded, as was the type of observation such as adult, larvae, or egg mass. In some areas, dip nets were used to

capture individuals for positive identification. Dip nets were also used to identify aquatic invertebrates, potential predators and food sources for larval amphibians, in each pool. Finally, data on the location, size, and habitat within and around each pool surveyed were recorded.

Figure 4-1 Typical floodplain vernal pool in mid-April and mid-June.

This pool, 38-VP-2, is on the west shore of the river, upstream of New Lenox Road.

2.5 Aquatic Funnel Trap Surveys

Aquatic funnel traps (AFTs) were used to sample larval amphibians and aquatic invertebrates in 17 pools during 1998 (Map 2-5). Ten AFTs (Figure 4-2) were randomly placed in each of the pools selected for sampling. AFTs were placed in the pools either in the evening, and collected the following morning, or in the early morning, and collected several hours later. Pools were trapped three times from mid-May to mid-June 1998. The time and date when traps were placed in and removed from the pool were recorded on data sheets. Water temperature, pH, conductivity, and dissolved oxygen were also recorded on data sheets.

Figure 4-2 An aquatic funnel trap being removed from pool.

Contents were then filtered to collect larval amphibians and aquatic invertebrates.

When traps were collected, the total number of larval amphibians, by species, was recorded and a sample of 25 individuals per species were measured (total and tail length for tadpoles, total and snout-vent length for salamander larvae) from each trap (Figure 4-3). Specimens were checked for gross external deformities, and returned to pools.

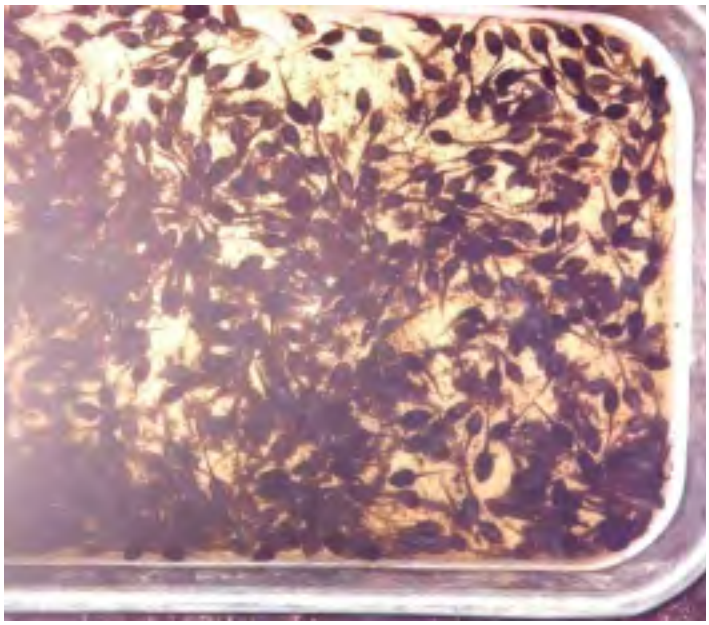


Figure 4-3 Wood frog tadpoles.

Tadpoles were counted after being caught in aquatic funnel traps.

2.6 Pitfall Trap Surveys

Pitfall traps were constructed around four pools (8-VP-1, 8-VP-2, 38-VP-2, and 46-VP-5) in 1999 (see Map 4-1) (Woodlot Alternatives, Inc. *in prep).* Traps were placed along plastic drift fencing (Figure 4-4) and all individuals entering and exiting the pools were captured, identified to species, sexed, weighed, measured for total length, tail length, hind leg length, and foreleg length. During 2000, drift fences and pitfall traps were used to capture metamorphosed wood frog juveniles emerging from the pools at 8-VP-1, 18-VP-1, 23B-VP-1, 23B-VP-2, 38-VP-1, 38-VP-2, 46-VP-1, 46-VP-5 (Map 4-1), and three pools in the October Mountain State Forest reference area designated as WML-1, WML-2 and WML-3. Pit traps were also installed throughout the PSA to capture breeding leopard frogs during 1999 and 2000. Incidental species captured in pit traps were recorded.

Figure 4-4 Drift fencing and pit traps encircling a vernal pool.

3.0 Reptile and Amphibian Community Descriptions

3.1 Herptiles

Herptile populations in the PSA are diverse. Sixteen reptile and 19 amphibian species could potentially occur in the PSA, based on range, habitat requirements, and habitat availability. Only four (25 percent) of the potentially occurring reptiles were documented in the PSA, whereas 14 (75 percent) of the amphibians were documented. This discrepancy may be due to the different reproductive strategies these species exhibit that make them more, or less, observable. Frogs and salamanders, for example, tend to

congregate during the breeding season, with the frogs vocalizing to attract mates. This makes theses species quite obvious and simple to document using even the most general survey methods. Even among the reptiles, the turtles have reproductive strategies and daily habits that make them more observable, such as overland travel to nesting sites and basking on rocks and logs, and three of the possible seven species were documented in these situations. Snakes, by contrast, live largely solitary lives, have cryptic coloration, and usually utilize structurally complex microhabitats that make them difficult to observe. Consequently, only two of the nine species potentially occurring in the PSA were observed.

3.2 Reptiles

The potential reptile community within the PSA consists of 13 snake species and 7 turtle species (Attachment C). Only two species of snake, the garter snake and northern water snake, were observed in the study area. Three turtle species were observed: common snapping turtle, painted turtle, and wood turtle. The snapping turtle and painted turtle were common and seen in most riverine and wetland habitats. The wood turtle, a species of Special Concern, was rarely observed (see Section 4.0).

3.2.1 Snakes

The northern water snake, northern brown snake, northern redbelly snake, common garter snake, ribbon snake, northern ringneck snake, northern black racer, eastern smooth green snake, and eastern milk snake could potentially occur in the PSA. Only the common garter snake and northern water snake were observed. The garter snake is ubiquitous and was found in a variety of wetland and terrestrial habitats. It was observed at the edges of isolated pools, in transitional floodplain forest, red maple swamp, shrub swamp, and in most of the terrestrial community types. Garter snakes were also observed swimming across the river. During pitfall trapping efforts, garter snakes were routinely observed traveling along the drift fencing and occasionally seen swallowing wood frogs (Figure 4-5).

Figure 4-5 Common garter snake.

Common garter snakes were commonly seen near pit trap areas in transitional floodplain forests where they preyed on wood frogs (look closely to see the wood frog in this snake's mouth).

A single northern water snake was observed swimming in Woods Pond near the footbridge during the summer of 2000. This was the only sighting of this species despite the presence of suitable habitat.

Of the remaining snake species expected to occur in the PSA, many tend to favor upland rather than wetland habitats. Since investigations focused largely on wetland habitats, it is not surprising that fewer species of snakes were observed. One species, however, the ribbon snake, routinely uses wetland habitats but was not observed in the PSA. It is a semi-aquatic species, inhabiting grassy and shrubby stream edges, ponds, bogs, vernal pools, and wet woodlands.

3.2.2 Turtles

Seven turtle species potentially occur in the study area: common snapping, common musk (or stinkpot), spotted, wood, bog, eastern box, and painted turtle. Of these, snapping and painted turtles are common and were routinely observed in the Housatonic River, adjacent backwaters, and pools. Wood turtles, a species of conservation concern in Massachusetts, were recorded at several PSA locations (Section 4.0).

Snapping and painted turtles were largely associated with aquatic communities, being observed most often in backwaters of deep emergent marsh, although both species were seen in the river channel itself. Snapping turtles were more uniformly

distributed through the PSA, being commonly found in backwaters, shallow and deep emergent marshes, and vernal pools. Painted turtles, however, appeared to utilize deep emergent marshes over other habitats.

Snapping turtles were also observed in more terrestrial habitats, presumably while traveling to temporary feeding or nesting areas. Several small snapping turtles were caught in pitfall traps placed in transitional floodplain forests near the confluence of the East and West Branch Housatonic River and just north of New Lenox Road. Additionally, adults were observed in a large number of vernal pools. The seasonal abundance of invertebrates and, perhaps more importantly, amphibian larvae likely attract snapping turtles to these areas. Turtles were also observed nesting in the PSA. Several snapping turtles nests were found along the Springfield Terminal Railroad tracks along the west side of the river. Painted turtles were seen nesting along road shoulders, and hatchlings were observed in the gravel pits, which provide excellent nesting habitat, north of the Pittsfield WWTF (Figure 4-6).

Figure 4-6 Female painted turtle laying eggs.

The wood turtle (Figure 4-7) is a Special Concern species in nearly every state of its range, which extends from Nova Scotia, southern Quebec and Ontario, south into northernmost Virginia, and west to northern Michigan, Wisconsin, and Minnesota (see section 4.0). Wood turtles prefer slow moving streams with sandy bottoms and heavily vegetated banks and were observed in this type of habitat along the West Branch and northern East Branch of the Housatonic River during 1998 and 1999. During the spring and summer wood turtles make long daily movements, through both upland and wetland

habitats, searching for mates, traveling to nesting sites, and foraging. Wood turtles are omnivorous, feeding in water or on land. They consume a variety of vegetation, grass, moss, mushrooms, berries, insects (aquatic and terrestrial), tadpoles, fish, and carrion. Wood turtles can often be found in vernal pools during the spring, where they take advantage of the abundant food items. Several wood turtle observations in the PSA occurred in or near vernal pools (Map 4-2).

Figure 4-7 Adult wood turtle.

The spotted turtle and common musk turtle would be expected to occur in similar habitat as the painted turtle in the PSA. However, neither was observed during any of our surveys. The spotted turtle is uncommon in New England and listed as a species of Special Concern in Massachusetts (see Section 4.0). The small size and secretive habits of the common musk turtle makes observation of this species difficult; it is nocturnal and highly aquatic, emerging from the water only to nest. The bog turtle occurs in open sphagnum bogs, wet meadows, and clear meadow streams. It is Endangered in Massachusetts, having been documented in only three locations in the state. The eastern box turtle is also Special Concern species and is the most terrestrial turtle potentially occurring in or near the PSA. Even though the PSA is within the known ranges and contains suitable habitats for these turtles, none of these species were found during the extensive field investigations from 1998 – 2000.

3.3 Amphibians

Due to life history characteristics that make them more visible, 14 of the 19 amphibians identified as potentially occurring in the PSA were confirmed (Attachment C). Breeding populations within the PSA were recorded for most of these species. Of the 68 breeding pools that were originally surveyed in 1998, temporary pools supported an average of 4.4 species per pool, while semi-permanent to permanent pools supported an average of 6.0 species per pool (Table 4-1). Wood frogs and spotted salamanders were the most common species breeding in temporary vernal pools. Leopard frogs, green frogs, bullfrogs, and red-spotted newts were more common in the semi-permanent pools and backwaters connected to the Housatonic River.

Table 4-1 Species use of 68 vernal pools in the PSA.

Pool Designation	Pool Habitat*	Permanency	Snapping turtle	Wood turtle	Painted turtle	Garter snake	Red-spotted newt	Spotted salamander	Jefferson salamander	Red-backed salamander	Four-toed salamander	American toad	Spring peeper	Gray treefrog	Northern leopard frog	Pickerel frog	Wood frog	Green frog	Bullfrog	Fairy shrimp	Total No. Species
5-VP-1	SEM	T																		A	1
5-VP-2	SEM	T																			0
5-VP-3	SS	P	A	A								T	A		A			A	A		7
8-VP-1	DEM	T	A		A	A	A , J	A,E,L		A		A	A	A	A		A,E,T	A	A	A	14
8-VP-2	SEM/SS	T	A		A	A						A	A		A		A,E,T	A	A	A	10
8-VP-3	SS	T																		A	1
8-VP-4	DEM	P						E									E			A	3
8-VP-5	SS	T															E , T			A	2
8-VP-6	SS	T																A			1
12-VP-1	SS	P						E					A	A			E , T				4
18-VP-1	DEM/SS	T											A		A		A,E	A	A	A	6
18-VP-2	DEM/SS	T				A	A	E				A	A , T		A , T	A	A,E,T	A		A	10
19-VP-1	SEM	T															A,E,T			A	2
19-VP-2	SEM	T																		A	1
19-VP-3	SEM	T																	A		1
19-VP-4	SEM	T																	A		1
19-VP-5	SEM	T			A										A	A	A	A	A		6
19-VP-6	DEM	P			A								A		A		A	A	A		6
19-VP-7	SEM	T													A		A,E,T	A	A		4
19-VP-8	SEM	P			A										A		A	A	A		5
23-VP-1	SS	T																			0
23-VP-2	SEM	T																			0
23-VP-3	DEM	P	A		A													A	A		4
23A-VP-1	DEM/SS	P	A				A	E	E				A		A , E		T	T			8
23B-VP-1	SS	T	A		A , J	A						A	A		A , T		A,E,T	A	A	A	10
23B-VP-2	SS	T			A , J	A						A	A		A , T		A,E,T	A	A	A	9
26-VP-1 (A+B)	SS	T				A		E					A		A		E				5

Pool Designation	Pool Habitat*	Permanency	Snapping turtle	Wood turtle	Painted turtle	Garter snake	Red-spotted newt	Spotted salamander	Jefferson salamander	Red-backed salamander	Four-toed salamander	American toad	Spring peeper	Gray treefrog	Northern leopard frog	Pickerel frog	Wood frog	Green frog	Bullfrog	Fairy shrimp	Total No. Species
27-VP-1	DEM	P			A										A		E , T	A			4
27-VP-2	DEM	P	A		A	A												A	A		5
27A-VP-1	SEM	T						E										A		A	3
27B-VP-1	TFF	T												E				A	A	A	4
27B-VP-2	TFF	T															E , T	A		A	3
27B-VP-3	TFF	T															E , T	A		A	3
33-VP-1	TFF	T																		A	1
33-VP-2	SS	T											A							A	2
38-VP-1	SEM	T	A			A	J	E , L		A			A		A		A,E,T	A	A	A	11
38A-VP-1	SS	T						E									E			A	3
38-VP-2	SEM	T	A		A	A	A , J	A,E,L				A , T	A		A		A,E,T	A	A	A	12
38-VP-3	SEM	T						E									E			A	3
39-VP-1	DEM	P			A		A	E							A		E , T				5
40-VP-1	SEM	T						E					A	A	A		A	A			6
40-VP-2	DEM/SS	P			A								A	A	A		A	A			6
40-VP-3	DEM/SEM	T					A					T	A	A	A		A	A,E			7
40A-VP-1	SEM	T																			0
42-VP-1	DEM	T											A		A , E		A,E,T	A,T	A		5
42-VP-2	SEM	T											A		A		A,E,T	A	A		5
42-VP-3	DEM	T											A		A		E , T	A	A		5
42-VP-4	DEM	T										E	A		A						3
42-VP-5	SEM	T															E , T				1
42A-VP-1	DEM	P											A		A			A			3
46-VP-1	SS	T	A		A	A		E , L				A , T	A		A		A,E,T	A	A	A	11
46-VP-2	DEM/SS	P			A		A	E										A			4
46-VP-3	DEM	P			A			E										A			3
46-VP-4	RMS	T															E				1
46-VP-5	RMS	T	A		A	A	A , J	A,E,L	A , E	A	A	A	A		A		A,E,T	A	A	A	15
49-VP-1	DEM	P					A											A,T			2

Pool Designation	Pool Habitat*	Permanency	Snapping turtle	Wood turtle	Painted turtle	Garter snake	Red-spotted newt	Spotted salamander	Jefferson salamander	Red-backed salamander	Four-toed salamander	American toad	Spring peeper	Gray treefrog	Northern leopard frog	Pickerel frog	Wood frog	Green frog	Bullfrog	Fairy shrimp	Total No. Species
49A-VP-1	SS	T					A	E									E	A			4
49B-VP-1	TFF	T						E							A		A	A	A		5
54-VP-1	DEM	P	A				A	A				A	A	E	A	A	A	A	A,T		11
55-VP-1	DEM	P			A								A					A	A		4
55A-VP-1	DEM	P	A				A , J	A				A			A	A	A	A	A		9
56A-VP-1	DEM	P					A	E					A		A						4
58A-VP-1	DEM	P	A				A	E		A		A	A		A , E	A	A,E	A	A		11
61A-VP-1	DEM	P	A				A	A		A		A	A		A	A	A	A,T	A		11
61A-VP-2	DEM	P	A		A		A	E		A		A	A		A , E	A	A,T	A	A,T		12
66A-VP-1	RMS/SS	T						E , L									T	T			3
67A-VP-1	DEM/SS	T						E													1
69-VP-1	SEM/SS	T						E													1
Number of Pools Species Occurred in:			16	1	19	11	17	28	2	6	1	16	30	7	34	7	42	43	29	24	
Percent Frequency of Occurrences***:			24	1	28	16	25	41	3	9	1	24	44	10	50	10	62	63	43	35	

* Habitats
SEM = Shallow Emergent Marsh
DEM = Deep Emergent Marsh
SS = Shrub Swamp
TFF = Transitional Floodplain Forest
RMS = Red Maple Swamp

T = Temporary
P = Permanent

Average Number of Species in Temporary Pools: 4.4
Average Number of Species in Permanent Pools: 6.0

Includes species captured in Aquatic Funnel Traps.

** Letter indicates Life Stage Observed, as Follows:
A = Adult
E = Egg mass
T = Tadpole(s)
L = Larvae

*** Percent Frequency of Occurrence = (No. of Pools Species Observed In/Total No. of Pools)*100

3.3.1 Toads and Frogs

Frogs were the most commonly observed group of herptile species and eight of the nine potentially occurring species were observed in the PSA. Wood frogs and American toads were common in nearly all the terrestrial and wetland habitat types. Spring peepers and gray treefrogs, although rarely seen, were heard in a variety of habitats, predominately floodplain forest vernal pools and shallow emergent marshes. Northern leopard frogs and pickerel frogs are semi-terrestrial and were observed in most of the wetland habitats, predominately emergent marsh communities during the breeding season and wet meadows during the summer. Northern leopard frogs were the most common of these two species, being found throughout the PSA, while the distribution of pickerel frog was somewhat limited. Green frogs were abundant in backwaters and pools throughout the entire PSA. Bullfrogs were also common throughout the PSA, but they were most abundant during the long summer breeding period in large open wetlands, particularly the backwaters near Woods Pond. Individual bullfrogs, however, were observed in transitional floodplain forests, red maple swamps, and vernal pools.

Wood frogs were the most abundant species in the PSA and were a target of two detailed studies. In 1999, a large number of adults and recently metamorphosed juveniles were trapped as part of a study on the reproductive success of amphibians in four vernal pools of the PSA (Figure 4-8 and Figure 4-9) (Woodlot Alternatives, Inc. *in prep)*. Wood frogs are terrestrial except during the breeding season, when they congregate in small, usually temporary pools. During the 1998 vernal pool survey, 81 percent of the pools containing wood frog eggs or tadpoles were temporary pools.

Figure 4-8 Adult wood frogs captured in pit traps.

Captured during the 1999 vernal pool amphibian reproductive study. Note the spotted salamander barely visible among the frogs along the right hand side of the pit.

Figure 4-9 Wood frogs in amplexus.

Amplexus is the mating position in which the male tightly grips the female, signaling her to begin laying eggs.

Wood frogs are explosive breeders, arriving at breeding pools in mass, mating, laying eggs, and returning to their terrestrial habitat within a matter of days. This explosive breeding occurred during the last week of March or first week of April during the three years of investigation. Petranka and Thomas (1995) noted that 80 percent of adult wood frogs breed within a three-day period. Wood frogs lay 2,000 – 3,000 eggs surrounded by a globular, gelatinous mass, attached to submerged twigs (Knox 1999a) (Figure 4-10).

Figure 4-10 Wood frog egg masses.

These egg masses are attached to dogwood branches at the edge of a vernal pool. Female wood frogs often lay their egg masses in a communal aggregation such as this.

After hatching, tadpole metamorphosis occurs in 6 – 15 weeks depending upon site conditions. In 1999, metamorphs began leaving their pools in mid-June, but in 2000, they did not leave until early July, despite the fact that breeding occurred on very similar dates during both years (Figure 4-11). This difference could be in response to the drier pool conditions observed in 1999, which has been suggested to stimulate an earlier, faster metamorphosis by tadpoles (Wilbur and Collins 1973, Duellman and Trueb 1986).

Figure 4-11 Wood frog metamorph.

Recently metamorphed wood frog with remnant tail.

Spring peepers were also common in nearly all the habitat types in the PSA (Figure 4-12). Though they were not seen or captured as often as other larger species, their chorusing revealed that they were abundant. Breeding populations were densest in a series of semi-permanent shallow emergent marshes and temporary pools immediately

north of New Lenox Road, along the shallow backwater edges north of Woods Pond, the extensive marshes of Yokum Brook and Willow Creek, at Washington Mountain Lake, in a reference permanent pool in October Mountain State Forest, and in the calcareous wet meadows north of Threemile Pond.

Figure 4-12 Spring peeper

The characteristic dark cross or "X" pattern on the back, gives the spring peeper its specific epithet of *crucifer*.

Spring peepers forage among the leaf litter, woody debris, tree bark, and vegetation near the forest floor. Small spiders are the common prey item, making up more than 48 percent of the diet (Knox 1999b). Mites, ants, beetles, ticks, leafhoppers, nematode worms, and caterpillars are also commonly eaten.

The gray treefrog is a treefrog found in the PSA. They were less common than spring peepers, being heard at only a few locations and never captured or seen. Lack of observations is likely due to their arboreal habits and their ability to climb over drift fences and out of pits. Except for their breeding season, gray treefrogs spend all their time hidden beneath the bark and cavities of trees. In the PSA, they were commonly heard calling from the same pools as spring peepers. Both sexes reach sexual maturity after their second winter.

American toads were the only toads observed in the PSA (Figure 4-13). Fowler's toads could potentially occur, but none were observed during the three years of study. American toads were relatively uncommon in the open and forested wetland communities

of the PSA, but they were more common in terrestrial habitats. American toad eggs and tadpoles were found in many vernal pools, semi-permanent pools, shallow riverine backwaters, and marshes. American toad egg masses were most common in warm, shallow roadside ditches and ruts of seldom used dirt roads in the October Mountain State Forest reference area.

Figure 4-13 Male American toad vocalizing during breeding season.

The northern leopard frog and pickerel frog are two closely related semi-terrestrial frogs found in the PSA. Leopard frogs are the more abundant of the two in the PSA; however, in some localized areas such as Threemile Pond and Muddy Pond in the Hinsdale Flats SWMA, pickerel frogs outnumbered leopard frogs.

Two taxa of leopard frogs were formally recognized: northern and southern. Within New England the northern leopard frog is found from Maine south into Massachusetts and Connecticut along the Housatonic and Connecticut River valleys. Southern leopard frogs occur immediately south of New England and to the west in eastern New York. Within this region, northern and southern leopard frogs are difficult to distinguish by visual observation alone and populations may overlap. Klemens (1993) reports that these species can be separated based on dissection and presence or absence of vestigial oviduct in the males. He found that leopard frogs collected from the Housatonic watershed more closely resembled southern leopard frogs (that former taxon is now a species called *Rana utricularia*) collected in northern New Jersey and southeastern New York than other northern leopard frogs in New England. Individuals from the Housatonic River might be

more accurately placed within the southern leopard frog taxon, they might belong to a unique taxon, or they might be a hybrid population. Either way, further research is needed to accurately identify this population. For the purposes of this investigation, the common consensus of available literature suggests the population within the PSA to be northern leopard frogs.

Leopard frogs breed in ponds, marshes, shallow slow moving streams, bogs, semi-permanent and temporary pools in April and May (Figure 4-14). In the PSA, leopard frogs were heard calling and egg masses were seen most commonly in shallow, vegetated backwaters associated with the Housatonic River and the marsh systems of Yokum Brook and Willow Creek. Metamorphs were common in September of 1998 and 1999 and were observed crossing a variety of riparian habitats. A large number of leopard frogs and egg masses were collected in 1999 and 2000 as part of a leopard frog reproduction laboratory study (Roy F. Weston, Inc. 2000). A number of leopard frogs were also caught in pitfall traps during the 1999, vernal pool amphibian reproduction study. Adult and juvenile leopard frogs were caught throughout the study period, which extended from early April to mid-July. Individual animals were caught entering and leaving the vernal pools, presumably during typical feeding and movement habits.

Figure 4-14 Northern leopard frog.

Round spots with halos and white dorsolateral lines are characteristic of northern leopard frogs.

The pickerel frog is closely related to the leopard frog and these two species generally have similar habits and life history (Figure 4-15). Like the leopard frog, pickerel frogs were found in open wet meadows, marshes, and wet woodlands during the summer months. However, far fewer pickerel frogs were observed compared to leopard frogs, with less than a dozen documented during the three years of field investigations. The preponderance of emergent wetlands and wet meadow habitats in close proximity to the river likely make the PSA slightly more suitable for leopard frog populations than pickerel frogs (Mairs 1999). Conversely, pickerel frogs were more common at the Threemile Pond SWMA reference area, where few leopard frogs were observed.

Figure 4-15 Pickerel frog.

Pickerel frog showing bright yellow-orange coloration on undersurface of hind legs and squared off blotches on back.

Green frogs (Figure 4-16) were abundant in the more aquatic habitats in the PSA. They were also commonly caught in pitfall traps at vernal pools in transitional floodplain forests and red maple swamps. Those areas are used as summer foraging grounds because some of the common prey of green frogs—beetles, flies, grasshopper, and caterpillars (Hamilton 1948)—are found at vernal pools then.

Figure 4-16 Male green frog.

The sex of a male green frog can be determined by the diameter of the tympanum (eardrum), which is larger than the eye in males.

Green frogs were documented breeding within the PSA. Egg masses (Figure 4-17) were found at two locations, both of which were semi-permanent pools and ponds filled with deep and shallow emergent marsh vegetation. Characteristic egg mass locations for green frogs consist of shallow water in permanent water bodies, likely because the larval period, in the northern parts of its range, lasts for at least one full year (Stockwell 1999). Efforts did not focus on locating their egg masses in permanent water bodies and, consequently, none were found. However, based on calls heard at those habitats, green frogs breed in these areas within the PSA.

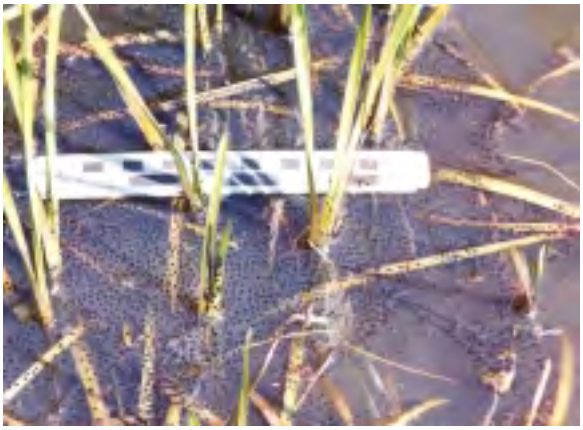


Figure 4-17 Green frog egg mass.

Green frog egg mass containing up to 5,000 eggs in a large flat mass floating on the water surface among aquatic vegetation.

Bullfrogs are closely related to green frogs and share many similar traits. They are the largest North American frog, with adults commonly exceeding eight inches in length (snout to vent length). Bullfrogs are highly aquatic and rarely found away from water. They were most common in the backwaters north of Woods Pond, where they were heard calling throughout the summer months. However, they commonly traveled from the river to nearby vernal pools in transitional floodplain forests and red maple swamps, where they took advantage of the high densities of prey items.

Breeding occurs in deep permanent water with emergent vegetation, and less commonly in semi-permanent pools, from late May to July. The calling heard from many of the backwaters indicates that bullfrogs are indeed breeding in the PSA. Bullfrogs were captured from the PSA in 1999 for tissue analysis (Roy F. Weston, Inc. 2000). During that time period 29 individuals were captured in upper and lower portions of the PSA. Bullfrogs were also captured at the Threemile Pond (12 individuals) and Hinsdale Flats (11 individuals) SWMA reference areas. This work was conducted as part of ecological risk assessment, but also for the assessment of human health risks, as some people eat bullfrogs.

3.3.2 Salamanders

Ten species of newts and salamanders may occur in the PSA. Of these, seven were recorded in the PSA.

Red-spotted newts (Figure 4-18) are common throughout the eastern United States and were abundant in the backwaters near Woods Pond, in oxbows, backwater channels, and permanent pools associated with the river throughout the PSA, as well as in the river itself. Only in the upper two miles, where the river travels between steep banks, were newts noticeably absent. Red efts, the juvenile, terrestrial stage of the red-spotted newt, were also observed throughout the PSA (Figure 4-19). Red-spotted newts were common in Threemile Pond, Washington Mountain Lake, and a semi-permanent pool in October Mountain State Forest.

Figure 4-18 Red-spotted newt adult.

Figure 4-19 Red eft.

Red eft is the terrestrial juvenile stage of the red-spotted newt.

Newts are unique in that they are the only eastern salamander that has three distinct stages in their life cycle. Breeding occurs in the spring in shallow bodies of water with soft bottoms and vegetation. The larvae spend 5 – 7 months in aquatic habitats during which time they have a keeled tail and external gills. The gills shrink throughout the summer, until they disappear completely during fall metamorphosis, when the newts take on the color and body shape of the terrestrial juvenile stage, known as the red eft stage. The efts leave the water for terrestrial woodland habitats, where they spend the next 3 – 7 years. A second metamorphosis then occurs when the red efts become sexually mature, at which time they migrate back to aquatic habitats, where they take on the characteristics of the adult form, and spend the remainder of their life in the water.

Four of the salamanders potentially occurring in the PSA—spotted, Jefferson, blue-spotted, and marbled salamanders—are known as the mole salamanders because of their burrowing habits. These relatively large, robust salamanders (Figure 4-20) occur in forested habitats throughout the eastern United States. All of these species breed in temporary vernal pools, but they show slightly different trends in breeding. Spotted salamander is the only member of the group that is common in Massachusetts, with the remainder being species of conservation concern.

Figure 4-20 Spotted (upper two) and Jefferson salamanders.

The spotted and Jefferson salamanders are two of the four mole salamanders in western Massachusetts.

Spotted salamander adults, eggs (Figure 4-21), and larvae were common in many of the vernal pools throughout the PSA. They were found in 28 of the 68 vernal pools originally surveyed in 1998 (Table 4-1). Spotted salamanders are usually identified as an obligate vernal pool species (i.e., species that presumably breed only in the absence of fish in temporary pools). Klemens (1993), however, identifies a number of other habitats used for breeding, including floodplain swamps, marshes, bogs, margins of lakes and reservoirs, and beaver ponds, among others. Similar, varied habitat use was documented in the PSA and reference areas. While spotted salamanders were routinely documented in vernal pools, breeding activity and egg masses were also in shallow backwater habitats. Adults were also captured in pit-fall traps along the shoreline of the river.

These pitfall traps were on the opposite shore from the nearest suitable non-breeding habitat (i.e., upland hardwood forest), indicating that these salamanders do, in fact, cross and use these more permanent water bodies.

Figure 4-21 Spotted salamander egg masses.

Spotted salamander egg masses are often characterized by a milky opaque jelly capsule, with 50 to 150 eggs.

During the breeding period, male spotted salamanders migrate to breeding pools first, followed by females a few days later. This usually occurs at the very beginning of April in the PSA. Both sexes may travel as far as 120 m (400 feet) from nonbreeding territory to a breeding pool (Madison 1997). Spotted salamanders tend to congregate in large numbers after the first warm spring rain, and breed in mass. Males deposit spermatophores on the bottom of the pools during an elaborate courtship of nudging, intertwining, and tail fanning. The females then pick up the spermatophores and store them in their cloaca for egg fertilization. These spermatophores can be seen littering the bottom of pools immediately following breeding events. Spotted salamanders show a high degree of fidelity to breeding pools, returning to the same location year after year. Whitford and Vinegar (1966) reported that 86 percent of marked spotted salamanders returned to the same pool after one year and 77 percent returned the second year, with an estimated annual mortality of 10.5 percent.

Interestingly, an un-spotted spotted salamander was found in the PSA (Figure 4-22). While this animal was originally thought to be a hybrid between a spotted and Jefferson salamander, because of the lack of spots and a thinner, more streamlined body form,

further investigation has found that adults lacking spots do occur in low frequencies in certain populations and that this individual was most likely a spotted salamander (Husting 1965, Easterla 1968, Petranka 1998).

Figure 4-22 Spotted salamander without its usual markings.

Note faint pigment spots located on the side of the neck, just in front of the right foreleg, and on base of tail.

Jefferson salamanders were less common than spotted, occurring only at vernal pool 46-VP-5 in the red maple swamp south of New Lenox Road and at a semi-permanent pool in October Mountain State Forest (Maps 4-2 and 4-3). The timing of breeding and breeding habitat requirements for Jefferson salamanders is very similar to spotted salamanders, although Jefferson salamanders usually show up a few days before spotted salamanders. Jefferson salamander egg masses are deposited a few days after courtship, in small masses contained within a gelatinous coating that adhere to aquatic vegetation or submerged branches (Figure 4-23).

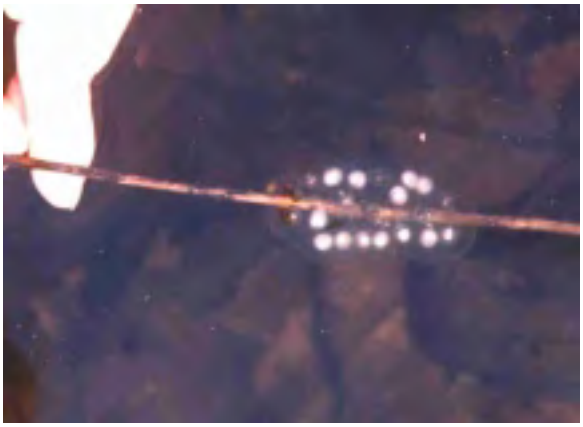


Figure 4-23 Jefferson salamander egg mass.

Masses are smaller, sausage-shaped, and contain fewer eggs than spotted salamander egg masses – usually around 30 (Klemens 1993).

The Jefferson salamander, blue-spotted salamander, and their hybrids form a group known as the Jefferson complex (see Section 4.0). Visually, these species and hybrids are difficult to distinguish and often electrophoretic evidence is the only method to identifiy an individual with certainty. However, in general, Jefferson salamanders are uniformly grayish brown and have larger egg masses. Blue-spotted salamanders and the hybrids usually have varying amounts blue flecks and deposit their eggs singularly or in small groups of 2 to 4 (Knox 1999b). The hybrids, which usually have varying amounts of faint blue flecks or undertones, tend to produce intermediate-sized egg masses.

Marbled salamanders are unique among the mole salamanders found in the PSA in that they breed in the fall (September to October). Marbled salamanders congregate in dry vernal pools and courtship takes place under the leaf litter. The eggs are then deposited individually in a nest, usually in a small cavity under a log or leaf litter. The female remains to guard her eggs until fall rainwater floods the pools, inundating the eggs. Hatching is triggered by inundation and occurs a few days after the pool fills with water. Marbled salamander eggs are able to withstand extended desiccation without mortality and in some cases when the pool fails to flood in the autumn, eggs may be able to overwinter and hatch in the spring (Klemens 1993).

All adult mole salamanders are terrestrial when not breeding, spending their lives predominately underground in burrows or beneath large decaying logs and rocks. They

often utilize small mammal tunnels and burrows but will excavate their own if necessary. A study in New York found that 80 percent of the small mammal tunnels utilized by spotted salamanders during the summer were short-tailed shrew burrows, but overwintering sites were either white-footed mice burrows or rock recesses (Madison 1997). Their home ranges are small, but largely unreported. One tracking study found spotted salamanders using an area of only 0.03 m^2 (0.3 square feet) around their burrows (DeGraaf and Yamasaki 2001). Burrows are located within the proximity of breeding pools, usually within 213 m (700 feet) (Kleeberger and Werner 1983, Madison 1997, Semlitsch 1998). Mole salamanders spend most of the year within their burrows, foraging nocturnally for earthworms, snails, slugs, and larval and adult insects, particularly beetles. Mole salamanders may occasionally forage aboveground, under the leaf litter during rainy periods, but stay within close proximity to their burrows. The only above-ground travel done by mole salamanders is during the spring or fall migration to and from breeding pools and by newly metamorphosed juveniles dispersing from the pools.

The remaining salamanders expected to occur in the vicinity of the PSA, which include northern dusky, northern two-lined, spring, four-toed, and redback salamander, are all members of the plethodontid family. These salamanders have no lungs and absorb oxygen through their moist skin and membranes in their throat. Their physiology requires these salamanders to inhabit cool, moist habitats. They mostly use terrestrial habitats, such as mesic upland forests or small high-gradient streams on rocky slopes, so they would not be expected to be common in the PSA because of the presence of forests that are flooded one or more times annually.

The northern redback salamander, the only entirely terrestrial salamander in New England, was the most commonly observed of these species, although sightings were infrequent. In many forested communities these small salamanders make up a large percentage of the total vertebrate biomass. In the Hubbard Brook Experimental Forest in New Hampshire, red-backed salamanders have been estimated to have a biomass of 1,770 g/ha (Burton and Likens 1975) and densities of approximately one per square yard have been reported from southern Maine (Witham 1999). They are most abundant in well-

drained upland habitats and typically avoid extremely wet bottomland areas. Within the PSA they were most common near the upland edges of transitional floodplain forests.

The northern dusky salamander, northern two-lined salamander, and northern spring salamander require undisturbed high-gradient stream or spring communities such as those found on October Mountain. They are not likely to occur in the PSA in any significant numbers, with the possible exception of Roaring Brook and no effort was made to specifically target these species during our survey effort. The only observations of these species were one sighting of a northern spring salamander crossing Woodland Road in the vicinity of Roaring Brook on a rainy night in the summer of 1999, and one northern two-lined salamander captured in a pit trap near Yokum Brook in 2000.

Finally, one four-toed salamander was captured in a pitfall trap in a red maple swamp (Figure 4-24). This species is typically found in wet forests and bogs. It breeds in small pools or slow moving streams in boggy, mossy areas, where it lays its eggs, sometimes communally. The pool where this individual was caught, 46-VP-5, is surrounded by suitable habitat (red maple swamp and black ash-red maple-tamarack calcareous seepage swamp) that is infrequently flooded.

Figure 4-24 Northern four-toed salamander captured in PSA.

Note the four toes and slight constriction, or narrowing, at the base of the tail. This individual dropped its tail soon after, a habit characteristic of this species as predator defense.

4.0 Rare, Threatened, and Endangered Reptiles and Amphibians

Nine species listed by the MNHESP potentially occur in the PSA, including one Endangered, one Threatened, and seven Special Concern species. Turtles represent four of these while salamanders make up the remaining five.

4.1 Reptiles

The wood turtle was the only reptile of conservation concern in the PSA that was actually observed. Wood turtles were once common throughout New England but are currently rare. They are listed as Special Concern in Massachusetts, Maine, Vermont, and Connecticut. In Massachusetts only 153 sightings were recorded in 97 locations from 1978 to 1994 (MNHESP 1994a). Since 1998, eight wood turtles were documented in the PSA. Over two days in May 1998, two males and a female were observed in the vicinity of the confluence. Another nearby occurrence (less than a quarter mile away) not long afterwards included a female with eggs that was struck and killed by a car in Pittsfield. While the death of one breeding-age female may be significant to small populations, the discovery of that particular female indicated that wood turtles are indeed attempting to breed and nest in the PSA.

The remaining listed turtles include the spotted, eastern box (both Special Concern), and bog turtle (state Endangered). The bog turtle, while extremely unlikely to occur in the PSA due to its affinity for fens, has a known range from Berkshire County south into Connecticut. Furthermore, the wet meadows and shrub swamps of the PSA could provide marginal habitat for them. Box turtles are highly terrestrial and would therefore not be expected to use the PSA. Suitable adjacent habitat along October Mountain, however, would allow for infrequent use of the PSA by box turtles, if they occur there. They are known from the Hinsdale Flats SWMA reference area (T. Gulo, MDFW, personal communication).

While several state listed snakes (such as black rat, northern copperhead, and timber rattler) have historically occurred in western Massachusetts, no recent occurrences are known from the PSA. Additionally, since these species would not typically use the wetland habitats here, none are expected to occur.

4.2 Amphibians

Five salamanders of conservation concern potentially occur within or next to the PSA: Jefferson, blue-spotted, spring, and four-toed salamanders (all Special Concern), and the marbled salamander (Threatened). Three of these species, Jefferson, spring, and four-toed salamanders, were observed in the PSA during 1998 – 2000 field studies.

The Jefferson salamander, blue-spotted salamander, and their hybrids compose the Jefferson complex. Members of this complex form a continuum in appearance from the grayish-brown coloration, pale blue flecks, and wide snout of the Jefferson salamander to the bluish-black coloration, prominent blue spots, and narrow snout of the blue-spotted salamander. It is believed that these two species originated from a common ancestor during the last Ice Age when glaciers separated the two populations. After the glacier retreated, the two populations met in New England and the Great Lakes Region, where they now commonly interbreed (Klemens 1993). The parent species normally have two sets of chromosomes and are known as diploid. Their hybrids, however, have three sets of chromosomes (triploid) and are almost always females (Petranka 1998). The hybrids having two sets of Jefferson genes and one set of blue-spotted genes are called the silvery salamander, while those hybrids having two sets of blue-spotted genes and one set of Jefferson genes are called the Tremblay salamander. These hybrids are not easily identified based on morphological characteristics, and laboratory tests are needed to positively identity them. One study conducted in Maine found that 70 percent of blue-spotted salamanders were hybrids (Knox 1999b). In areas where hybrids occur they usually outnumber the parent species two to one, resulting in females being twice as common as males. Hybrids are also commonly found in populations where only one of the parent species is known to occur.

The Jefferson salamander and its hybrids are listed as a species of Special Concern in Massachusetts. Forty-four populations are currently known in Massachusetts, primarily in the western part of the state in the Connecticut and Housatonic River valleys (MNHESP 1994b). This species occurs from southern New Hampshire south through Massachusetts and Connecticut west of the Connecticut River, into southern New York, Pennsylvania, south into West Virginia, and west into Kentucky and southern Indiana

(Petranka 1998). Jefferson salamanders range from locally common to rare in New England. Jefferson salamanders were documented breeding in one pool in the PSA (Map 4-2). Males and females were captured at this pool in 1999 and egg masses were observed. Jefferson salamander egg masses were also observed in one pool on October Mountain State Forest, near the access road to Washington Mountain Lake (Map 4-3).

The blue-spotted salamander is also listed as a species of Special Concern in Massachusetts. Ninety-nine populations have currently been documented in Massachusetts, predominately from east of the Connecticut River Valley. These populations are comprised of blue-spotted salamanders and their hybrids. Blue-spotted salamanders can be found discontinuously from the Gulf of Saint Lawrence across southern Canada to Lake Winnipeg and south throughout New England, New York, and northern Ohio, Indiana, and Illinois (Petranka 1998). The only known populations of genetically pure blue-spotteds in the northeast occurs on Prince Edward Island, Canada, and on Long Island, New York. Though widely distributed, blue-spotted salamanders are locally uncommon and threatened in much of their southern range. Blue-spotted salamanders prefer moist, shaded northern hardwood and hemlock forests, with shallow vernal pools for breeding. They were not found in the PSA.

The Marbled salamander is currently listed as a Threatened species in Massachusetts. Forty-three current populations are known to exist in Massachusetts (MNHESP 1994c). Populations in Massachusetts occur primarily east of the Connecticut River and in the Berkshire hills of western Massachusetts. This species occurs from southern New Hampshire and Massachusetts, west across southern New York and Pennsylvania to Missouri, south into eastern Texas, the Mississippi basin, and the panhandle of Florida (Petranka 1998). The marbled salamander is uncommon throughout New England, primarily because it is at its northernmost limit here. This species is found in well-drained sandy and gravelly soil in mixed deciduous woodlands, especially oak-maple and oak-hickory. Populations are small and localized in New England, occurring in forested uplands within a 213-m (700-foot) radius of breeding pools (DeGraaf and Yamasaki 2001).

The northern spring salamander is a species of Special Concern in Massachusetts and Maine and is listed as Threatened in Connecticut. This species is uncommon through most of its range. It occurs from south-central Maine, New Hampshire, and Vermont, south through the Appalachian Mountains and foothills to northern Georgia and northeastern Mississippi, west to eastern Tennessee, Kentucky, and Ohio, with the exception of the Atlantic costal plain (Petranka 1998). Within Massachusetts 37 populations have been verified from the western two thirds of the state (MNHESP 1994d). Northern spring salamanders are locally common in northwestern Berkshire County and southern Vermont. These salamanders have no lungs and must absorb oxygen through their skin and membranes in their throat (Markowsky 1999). They are large salamanders and have a small surface area, relative to their mass, through which to absorb oxygen. This restricts northern spring salamanders to cold (<12º C) water bodies with a high degree of dissolved oxygen. Northern spring salamanders are found only in undisturbed areas, as they are especially susceptible to stream degradation. One spring salamander was found crossing the Woodland Road in the vicinity of Roaring Brook, at the southern end of the PSA.

The four-toed salamander is listed as a species of Special Concern in Massachusetts, Vermont, and Maine (The Natural Heritage Network 2000). This species is widespread in Massachusetts with records from over 40 locations throughout the state, but it is still considered relatively rare (MNHESP 1994). The four-toed salamander occurs from southern Maine, New Hampshire, and Vermont west through New York, around the Great Lakes into Wisconsin, and south through the Appalachian Mountains to Georgia and Mississippi. The main habitat requirement for this species is wet moss within the vicinity of open water. In Massachusetts, four-toed salamanders are most commonly found in swamps dominated by red maple and white cedar. Due to the four-toed salamanders diminutive size, retiring habits, and nocturnal behavior, it is seldom observed and may therefore be more common than believed, especially considering the abundance of suitable habitat in New England (Burgason 1999). Two four-toed salamanders were captured in pitfall traps surrounding vernal pool 46-VP-5 during the 1999 vernal pool amphibian reproduction study (Woodlot Alternatives, Inc. *in prep*).

5.0 Literature Cited

Bishop, S.C. 1943. Handbook of Salamanders: The Salamanders of the United States, of Canada, and of Lower California. Comstock Publ. Co., Ithaca, NY, USA.

Burgason, B.N. 1999. Four-Toed Salamander (*Hemidactylium scutatum*). p. 62-65. In M.L. Hunter Jr., A.J.K. Calhoun and M. McCollough (ed.) Maine Amphibians and Reptiles. University of Maine Press, Orono, ME, USA.

Burton, T.M., and G.E. Likens. 1975. Salamander populations and biomass in the Hubbard Brook Experimental Forest, New Hampshire. Copeia 3:541-546.

Conant, R. 1986. The Peterson Field Guide Series: A Field Guide to Reptiles and Amphibians of Eastern/Central North America. Houghton Mifflin Company, Boston, MA, USA.

Crump, M.L., and N.J. Scott Jr. 1994. Visual Encounter Surveys. p. 84-92. In R.H. Heyer (ed.) Measuring and Monitoring Biological Diversity, Standard Methods for Amphibians. Smithsonian Institution Press, Washington, DC, USA.

Davis, S.L. 1999. Spring Peeper (*Pseudacris crucifer*). p. 85-89. In M.L. Hunter Jr., A.J.K. Calhoun and McCollough (ed.) Maine Amphibians and Reptiles. Univeristy of Maine Press, Orono, ME, USA.

DeGraaf, R.M., and D.D. Rudis. 1983. Amphibians and Reptiles of New England: Habitats and Natural History. University of Massachusetts Press, Amherst, MA, USA.

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH, USA.

Duellman, W.E., and L. Trueb. 1986. Biology of Amphibians. John Hopkins University Press, Baltimore, MD, USA.

Easterla, D.A. 1968. Melanistic spotted salamanders in northeast Arkansas. Herpetologica 24:330-331.

Ernst, C.H., R.W. Barbour, and J.E. Lovich. 1994. Turtles of the United States and Canada. Smithsonian Institution Press, Washington, DC, USA.

Hamilton, W.J. 1948. The food and feeding behavior of the green frog, Rana clamitans (Latreille), in New York state. Copeia 1948(3):203-207.

Hunter, M.L., A. Calhoun, and M. McCollough. 1999. Maine Amphibians and Reptiles. The University of Maine Press, Orono, ME, USA.

Husting, E.L. 1965. Survival and breeding structure in a population of Ambystoma maculatum. Copeia 1965:352-362.

Kenney, L.P. 1995. Wicked Big Puddles: A Guide to the Study and Certification of Vernal Pools. 2nd ed. Reading Memorial High School and the Vernal Pool Association, Reading, MA, USA.

Kleeberger, S.R., and J.K. Werner. 1983. Post-breeding migration and summer movement of Ambystoma maculatum. Journal of Herpetology 17(2):176-177.

Klemens, M.W. 1993. The amphibians and reptiles of Connecticut and adjacent regions. State Geol. Nat. Hist. Surv. Conn. Bull. 112. 318pp.

Knox, C.B. 1999a. Wood Frog *(Rana sylvatica*). p. 111-118. In M.L. Hunter Jr., A.J.K. Calhoun and M. McCollough (ed.) Maine Amphibians and Reptiles. University of Maine Press, Orono, ME, USA.

_____ 1999b. Blue-Spotted Salamander (*Ambystoma laterale*). p. 37-43. In M.L. Hunter Jr., A.J.K. Calhoun and M. McCollough (ed.) Maine Amphibians and Reptiles. University of Maine Press, Orono, ME, USA.

Madison, D.M. 1997. The emigration of radio-implanted spotted salamanders, Ambystoma maculatum. Journal of Herpetology 31(4):542-551.

Mairs, D.F. 1999. Pickerel Frog (*Rana palustris*). p. 98-100. In M.L. Hunter Jr., A.J.K. Calhoun and M. McCollough (ed.) Maine Amphibians and Reptiles. University of Maine Pres, Orono, ME, USA.

Markowsky, J.K. 1999. Spring Salamander (*Gyrinophilus porphyriticus*). p. 59-61. In M.L. Hunter Jr., A.J.K. Calhoun and M. McCollough (ed.) Maine Amphibians and Reptiles. University of Maine Press, Orono, ME, USA.

MNHESP (Massachusetts Natural Heritage and Endangered Species Program). 1994a. Endangered Species of Massachusetts - Wood Turtle (*Clemmys insculpta*). Fact sheet prepared by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Westborough, MA, USA.

_____ 1994b. Massachusetts Species of Special Concern - Jefferson Salamander (*Ambystoma jeffersonianum*). Fact sheet prepared by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Westborough, MA, USA.

_____ 1994c. Threatened Species of Massachusetts - Marbled Salamander (*Ambystoma opacum*). Fact sheet prepared by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Westborough, MA, USA.

_____ 1994d. Massachusetts Species of Special Concern - Spring Salamander (*Gyrinophilus porphyriticus*). Fact sheet prepared by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Westborough, MA, USA.

_____ 1994e. Massachusetts Species of Special Concern - Four-Toed Salamander (*Hemidactylium scutatum*). Fact sheet prepared by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Westborough, MA, USA.

The Natural Heritage Network. 2000. U.S. Natural Heritage Programs. URL http://www.heritage.tnc.org/nhp/us/usmap.html.

Petranka, J.W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington, DC, USA.

Petranka, J.W., and D.A.G. Thomas. 1995. Explosive breeding reduces egg and tadpole cannibalism in the wood frog, *Rana sylvatica*. Animal Behavior 50:731-739.

Pfingston, R.A., and F.L. Downs. 1989. Salamanders of Ohio. Vol. 7, No. 2. Ohio Bilo. Surv. Bull. New Series, Columbus, OH, USA.

Semlitsch, R.D. 1998. Biological delineation of terrestrial buffer zones for pond-breeding amphibians. Conservation Biology 12:1113-1119.

Stockwell, S.S. 1999. Green Frog (*Rana clamitans*). p. 94-97. In M.L. Hunter Jr., A.J.K. Calhoun and M. McCollough (ed.) Maine Amphibians and Reptiles. University of Maine Press, Orono, ME, USA.

Whitford, W.G., and A. Vinegar. 1966. Homing, survivorship, and overwintering of larvae in spotted salamanders, Ambystoma maculatum. Copeia 3:515-519.

Wilbur, H.M., and J.P. Collins. 1973. Ecological aspects of amphibian metamorphosis. Science 182:1305-1314.

Witham, J.W. 1999. Northern Redback Salamander (*Plethodon cinereus*). p. 66-70. In M.L. Hunter Jr., A.J.K. Calhoun and M. McCollough (ed.) Maine Amphibians and Reptiles. University of Maine Press, Orono, ME, USA.

Wright, A.H., and A.A. Wright. 1949. Handbook of Frogs and Toads of the United States and Canada. 3rd ed. Cornell Universtiy Press, Ithaca, NY, USA.

Chapter 5 Birds

1.0 Introduction

The avian community in the PSA was studied over a three-year period, from 1998 to 2000. To characterize the community, a literature review of local bird species and populations was conducted along with the collection of field data. Field data included methods targeted at specific species, as well as more general, reconnaissance-level investigations of species' presence, relative abundance, and habitat use.

2.0 Methods

2.1 Species:Habitat Association

A major goal for characterization of the bird community in the PSA was to identify all species that could reasonably be expected to occur, the habitats they would use, and when they would use them. The foundation of this work included a review of relevant literature on bird populations in western Massachusetts. An array of local and regional references on bird communities in the PSA was first used to identify the species whose range encompassed the study area (Andrle and Carroll 1984, Veit and Petersen 1993, Bevier 1994, DeGraaf and Yamasaki 2001). General and technical references on the habitat requirements and use, seasonality of occurrence, and relative abundance in the region were then used to refine the list and build a matrix to include only those species whose preferred habitats occur within the PSA (Bellrose 1980, Ehrlich *et al.* 1988, Sauer *et al.* 2000, DeGraaf and Yamasaki 2001).

As part of this effort, local and regional experts were consulted to obtain unpublished records regarding the historic occurrence of some species in the area. For example, the MNHESP, the MDFW, and the USFWS were contacted to determine present or historical occurrences of species of conservation concern, and the Berkshire Museum and the Massachusetts Audubon Society were consulted to determine if any records of raptors from the Housatonic River drainage were available from surveys sponsored or conducted

by these agencies. Any information received from these agencies, organizations, and individuals was then incorporated into the species matrix.

Field surveys were conducted to compliment the information compiled in the species matrix. These surveys focused on determining species' presence, although several methods were used to quantitatively document relative species and their abundance, or to sample animal tissues, as described below. Observations that were recorded in the field were used to refine the matrix to accurately depict the habitat use and seasonality of occurrence for all bird species expected to occur in the primary and reference study areas.

2.2 Incidental Observations

The presence of birds within the PSA was documented during field investigations in 1998, 1999, and 2000. Many field investigations were detailed studies in support of ecological risk assessment surveys and consisted of specific methods targeted at collecting animals from a variety of taxonomic groups to sample their tissues. Those investigations, however, provided an opportunity to confirm the presence of birds within the PSA by recording incidental observations of birds seen. During the course of those other investigations, birds observed within the PSA and reference areas were recorded, along with the habitat that they occurred in. When appropriate, other notes were recorded, including activity, interactions with other species, and general health.

2.3 Waterfowl Trapping

Waterfowl were trapped and collected in 1998 to provide tissue samples to USEPA as part of a human and ecological risk assessment. Two floating traps and one clover-leaf walk-in trap were used to capture waterfowl in backwaters near Woods Pond from 27 August to 16 September, 1998 (Map 5-1) (Figure 5-1). Trapping was conducted to supplement a sample of wood ducks and mallards captured by the MDFW in Woods Pond and adjacent backwaters. Three traps were also placed at the Threemile Pond SWMA reference area.

Figure 5-1 Clover-leaf walk-in type trap.

2.4 Wading and Marshbird Surveys

Marsh and wading bird surveys were conducted in 1998 using playback point counts to identify species utilizing the PSA wetlands. Forty-seven survey stations were established on seven general survey routes (Map 5-2). Survey routes were selected based on the location of suitable deep and shallow emergent habitat. Individual survey stations were established at a density of approximately one point per 4.9 ha of wetland.

Wading bird use was assessed using the methods described by Gibbs and Melvin (1993). The survey routes were visited three times from 8 June to 9 July 1998. Visits occurred between 30 minutes before, to approximately four hours after, sunrise. All marsh and wading birds seen or heard during a 15-minute period prior to the start of a survey were also recorded. Playbacks from a portable cassette player (Figure 5-2) were broadcast at each station for Virginia rail, sora, green heron, American bittern, least bittern, American coot, common moorhen, pied-billed grebe, and king rail. Approximately 50 seconds of calls per species were broadcast, interspersed with 10 seconds of silence. Additional information recorded at each survey location included wetland name, start- and end-time, observer, date, visit number, wind speed, cloud cover, precipitation, responses per species, and all other wildlife sightings.

Figure 5-2 Wading bird survey in PSA.

2.5 Hawk and Owl Surveys

Playback point counts (Kennedy and Stahlecker 1993) were used to survey hawks and owls (i.e., raptors) within the PSA and in three reference areas in 1999. Owls were surveyed on five occasions from February to June, and hawks were surveyed on three occasions from May to August. Within the PSA, hawk transects were positioned along the Housatonic River, from the confluence of the East and West Branches to Woods Pond. Owl transects were positioned along the Woodland Road in October Mountain State Forest near Woods Pond, and along the railroad tracks north of Lenox Station (Map 5-3). Hawk surveys were conducted at all reference areas (Maps 5-4, 5-5, and 5-6), while owl surveys were conducted only at Threemile Pond (Map 5-6). Point count locations were set at intervals of approximately 305 m (1,000 feet). At each survey point, playback calls were broadcast at 60°, 180°, and 300° for 10 seconds followed by 30 seconds of silence between each call. This was repeated with calls for the eight species of hawks or five species of owls expected to occur in the PSA and reference areas (Fuller and Mosher 1981, Veit and Petersen 1993).

Playbacks began with smaller-sized species and proceeded to larger species to avoid suppressing the responses of smaller species with the initial playbacks of the larger species. Approximately 10 minutes were spent at each point, during which time all hawks and owls observed or heard were identified and recorded. Additional data recorded included type of observation (e.g., call, visualization) and behavior. Hawk surveys were conducted between one half-hour before sunrise to sunset, while owl surveys were conducted one half-hour after sunset to sunrise. Raptor transects were visited a minimum of three times during the breeding and post-breeding seasons (Fuller and Mosher 1981). Surveys were not performed when weather conditions were considered detrimental to nesting raptors with eggs or young (i.e., temperature or precipitation stress).

2.6 Belted Kingfisher Nest Surveys

In 1998, surveys for belted kingfisher nest sites were conducted to assist the USEPA in determining if this species would be a suitable candidate for a more detailed study. Surveys were conducted by canoe in the PSA. During the surveys, kingfisher activity and observation locations were recorded and riverbanks were inspected for potential kingfisher nest sites. Nest sites were identified based on the size of the excavated hole according to measurements from Bent (1940). Potential nest sites were photographed and mapped. Additional data including bank height, bank soil type, and top-of-slope vegetation were recorded.

2.7 Forest Bird Surveys

Point counts with unlimited distance were conducted in 1998 to identify the forest birds within the PSA (Blondel *et al*. 1981) (Map 5-7). Sixteen survey sites were selected to sample the forested habitat types and were distributed, or stratified, according to the abundance of each habitat type. Sample points were separated by a minimum distance of approximately 488 m (1,600 feet) to reduce the chance of overlap of bird observations (Ralph *et al.* 1993). Each point was visited once in late June 1998 during the early morning hours (i.e., one half-hour before sunrise to four hours after sunrise). At each point, all birds seen or heard during a 20-minute sampling period were recorded.

Additional information recorded at each survey location included date, start- and end-time, percent cloud cover, degree of precipitation, wind speed and direction, temperature, natural community type, dominant species of overstory, sapling, shrub, herb, and woody vine stratums, and mean and maximum tree height. Five photographs were taken at the survey points: one in each of the four cardinal directions and one vertically to document canopy composition. Results of point counts were used to revise the bird species matrix.

3.0 Bird Community Description

Birds represent the most diverse assemblage of vertebrate species in the PSA. A total of 173 species were identified as potentially occurring in the vicinity of the PSA (Attachment C). Of these, 122 are passerines (songbirds and forest birds), 19 are raptors (hawks and owls), and 32 are water birds (wading, marsh, and shore birds, waterfowl, and gulls). The list of species expected to occur was based on the review of scientific literature, historical surveys, and local and regional references on species distribution. Of those species expected to occur, 101 occur only during the breeding period, 50 occur year-round, 12 only during migration, and 10 only in winter. Nearly 80 percent of these, or 139 species, were confirmed to occur in or near the PSA during the three years of field investigations.

The diversity of the bird community is largely due to the diverse nature of the habitats available within the PSA. The preponderance of large, open aquatic communities surrounded by forested and scrub-shrub habitats in the lower part of the PSA (i.e., Woods Pond and its backwaters) allows for use by waterbirds as well as many of the forest and shrub-associated landbirds. Ducks and geese were common in this area, as were green and great blue herons. The emergent and shrub swamp borders of these areas provide nesting habitat for a number of wetland-dependent species such as red-winged blackbirds and swamp sparrows. Swallows, cedar waxwings, and nighthawks feed over these habitats. Kingfishers also commonly use these areas, as well as the river, while hunting. The almost daily observations of kingfisher throughout the growing season indicates that they are likely nesting in the study area. Surveys for nest sites in 1998 indicated that there are suitable nesting locations, some of which appear to be used.

The middle and upper sections of the PSA are composed of a mixture of forested communities adjacent to open, largely agricultural lands or wet meadow habitat. These areas are suitable for a different assemblage of birds than those using Woods Pond and the adjacent backwaters. For example, far fewer waterfowl and marshbirds were observed north of Yokum Brook than south of it, but many of the forest songbirds observed during point counts occurred from Woods Pond to the Holmes Road. Species common to these areas included habitat specialists that require forested habitats, such as the thrushes and wood warblers, and habitat generalists that are found in a variety of habitats, such as the American robin, black-capped chickadee, and blue jay.

The forested wetland communities of the PSA generally provide habitat for the most number of bird species, from 88 species in red maple swamps to 96 species in transitional floodplain forests. The higher number of species in these areas is in response to the diverse vertical structure available from the ground to the forest canopy in these communities, as well as their adjacency to an abundant food supply. The upland forests, while having larger trees, often have less developed shrubs, saplings, and subcanopy trees, which reduces the structural diversity in these forests.

Open habitats tend to have fewer birds associated with them, again because of reduced structural diversity. An exception to this is the cultural grasslands, with 88 species potentially occurring. While this community receives high bird use, relatively few birds nest in these areas. Birds that do nest include killdeer, some sparrows, bobolinks, and, where shrubs are invading, some shrub nesters. Most of the bird use of this community is for feeding during the growing season; a wide range of species can be observed feeding in these areas, from the game birds (ring-necked pheasant, bobwhite, turkey) and songbirds (American robin, Northern cardinal, sparrows) that feed on plant matter and terrestrial invertebrates, to swallows, hawks, and nightjars that feed on flying insects and larger animal prey. The remainder of the open habitats, such as wet meadows, agricultural fields, and residential areas, tend to have fewer birds associated with them because of periodic or constant disturbances.

3.1 Carnivorous Birds

Carnivorous birds, those feeding almost exclusively on animal tissue, are represented by a wide range of species. The smallest avian carnivores, such as the swallows, flycatchers, and warblers, tend to feed on small insect prey while larger carnivores, such as hawks and owls, feed on larger vertebrate prey. Exceptions to this occur, however. For example, waterfowl, despite their larger size, feed primarily on small aquatic invertebrates and plants. Conversely, the northern shrike, a robin-sized songbird, preys on small mammals that can be up to half its size. Regardless of the target prey species, most tend to be opportunistic while feeding and may take a wide range of animals. The great blue heron, for example, feeds mostly on fish but also invertebrates, amphibians, reptiles, birds, and mammals (Butler 1992).

3.1.1 Hawks and Owls

No historic hawk and owl (raptor) surveys had been conducted in the Housatonic River valley by any of the agencies or groups contacted over the course of these investigations. However, the North American Breeding Bird Survey (BBS) is a large-scale avian survey program initiated in 1966 and coordinated by the USGS. The BBS is a roadside survey program, with more than 4,100 45-km (24.5-mile) long survey routes that are surveyed annually. Three survey routes occur in Berkshire County: in Pittsfield, Cheshire, and Sheffield. Since 1966, observers on these three routes have documented eight raptor species: turkey vulture, bald eagle, sharp-shinned hawk, Cooper's hawk, broad-winged hawk, red-tailed hawk, American kestrel, and barred owl (Sauer *et al.* 2000). Data for the red-tailed hawk were not available, but all of the other documented species were seen infrequently over that time period. In fact, bald eagles and sharp-shinned hawks were only observed once and Cooper's hawks were only observed twice on all three of these routes, combined. The turkey vulture, broad-winged hawk, and American kestrel were observed only slightly more often. Barred owls occurred very infrequently on the Cheshire and Pittsfield BBS routes (although two were recorded on the Pittsfield route in 1999), but they were more common on the Sheffield route, with three of the last four years having five or six owls recorded (Sauer *et al.* 2000).

Initial, reconnaissance-level observations of hawks and owls in the PSA in 1998 documented 10 raptor species. These included all species recorded on the BBS routes except Cooper's hawk, with the addition of osprey, northern harrier, and northern goshawk. Some species were observed during the nesting season, but most observations occurred largely in late summer and early fall, when these species migrate. Turkey vultures were common throughout the summer and were usually observed soaring over agricultural lands adjacent to the Housatonic River. Osprey and bald eagles were observed during the fall migration periods and were most commonly observed flying, feeding, or perching in the vicinity of Woods Pond and, in the case of the osprey, seen feeding on goldfish. Broad-winged and red-tailed hawks were commonly observed, along with American kestrels. These three species were most common in upland habitats adjacent to the Housatonic River, but they were also observed hunting over wet meadow and shallow emergent habitats in the PSA. Sharp-shinned hawks, northern goshawks, and barred owls were also seen, but observations were very infrequent. Despite the confirmation of nearly one-half of the species expected to occur, the lack of breeding season observations prompted playback surveys in 1999.

The playback surveys documented 11 raptor species during the nesting season (Table 5-1), including four species that had not previously been observed. Seven species responded to calls played in the PSA and a total of seven species responded from the reference areas. Northern harrier and red-shouldered hawk responses were documented in the PSA but not at the reference areas. Conversely, the sharp-shinned hawk, Cooper's hawk, and northern goshawk (all woodland accipiter hawks) responses were documented only in the reference areas. Great horned, barred, and northern saw-whet owls were documented in the PSA during playback surveys. Only the great horned and barred owls responded to playback surveys at the Threemile Pond SWMA reference area.

Differences in the results of the hawk surveys are attributable to habitat differences between the PSA and the reference areas. Northern harriers and American kestrels breed in open habitats, particularly open wetlands, wet, lightly grazed pastures, old fields, freshwater marshes, dry uplands, and mesic grasslands and many of the other species hunt in and near these areas (MacWhirter and Bildstein 1996, DeGraaf and Yamasaki

2001). The PSA has an abundance of this type of habitat. The PSA also contains a large amount of floodplain forest dominated by silver maple, one of the preferred habitats of the red-shouldered hawk (Crocoll 1994). This species generally requires extensive forest stands consisting of mature trees and an open, park-like appearance to the subcanopy and understory (Crocoll 1994). However, no red-shouldered hawk nests were found in the PSA.

The reference areas differed from the PSA in that they generally consisted of isolated aquatic communities surrounded by relatively intact upland deciduous and mixed forest. The three accipiters (sharp-shinned hawk, Cooper's hawk, and northern goshawk) that responded to playback calls only in the reference areas are species of extensive mixed and deciduous forest (Rosenfield and Bielefeldt 1993, Squiers and Reynolds 1997, Bildstein and Meyer 2000) and would, therefore, prefer the forests surrounding the reference areas and the lower half of the PSA, which is also part of a large contiguous forest (i.e., October Mountain State Forest).

Most species documented through incidental observations likely do not breed within the PSA. These individuals (such as osprey and bald eagles) were simply migrating through the area. Other species that breed nearby likely use the PSA only infrequently and, therefore, were not documented during playback surveys.

Table 5-1 1999 raptor survey results.

Species Name	PSA	Threemile Pond SWMA	October Mountain State Forest	Hinsdale Flats SWMA
Turkey vulture				
Osprey				
Bald eagle				
northern harrier	CR		IO	
sharp-shinned hawk	IO			CR
Cooper's hawk	IO	CR	CR	
northern goshawk	IO		CR	
red-shouldered hawk	CR			
broad-winged hawk	CR	CR	IO	CR
red-tailed hawk	CR	CR	IO	CR
Rough-legged hawk			yes	
American kestrel	CR			
Peregrine falcon				
Common barn owl				
great horned owl	CR	CR		
barred owl	CR	CR	IO	
northern saw-whet owl	CR			
bald eagle	IO	IO		
osprey	IO		IO	
turkey vulture	IO	IO	IO	IO

CR = Call response during playback surveys.

IO = Incidental observation, not observed during playback surveys.

During the playback point counts and throughout the 1998-2000 field seasons, efforts were made to identify and locate nests of breeding hawks and owls within the PSA and reference areas. Only one confirmed nest was found, that of an American kestrel on the west side of the Housatonic River, just north of New Lenox Road. The nest cavity was located near the top of an approximately 20-m telephone pole, positioned in the middle of a cleared field, adjacent to forested upland habitat. Two adult kestrels, one of which was confirmed as male, were observed entering the cavity, and what sounded like begging cries were heard originating from the cavity. Young were not observed fledging from the cavity, but four or five juvenile kestrels (aged according to Palmer 1988a) were observed perching along power lines located approximately 300 m from the cavity. The response of raptors to playback calls represents a territorial behavior attributable to nesting activities. Therefore, while only one raptor nest was found, it is likely that other raptors, such as red-shouldered hawks, do nest in the vicinity of the PSA.

3.1.2 Wading Birds

Four wading bird species were observed in the PSA: American bittern, great blue heron, green heron, and black-crowned night heron. Only one species, the green heron, was documented during playback surveys in 1998 (see Section 3.2.2). However, these observations were of birds flying along the river near the survey points but not directly responding to the calls. Great blue herons were by far the most abundant wading bird observed. They occurred in a variety of shoreline habitats, particularly around Woods Pond and the nearby backwaters. Great blue herons were frequently observed hunting for fish and other aquatic prey in low-gradient stream, deep emergent marsh, and shallow emergent marsh communities. The green heron was the next most commonly seen wading bird. Observations of this species were distributed throughout the entire PSA and usually occurred in or near shrub swamp, the species' preferred habitat (DeGraaf and Yamasaki 2001). American bitterns were observed throughout the PSA on several occasions, mainly during spring and fall migration. One individual, however, was heard calling from within the PSA in July of 1999, indicating an intent to breed in the area. This species was most commonly observed in shallow emergent marsh communities.

Finally, only one black-crowned night heron was observed. One dead individual was found in a parking lot adjacent to the East Branch Housatonic River in Pittsfield.

3.1.3 Belted Kingfishers

During the 1998 surveys, three potential belted kingfisher nest sites were located in the PSA (Map 5-8). All three sites, along with a fourth found upstream of the PSA on East Branch Housatonic River, were located on sloping to steep eroded banks, which are typical nest sites for this species. The kingfisher nest sites were distributed largely in the northern half of the PSA. Despite the sparse distribution of nest sites, use of the river by kingfishers is much more widespread, with observations occurring from the confluence to Woods Pond.

3.1.4 Tree Swallows

Tree swallows, along with the other northeastern swallows, are highly insectivorous birds that were commonly observed feeding over the river. The tree swallow is the focus of a detailed reproductive study in the PSA by the USGS. As part of that study, a large number of nesting boxes were erected along the river to provide subject animals for the study. The USGS has provided the results of that study, including nest box occupancy (Custer 2002). Anecdotal observations suggest that the nest boxes were frequently used by tree swallows. Other birds that used the boxes in the PSA included house wrens and black-capped chickadees.

3.1.5 Other Species

The wildlife species matrix (Attachment C) identifies a large number of additional species with carnivorous feeding habits. Most of these species are insectivorous forest songbirds. These species take predominantly flying insects using a variety of methods, including active aerial pursuit by swallows and nightjars, sallying by flycatchers, and rapid capture and gleaning off leaves by vireos and warblers. Additionally, terrestrial invertebrates are caught by a number of species that actively probe the soil or search the stems, branches, foliage, and forest leaf litter.

The forest bird surveys conducted in 1998 documented 47 species, most of which were passerines, or perching songbirds (Table 5-2). The surveys were conducted largely in forested wetland communities, with red maple swamps and ash-maple-tamarack swamps being sampled the most. Consequently, a greater number of species were documented in these communities (32 and 35 species, respectively) than in the less-sampled floodplain forests and shrub swamps (7 and 26 species, respectively).

The veery was the most common songbird, seen at all 16 point count survey sites. The American robin, common yellowthroat, and black-capped chickadee were also common, occurring at 13, 11, and 9 survey sites, respectively. Other commonly observed species included the American goldfinch, northern waterthrush, red-winged blackbird, and yellow warbler, all of which occurred at half of the survey sites. Incidental observations of the avian community documented similar results with respect to the relative abundance of birds in the PSA.

Table 5-2 1998 forest bird survey results.

Species	Ecosystem, Community Type, and Survey Point Number																Percent Frequency
	Forested Wetlands													Shrub Wetlands			
	Red Maple Swamp					Black Ash-Red Maple-Tamarack Calcareous Seepage Swamp							Transitional Floodplain Forest	Shrub Swamp			
	2	3	4	5	7	6	9b	10	11	12	13	14	1	8	9a	Yokum	
Veery	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	100%
American robin	X	X	X	X		X	X		X	X	X		X	X	X	X	81%
Common yellowthroat	X		X			X	X	X	X		X		X	X	X	X	69%
Black-capped chickadee	X	X	X	X		X	X	X	X	X							56%
American goldfinch	X	X	X		X	X	X							X		X	50%
Northern waterthrush		X				X	X		X	X	X	X			X		50%
Red-winged blackbird			X						X	X	X	X		X	X	X	50%
Yellow warbler	X		X		X				X		X			X	X	X	50%
American crow	X	X	X	X		X		X							X		44%
Chestnut-sided warbler		X			X	X			X				X	X			38%
Great crested flycatcher	X	X					X		X					X	X		38%
Song sparrow	X	X	X								X	X	X				38%
Cedar waxwing					X				X		X				X	X	31%
Rose-breasted grosbeak	X		X	X					X						X		31%
Brown-headed cowbird	X							X						X	X		25%
Eastern wood pewee				X	X	X				X							25%
Northern flicker	X						X				X					X	25%
Red-breasted nuthatch			X	X	X					X							25%
Red-eyed vireo				X	X	X		X									25%
Warbling vireo		X						X						X	X		25%
Common grackle		X													X	X	19%
Gray catbird										X				X	X		19%
Hairy woodpecker		X		X						X							19%
Least flycatcher					X	X										X	19%
Mourning dove										X	X	X					19%
Northern cardinal				X										X		X	19%
Ovenbird				X		X		X									19%
White-throated sparrow	X		X					X									19%
Belted kingfisher						X					X						13%
Blue jay	X		X														13%
Baltimore oriole							X							X			13%
Swamp sparrow												X		X			13%
Tree swallow			X												X		13%
Wood thrush						X							X				13%
American redstart													X				6%
Black and white warbler				X													6%
Black-throated blue warbler						X											6%
Canada warbler								X									6%
Chimney swift	X																6%
Chipping sparrow		X															6%
Eastern pheobe			X														6%
Golden-crowned kinglet								X									6%
House wren															X		6%
Tufted titmouse										X							6%
Turkey vulture															X		6%
Willow flycatcher																X	6%
Wood duck																X	6%
unknown warbler						X											6%
No. Species per Site	15	13	15	12	9	16	9	11	11	11	11	6	7	14	17	13	
No. Species per Habitat	32					35							7	26			

* PFO = Palustrine Forested, PSS = Palustrine Scrub-Shrub, PEM = Palustrine Emergent wetland habitats

Percent Frequency = The number of plots at which a species was observed divided by the total number of plots (16) multiplied by 100.

3.2 Omnivorous Birds

Relatively fewer birds have diets equally mixed of animal and plant materials. Of the birds that have an omnivorous feeding strategy, most utilize peaks of food abundance as they are available. For example, in order to meet the nutritional demands of egg laying, many species of waterfowl time their migrations to arrive on breeding grounds when aquatic invertebrates, rich in protein, can form a high proportion of the diet of nesting hens and developing young (Krapu and Reinecke 1992). They then switch their feeding to the fruits, seeds, and tubers of aquatic and emergent plants as invertebrate populations decline and plant materials ripen or become available in late summer and fall.

3.2.1 Waterfowl

Nine species of ducks and geese potentially occur within the PSA and all but one, the ring-necked duck, have been observed. Three of these species, Canada geese, wood duck, and mallard, readily breed and broods of each species were routinely observed during the three years of study. Broods were observed most commonly in the backwater channels and wetlands between New Lenox Road and Woods Pond. Wood duck broods were also observed in the main channel of the river between Holmes Road and New Lenox Road. Similarly, Canada geese broods were observed in the river channel, backwaters, Woods Pond, and on residential lawns.

Trapping efforts in 1998 resulted in the collection of 15 wood ducks and one mallard in the backwaters of Woods Pond during 14 – 15 September 1998. Eight wood ducks and one mallard were retained for tissue analysis, along with 12 wood ducks and three mallards provided by MDFW. In addition, 20 wood ducks were captured from the Threemile Pond SWMA reference area and retained for tissue analysis. Many of the wood ducks caught in the PSA exhibited juvenile plumage characteristics, indicating that they were hatched and reared from within or very near the PSA.

Several waterfowl species were observed only during migration, including green-winged teal, common goldeneye, common merganser, and snow goose. Interestingly, American black ducks were only commonly observed in winter. Small groups of black ducks were

usually observed from November to April and often formed mixed flocks with mallards. No black duck broods were observed in the PSA and very few individual black ducks were observed during the nesting season.

3.2.2 Marsh Birds

Marsh bird surveys conducted in 1998 documented four of the nine species potentially occurring in the PSA (Table 5-3). The Virginia rail (Figure 5-3) was the most common species observed, with 11 individuals documented from eight survey sites between the Pittsfield WWTF and Woods Pond. Incidental observations of Virginia rails also occurred at the confluence of the East and West Branches and at a site north of New Lenox Road. Common moorhen responses were documented from four playback survey sites in downstream portions of the PSA and several additional individuals were repeatedly seen there in 1998. One sora was recorded adjacent to the Pittsfield WWTF. American coots were observed in the PSA during migration, but they were not documented during the playback surveys.

Figure 5-3 Virgina rail.

Rails were the most common marsh bird responding to playback surveys. This individual was displaced by a July 1998 storm event that flooded their typical shallow and deep emergent marsh habitats.

Table 5-3 1998 marsh and wading bird survey results.

Species	West Branch	Canoe Meadows	WWTF	Canoe Launch	Yokum Brook	Cul-de-sac North	Woods Pond	Total
	3 sites	4 sites	8 sites	9 sites	3 sites	10 sites	10 sites	47 sites
Virginia rail	0	0	3	4	0	1	3	11
Sora	0	0	1	0	0	0	0	1
Green heron	0	1	0	0	0	0	1	2
American bittern	0	0	0	0	0	0	0	0
Least bittern	0	0	0	0	0	0	0	0
American coot	0	0	0	0	0	0	0	0
Common moorhen	0	0	0	0	0	2	4	6
Pied-billed grebe	0	0	0	0	0	0	0	0
King rail	0	0	0	0	0	0	0	0
Total	0	1	4	4	0	3	8	20

Refer to Map 5-2

Numbers indicate total number of each species that responded during playback surveys.

Numbers are combined for all three visits at each site.

3.2.3 Other Species

Very few other species or species groups are categorized as omnivorous birds. Included are the jays and crows, which have a varied diet of insects, bird eggs and young, carrion, and trash. Blue jays and American crows are common in the PSA and have been documented using most of the available habitats.

3.3 Herbivorous Birds

Very few (only 11 species) species are solely herbivorous and, in the PSA, include geese, doves, ruby-throated hummingbird, and the finches (Attachment C). Most of these species occur within the PSA, except for the pine grosbeak and pine siskin. One snow goose was observed in an agricultural field I the fall. This species is expected to only occasionally occur, during spring and fall migration. Similarly, pine grosbeaks could occur seasonally, mostly in winter. Pine siskins may breed in the hills surrounding the Housatonic River (Veit and Petersen 1993). Bobwhite quail are also primarily herbivorous and, while not known from the PSA, could potentially occur, as they were heard in adjacent habitat.

4.0 Rare, Threatened, and Endangered Birds

Several state- and federally-listed birds were observed within the PSA and reference areas during the 1998, 1999, and 2000 field investigations (MNHESP 1999). Following are brief descriptions on the nature of these observations.

American Bittern

The American bittern is listed as Endangered by the MNHESP. American bitterns breed in eastern North America from Newfoundland to North Carolina, west to central Oklahoma and Manitoba, and they winter in coastal marshes from Massachusetts to the Gulf Coast (Gibbs *et al.* 1992). In Massachusetts, breeding populations of American bitterns have been declining since the 1960s. Between 1976 and 1980, the Massachusetts Breeding Bird Atlas project confirmed only 17 breeding pairs in the state (Veit and

Petersen 1993). This decline is due in a large part to the disappearance of extensive cattail marshes, their primary breeding habitat.

Nests are constructed from sticks, grass, and sedges in tall emergent vegetation (Ehrlich *et al.* 1988). The PSA provides suitable nesting habitat for American bitterns, and they were documented from 1998 to 2000 (Map 5-9) and in the October Mountain State Forest reference area in 2000 (Map 5-10). Observations during the three years ranged from May to September, with the most occurring in August and September. Bitterns were usually observed in wet meadow, shallow emergent marsh, and deep emergent marsh habitats. Only one of the bitterns, observed in early July 1999, was heard calling from within the PSA, indicating an intent to breed in the area. No bitterns responded to marshbird playback calls in 1998. MNHESP Rare Animal Forms for American bitterns are included in Attachment H.

Bald Eagle

The bald eagle is listed as Threatened by the USFWS and Endangered by MNHESP. The bald eagle historically nested throughout the United States and Canada in deciduous and coniferous forests, especially along bodies of water. Eagle populations have experienced significant declines, due to egg shell thinning from DDT poisoning, habitat loss, and shooting, to the point that the species was formerly listed as Endangered nation-wide. Bald eagle populations are currently recovering due to habitat protection and other recovery efforts such as hacking. Hacking at artificial nest platforms on Quabbin Reservoir, for example, has led to the first successful Massachusetts breeding record in recent years, when two pair produced a total of three young (Veit and Petersen 1993).

Bald eagles are closely associated with aquatic habitats, usually nesting in large trees along shorelines and feeding on fish. The PSA does provide nesting and foraging habitat for bald eagles. In the mid-1990's, a pair of bald eagles were reported to have constructed a nest at Woods Pond (T. Gulo, MDFW personal communication). The nest was reportedly destroyed during an April snowstorm and the pair did not attempt to re-nest. Bald eagles were documented in the PSA and reference areas eight times during the course of field investigations, although some of those observations may be of the same

individuals (Map 5-9). Most observations occurred near Woods Pond and the adjacent backwaters and many of the eagles observed were apparently hunting over these shallow water habitats. MNHESP Rare Animal Forms for bald eagles observed in 1998 are included in Attachment H.

Northern Harrier

Breeding populations of northern harriers in Massachusetts have declined since 1955 (Veit and Petersen 1993) and they are currently listed as Endangered by MNHESP. Their range extends across the United States and Canada. They typically nest on elevated ground in dense herbaceous vegetation of wet meadows, old fields, and shrublands (Ehrlich *et al*. 1988).

The PSA and reference areas provide suitable habitat for northern harriers. Nesting and foraging habitat is available in many of the larger emergent wetlands, and in the wet meadow habitats south of New Lenox Road. Old fields in uplands adjacent to the study area also provide suitable nesting and foraging areas. Prey items consist mainly of small vertebrates such as voles, birds, snakes, frogs, and also invertebrates such as grasshoppers (Ehrlich *et al.*1988). Prey is captured while the harrier is in flight, as it hovers low to the ground searching fields and agricultural areas for food items.

Thirteen northern harriers were observed in the PSA and near Washington Mountain Lake in the October Mountain State Forest reference area on 12 occasions (Maps 5-9 and 5-10). Most observations occurred either early (May) or late (September and October) in the season and were of individuals displaying migratory behavior (i.e., high, rapid, non-hunting flight) (Attachment H). One observation in July of 1999 occurred in the nesting season for this species although no breeding behavior (e.g., displays, territoriality) was observed by this individual.

Sharp-shinned Hawk

The sharp-shinned hawk is presently listed as a species of Special Concern by MNHESP. This hawk ranges across the United States and the southern half of Canada and is common throughout Massachusetts during migration (Veit and Petersen 1993).

However, while historically abundant, there have only been a few confirmed instances of breeding sharp-shinned hawks in Massachusetts since the 1950's. A Massachusetts State biologist described a sharp-shinned hawk in Lee, MA, during the summer of 1999 as a potential breeder, but no confirmed account was reported (T. Gulo, MDFW, personal communication). In winter, sharp-shinned hawks can occur throughout the state (Bildstein and Meyer 2000).

Sharp-shinned hawks nest in coniferous, deciduous, and mixed woodlands where they constructs stick nests at heights of 3 – 18 m (10 – 60 feet) in deciduous and coniferous trees (Ehrlich *et al.* 1988, Palmer 1988b). Palmer (1988b) notes that the nest is typically in a stand of dense young conifers near a forest opening. Prey items include mainly birds, and occasionally small mammals, frogs, lizards, and insects (Ehrlich *et al.* 1988, Palmer 1988b, Peterson and Peterson 1980).

Sharp-shinned hawks were seen in the PSA and the Hinsdale Flats SWMA reference area during the field investigations (Maps 5-9 and 5-11). Most observations occurred from early fall to early winter. Two observations, however, occurred during the 1999 hawk playback surveys at the Hinsdale Flats SWMA reference area. These occurred approximately a week apart and included an aggressive response from the birds. Due to the similarity in response, it is likely that the two observations were of the same individual and that it is likely nesting in the vicinity. No behavior indicative of nesting was displayed by any of the sharp-shinned hawks observed in the PSA. Data sheets for these observations are provided in Attachment H.

Cooper's Hawk

The Cooper's hawk is a species of Special Concern in Massachusetts. Its range extends throughout most of the United States and extreme southern Canada. In Massachusetts, the Cooper's hawk is a rare and local breeder, with breeding records located in the central and eastern portion of the state (Veit and Petersen 1993). Like the other species in this genus, Cooper's hawks nest in forested habitats, particularly deciduous, riparian forest stands (DeGraaf and Yamasaki 2001). Cooper's hawks nest on a platform of sticks positioned in deciduous and coniferous trees at heights of 7 – 15 m (25 – 50 feet) (Ehrlich

et al. 1988, Palmer 1988b). Prey items include medium-sized birds, small mammals, and occasionally reptiles, amphibians, and insects (Ehrlich *et al.*1988, Palmer 1988b).

Both the PSA and the reference areas provide suitable nesting habitat for Cooper's hawks. They were seen on seven occasions in 1999 and 2000: three times in the PSA, once at the Threemile Pond SWMA reference area, and three times near Washington Mountain Lake in the October Mountain State Forest reference area (Maps 5-9, 5-10, and 5-12). The PSA observations occurred in the vicinity of New Lenox Road and southward. These observations were outside the nesting season. At the Threemile Pond SWMA reference area, one adult responded to playback surveys in the middle of June 1999, and was presumed to be nesting in the area. At the October Mountain State Forest reference area, a Cooper's hawk was observed chasing a broad-winged hawk. This territorial display is indicative of nesting activity. In addition, a single bird and a pair of adults were observed near Washington Mountain Lake in early May 2000, well within the nesting season for this species. Data sheets for these observations are provided in Attachment H.

Common Moorhen

Common moorhens occur across the eastern and southwestern United States. In Massachusetts, they are listed as a species of Special Concern. Scattered localized breeding has been confirmed throughout Massachusetts, including Pittsfield (Veit and Petersen 1993; T. Gulo, MDFW personal communication).

Common Moorhens breed in freshwater marshes, lakes, and ponds with emergent vegetation and grassy edges. Moorhens typically nest over water, where they form a rimmed-cup nest of aquatic plants, which is lined with grass (Ehrlich *et al*. 1988). Common Moorhens were repeatedly observed in the PSA in 1998 and 1999. Some individuals responded to playback surveys in June and July, 1998, while others were observed during the course of concurrent investigations. Moorhen sightings were generally limited to the lower one mile of the PSA, typically at the north end of Woods Pond and the adjacent upstream backwaters (Map 5-9), and one individual was observed at Washington Mountain Lake (Map 5-10). The responses elicited by moorhens during

the playback survey indicate that moorhens were territorial and likely nesting within the PSA. However, no moorhen broods were observed in either year. Rare animal data sheets documenting moorhen sightings are located in Attachment H.

Northern Parula Warbler

The northern parula is listed as a Threatened species in Massachusetts (MNHESP 2000). Northern parulas are common during migration, but a slow and steady decline of breeding populations has prompted this listing (MNHESP 1994a). Breeding populations are restricted to the eastern part of the state, north of Boston and along the southern shore of Cape Cod. Three observations of northern parula were recorded in two locations in the PSA during May 1999. These observations occurred during the migration period and do not represent a breeding population.

Blackpoll Warbler

The blackpoll warblers is a species of special concern in Massachusetts due to its rarity during the breeding period (MNHESP 1994b, 2000), although it is common during the migration period. The preferred habitat of the blackpoll warbler, stunted spruce fir forest, is very limited in Massachusetts and restricted largely to the summit of Mt. Greylock, north of the PSA (MNHESP 1994b). Six observations of blackpoll warblers were recorded from five locations within the PSA during May in 1999 and 2000. These observations were during the migration period and do not represent a breeding population.

5.0 Literature Cited

Andrle, R.F., and J.R. Carroll. 1984. The Atlas of Breeding Birds in New York State. Cornell University Press, Ithaca, NY, USA.

Bellrose, F.C. 1980. Ducks, Geese and Swans of North America. Stackpole Books, Harrisburg, PA, USA.

Bent, A.C. 1940. Life Histories of North American cuckoos, goatsuckers, hummingbirds, and their allies. United States National Museum Bulletin No. 176. Washington, DC, USA.

Bevier, L.R. ed. 1994. The Atlas of Breeding Birds of Connecticut. Connecticut Department of Environmental Protection. State Geological and Natural History Survey of Connecticut. Bulletin 113. Hartford, CT, USA.

Bildstein, K.L., and K. Meyer. 2000. Sharp-shinned Hawk (*Accipiter striatus*). p. 1-28. In A. Poole and F. Gill (ed.) The Birds of North America, No. 482. The Birds of North America, Inc., Philadelphia, PA, USA.

Blondel, J., C. Ferry, and B. Frochot. 1981. Point Counts with Unlimited Distance. p. 414-420. In C.J. Ralph and J.M. Scott (ed.) Studies in Avian Biology No. 6. The Cooper Ornithological Society, Sacramento, CA, USA.

Butler, R.W. 1992. Great Blue Heron (*Ardea herodias*). p. 1-19. In A. Poole, P. Stettenheim and F. Gill (ed.) The Birds of North America, No. 25. The Birds of North America, Inc., Philadelphia, PA, USA.

Crocoll, S.T. 1994. Red-shouldered Hawk (*Buteo lineatus*). p. 1-20. In A. Poole and F. Gill (ed.) The Birds of North America, No. 107. The Birds of North America, Inc., Philadelphia, PA, USA.

Custer, C.M. 2002. Exposure and effects of chemical contaminants on tree swallow nesting along the Housatonic River, Berkshire Co., Massachusetts, 1998 – 2000. Prepared for USEPA. USGS, La Crosse, WI, USA.

DeGraaf, R.M., and D.D. Rudis. 1986. New England Wildlife: Habitat, Natural History, and Distribution. General Technical Report NE-108, U.S. Dept. Agriculture, Forest Service, Northeast Forest Experiment Station, 491 pp. (N)

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH, USA.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon and Schuster, New York, NY, USA.

Fuller, M.R., and J.A. Mosher. 1981. Methods of Detecting and Counting Raptors: A Review. p. 235-246. In C.J. Ralph and J.M. Scott (ed.) Studies in Avian Biology No. 6. Cooper Ornithological Society, Sacramento, CA, USA.

Gibbs, J.P., S.M. Melvin, and F.A. Ried. 1992. American Bittern (*Botaurus lentiginosus*). p. 1-11. In A. Poole, P. Stettenheim and F. Gill (ed.) The Birds of North America, No. 18. The Birds of North America, Inc, Philadelphia, PA, USA.

Gibbs, J.P., and S.M. Melvin. 1993. Call-response surveys for monitoring breeding waterbirds. Journal of Wildlife Management 57(1):27-34.

Kennedy, P.L., and D.W. Stahlecker. 1993. Responsiveness of nesting northern goshawks to taped broadcasts of three conspecific calls. Journal of Wildlife Management 57(2):249-257.

Krapu, G.L., and K.J. Reinecke. 1992. Chapter 1 - Foraging Ecology and Nutrition. p. 1-29. In B.D.J. Batt, A.D. Afton, M.G. Anderson, C.D. Ankney, D.H. Johnson, J.A. Kadlec and G.L. Krapu (ed.) Ecology and Management of Breeding Waterfowl. University of Minnesota Press, Minneapolis, MN, USA.

MacWhirter, R.B., and K.L. Bildstein. 1996. Northern Harrier (*Circus cyaneus*). p. 1-32. In A. Poole and F. Gill (ed.) The Birds of North America, No. 210. The Birds of North America, Inc., Philadelphia, PA, USA.

MNHESP (Massachusetts Natural Heritage and Endangered Species Program). 1994a. Threatened Species of Massachusetts - Northern Parula (*Parula americana*). Fact sheet prepared by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Westborough, MA, USA.

_____ 1994b. Massachusetts Species of Special Concern - Blackpoll Warbler (*Dendroica striata*). Fact sheet prepared by the Commonwealth of Massachusetts, Division of Fisheries and Wildlife, Westborough, MA, USA.

_____ 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

_____ 2000. Massachusetts List of Endangered, Threatened, and Special Concern Species. Division of Fisheries and Wildlife. Westborough, MA. URL http://www.state.ma.us/dfwele/dfw/nhesp/nhdat.htm.

Palmer, R.S. 1988a. Handbook of North American Birds. Vol. 5. Yale University Press, New Haven, CT, USA.

_____ 1988b. Handbook of North American Birds. Vol. 4. Yale University Press, New Haven, CT, USA.

Peterson, R.T., and V.M. Peterson. 1980. A Field Guide to the Birds of Eastern and Central North America. Houghton Mifflin Company, New York, NY, USA.

Ralph, C.J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. Handbook of Field Methods for Monitoring Landbirds. General Technical Report PSW-GTR-144. Pacific Southwest Research Station, Forest Service, United States Department of Agriculture, Albany, CA, USA.

Rosenfield, R.N., and J. Bielefeldt. 1993. Cooper's Hawk (*Accipiter cooperii*). p. 1-24. In A. Poole and F. Gill (ed.) The Birds of North America, No. 75. The Birds of North America, Inc., Philadelphia, PA, USA.

Sauer, J.R., J.E. Hines, I. Thomas, J. Fallon, and G. Gough. 2000. The North American Breeding Bird Atlas, Results and Analysis 1966-1999. Version 98.1. United States Geological Service. Patuxent Wildlife Research Center. Laurel, MD, USA.

Squiers, J.R., and R.T. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*). p. 1-32. In A. Poole and F. Gill (ed.) The Birds of North America, No. 298. The Birds of North America, Inc., Philadelphia, PA, USA.

Veit, R.R., and W.R. Petersen. 1993. Birds of Massachusetts. Massachusetts Audubon Society, Lincoln, MA, USA.

Chapter 6 Mammals

1.0 Introduction

The mammalian community in the PSA was studied over the three-year period, from 1998 to 2000. To characterize the community, a literature review of local species and populations was conducted along with the collection of field data. Field efforts included methods targeted at specific species, as well as more general, reconnaissance-level investigations of species presence, relative abundance, and habitat use.

2.0 Methods

2.1 Species:Habitat Association

The principle goal for the characterization of the mammal community was to identify all species that could reasonably be expected to occur in the PSA, the habitats they would use, and when they would use them. The foundation of this work included a review of relevant literature on the mammal populations in western Massachusetts. Local and regional references on bird communities were first used to identify the species whose range encompassed the PSA (Burt and Grossenheider 1976, Godin 1977, DeGraaf and Yamasaki 2001). General and technical references on the habitat requirements and use, seasonality of occurrence, and relative abundance in the region were then used to refine the list and build a matrix (Attachment C) to include only those species whose preferred habitats are within the study area (Whitaker and Hamilton 1998, DeGraaf and Yamasaki 2001).

As part of this effort, local and regional experts were consulted to obtain unpublished records regarding the historic occurrence of some species in the area. For example, the Massachusetts Natural Heritage and Endangered Species Program, the MDFW, and the USFWS were contacted to identify any historic mammal occurrences and to review historic trapping records from the area. Information received from these agencies, organizations, and individuals was then incorporated into the species matrix.

Field surveys were then conducted to complement the information compiled in the species matrix. Field surveys largely focused on determining species' presence, although several methods were used to more quantitatively document species and their relative abundance or to sample animal tissues, as described below. The observations that were recorded in the field were used to refine the matrix to accurately depict the habitat use and seasonality of occurrence for all mammal species expected to occur in the PSA.

2.2 Incidental Observations

The presence of mammals within the PSA was documented during year-round field investigations in 1998, 1999, and 2000 (Roy F. Weston, Inc. 2000). Several of the other investigations were detailed studies in support of ecological risk assessment surveys, and consisted of specific methods targeted at documenting or collecting animals from a variety of taxonomic groups to sample their tissues. Those investigations provided an excellent opportunity to confirm the presence of all mammals within the PSA by recording incidental observations of any mammals or mammal sign seen (e.g., tracks, scat, browsing). During the course of those investigations, mammals observed within the PSA and reference areas were recorded, along with the habitat in which they occurred. When appropriate, other notes were recorded, including activity, interactions with other species, and general health.

2.3 Mink and Otter Surveys

2.3.1 Snow Tracking

Mammal snow track counts (Halpin 1984, Halpin and Bissonette 1988) were conducted during the winters of 1998-1999 (hereafter 1999) and 1999-2000 (hereafter 2000) in the riparian habitats of the PSA as well as in four reference areas (Threemile Pond SWMA, Washington Mountain Lake in October Mountain State Forest, Muddy Pond in Hinsdale Flats SWMA, and Ashley Lake). During the 1999 survey, six 500-m (1,650-ft) transects were established in the PSA so that many of the habitat types (e.g., low-gradient stream, black ash–red maple–tamarack calcareous seepage swamp, shrub swamp, deep emergent marsh, shallow emergent marsh, and wet meadow) could be sampled (Map 6-1).

Transects were surveyed after a fresh snowfall for a minimum of two or three snow events each winter. Mammal tracks were recorded according to species (or lowest identifiable taxonomic level), and photographs were taken of notable tracks (e.g., large carnivores, otter, mink). Transect locations were recorded and plotted on a map of the study site. Ashley Lake and Washington Mountain Lake in the October Mountain State Forest were surveyed as reference areas during the 1999 winter. The entire shorelines of these lakes were surveyed rather than establishing transects.

During the 2000 surveys, three transects were established in the PSA and were sampled in a similar fashion as the 1999 transects (Map 6-1). During that winter, however, mink and otter scents were placed every 60 m (200 feet) along the transects in an effort to attract these animals to the actual transects and determine whether or not those species were present in the PSA (Roy F. Weston, Inc. 2000). In addition, three transects were established at each of the four reference areas (Maps 6-2, 6-3, 6-4, and 6-5). Identification of tracks followed Murie (1974), Halfpenny and Biesiot (1986), Forrest (1988), and Rezendes (1999).

2.3.2 Scent Post Surveys

Scent post station surveys (Conner *et al.* 1983) were used during the autumns of 1998 and 1999 and concurrent with the winter 2000 snow tracking surveys to determine the presence of mink and river otter in the PSA (Roy F. Weston, Inc. 2000). Three transects were established during the autumn surveys, one each in the upper, middle, and lower portions of the PSA (Map 6-6). Each transect ran parallel to the shoreline for 500 m (1650 feet) and consisted of 10 scent post stations placed at 60-m (200-foot) intervals and 0.3 – 1.5 m (1 – 5 feet) from the shoreline. Each scent station consisted of a 1-m (3.3-foot) diameter circle of moist sand sifted into place, with a wooden dowel smeared with a commercial lure (Leon Lures® Mink #1 Super All Call and Otter Super All Call) placed in the center of the circle (Linhart and Knowlton 1975, Phillips 1982). Lures were alternated between stations so that half of the stations on each transect were baited with mink lure and half with otter lure (Humphrey and Zinn 1982).

During the winter 2000 surveys, scent posts were placed along the snow tracking transects in the PSA (Map 6-1) and in each of the four reference areas (Maps 6-2, 6-3, 6-4, and 6.5). The methods of applying, spacing, and alternating the scents were the same as the autumn surveys, except that, rather than using sand as a track medium, the snow surrounding each scent post was examined.

2.3.3 Otter Scat Analysis

River otter scats discovered during the scent post and snow tracking surveys were collected to analyze prey species. After collection, scats were measured, photographed, and analyzed for prey composition. Fish scales were removed and placed in envelopes to dry. The scales were shipped to the Laconia, New Hampshire Office of Fishery Assistance, USFWS, where they were identified to lowest possible taxonomic group and aged. Identifications were based upon voucher scales taken during previous fish sampling events from the Housatonic River, or from other areas. That information was summarized by the USFWS (Smithwood 2002).

2.4 Small Mammal Surveys

2.4.1 Small Mammal Trapping

Small mammal trapping was conducted in September 1998 and August to September 1999 to verify the occurrence of some small mammal species within the PSA and to provide tissue samples to the USEPA for PCB analysis (Roy F. Weston, Inc. 2000). Sixteen potential small mammal trapping array sites were flagged in the PSA. Soils at these sites were then analyzed for PCB concentrations. Three of the sites (1B, 3, and 8) were chosen as actual trapping locations in 1998 and three (13, 14, and 15) in 1999 (Map 6-7). At each trap site, 100 small mammal traps baited with peanut butter were placed in an "+" pattern (when possible), with each axis being approximately 150 m (490 feet) in length (Clough 1987, Lortie and Pelletier 1987). Fifty trap stations spaced at 3-m (10-foot) intervals were placed on each axis. One trap was placed at each trapping station on the line and every tenth trapping station was a pit trap, which is more effective for

capturing shrews (Kirkland 1982). Where small mammal runways were apparent, traps were placed on the runways to increase capture efficiency.

Because pit traps tend to be more efficient at capturing shrews, pit trap arrays were also used at each trapping site. These arrays consisted of four plastic drift fences 7.6 m (25 feet) long and 0.6 m (2 feet) high, arranged in an "+" formation with a 15-m (50-foot) gap in the center of the "+". Individual pit traps were installed on both sides and at either end of each of the four drift fences, for a total of 16 pits per array. The pit trap arrays were situated near one of the axes of the larger snap trap arrays.

All trap arrays were set on one day and run for five consecutive nights for a total of 580 trap nights (116 traps times 5 nights equals 580 TN) per trap site. Captured individuals were placed in plastic bags, labeled, and placed on wet ice for transport to the central processing area.

2.4.2 Placental Scar Analysis

Species, sex, weight (g), total length (mm), tail length (mm), hind foot length (mm), and ear length (mm) were recorded for each individual small mammal collected. Each individual was also aged (adult versus juvenile) and inspected for abnormalities or deformities, which were described on data forms. Length (mm) and width (mm) of the testes were measured for all males. Each female was checked for milk production and the uterus was removed for placental scar analysis.

During placental scar analysis, the uterus was placed on a microscope slide and the number of placental scars and embryos were counted with the aid of a dissecting microscope. Placental scars were grouped and counted based on the size, shape, and opacity (Harder and Kirkpatrick 1994). Finally a sketch was prepared and a photograph was taken of each sample (Figure 6-1 and Figure 6-2).

Figure 6-1 Small mammal uterus.

Uterus showing placental scars and, at left, the ovaries.

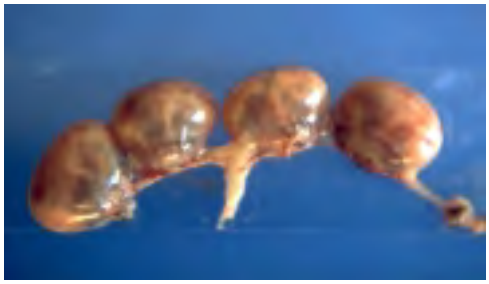


Figure 6-2 White-footed mice fetuses.

2.5 Bat Surveys

2.5.1 Field Sampling

Bat species were surveyed by recording their echolocation calls (de Oliveira 1998, Fenton and Bell 1981). Three transects were established along the riverbank at the upstream (Reach 5A), central (interface of Reaches 5B and 5C), and downstream (Reach 5C, 6A, 6B, and 6C) sections of the PSA (Map 6-8 through 6-11). Transects ran parallel to the river for approximately 1 km. Each transect was visited for three consecutive nights during either late July or August 1999. Surveys began at dusk (ca. 21:30) and continued for two hours to take advantage of the period of highest bat activity (Crampton and Barclay 1998). Transects were either surveyed by foot or canoe, depending on water levels.

During each survey the echolocation noise of bats was recorded using an Anabat II® Bat Detector (Titley Electronics, Ballina N.S.W., Australia), which transforms ultrasound to an audible output capable of being recorded by normal-speed tape recorders (de Oliveira

1998). The Anabat detector was set at a division ratio of 16 and microphone sensitivity of 8–9. A calibration tone of 40 KHz was recorded between each bat call or at 15–second intervals. Recorded calls were analyzed to identify species using Analook®, a PC sound analysis software program to determine the number of flyover passes for each species.

2.5.2 Computer Analysis

The recorded bat calls were downloaded into the Anabat V computer software program using the Anabat V Zero Crossing Analysis Interface Module (ZCAIM®, Titley Electronics). Each bat call is composed of a rapid series of short pulses, which are displayed as a string of points. The monitor mode, which uses established criteria to determine if recordings should be saved as a bat call, was used to download files (Corben 1999). When these criteria were met, the program saved the calls in 15-second sequences. After the calls were downloaded, they were processed to eliminate background noise and to separate individual calls, when possible.

The calls were then loaded into Analook® (Titley Electronics), a software program that extracts call parameters that are used to identify the calls to species. The parameters examined by Analook® include maximum frequency, minimum frequency, average frequency, duration of pulse, time between pulses, average slope of plotted pulse, and the knee of the pulse (the point at which the slope of the pulse changes from sloping to flat). These call parameters were then compared to known reference calls of northeastern bat species to determine species. Reference calls were primarily obtained from recordings of Maine bats, although some call parameters (e.g., call length and minimum, maximum and characteristic frequencies) from bats recorded in New Hampshire, Massachusetts, New York, and Kentucky were also used.

3.0 Mammal Community Description

Forty-two mammal species were documented in the PSA during the three years of field surveys. An additional 10 species are likely to occur but were not verified, for a total of 52 species potentially occurring (Attachment C). Many species were quite common and were observed throughout the PSA in a variety of habitats. These common species tend

to be ones with more cosmopolitan habitat requirements, such as white-footed mice, meadow voles, short-tailed shrews, little brown bats, cottontails, gray squirrels, raccoons, red fox, coyotes, and white-tailed deer, all of which were observed in forested and non-forested habitats as well as riverine, shoreline, wetland, upland, and residential habitats. Other species that utilize primarily riverine and wetland habitats, such as muskrat and beaver, were also commonly seen.

Forested communities, such as red maple swamp, black ash–red maple–tamarack calcareous seepage swamp, transitional floodplain forest, and high-terrace floodplain forest, supported the greatest number of species. Agricultural and residential habitats had few recorded species, which is reflective of survey effort but also of the reduced habitat value associated with periodically disturbed habitats. No surveys were conducted in these habitat types; all records were incidental observations that occurred during travel to and from other locations. Several of the species not observed in the PSA, such as the snowshoe hare and short-tailed weasel, were common in nearby reference areas. Other species not recorded, such as the Indiana bat and southern bog lemming, are state listed and considered rare throughout the region (see Section 4.0).

3.1 Piscivorous Mammals

Two piscivorous mammals, river otter and mink, occur very infrequently in the PSA. Mink were observed during 1999 and 2000 surveys. River otter sign was recorded in the PSA only during February and March 2000. River otters, however, were much more common in reference areas, having been recorded during all three years of study.

Piscivorous mammals are of special interest because of their diet and habitat usage. The aquatic nature of these mammals, river otters being almost entirely aquatic and mink being semi-aquatic, results in these species having greater exposure to water-borne contaminants than most other mammals. The diets of mink and river otters consist largely of aquatic organisms (fish, crayfish, amphibians, muskrat, and waterfowl), making them some of the highest trophic level aquatic predators in the PSA and thus increasing the potential of these species to bioaccumulate high levels of environmental contaminants. PCB concentrations in fish tissue have been shown to be positively

correlated with levels of PCBs in mustelid species (Foley *et al.* 1988). Many studies have shown that the concentrations of PCBs in wild mink accumulate to levels that are harmful in experimental animals (Auerlich *et al.* 1971, Bleavins *et al.*1980, Foley *et al.* 1988, Heaton *et al.* 1995, Wren *et al.* 1987). Less is known about the accumulation of PCBs and their effects in river otters. Concentrations of PCBs have been reported to be higher in river otters than in mink when these animals were collected from the same location (Foley *et al.* 1988); however, mink are thought to be more sensitive to PCBs (Heaton *et al.* 1995). Organ (1989) found that otters from the Housatonic River watershed had the highest level of PCBs of any otters in Massachusetts.

3.1.1 River Otter

Trapping data from the MDFW show that river otters have been present in the Housatonic River watershed for nearly every year with available data (1977–1999) (S. Langlois, MDFW, personal communication). However, it is not known if these individuals were captured from the Housatonic River or other bodies of water within the watershed. River otters were not recorded in the PSA during 1998 or 1999 snow tracking or scent post surveys.

River otter tracks, slides, and scats were observed in the PSA during February 2000 winter track and scent post surveys. One set of slides, tracks, and scat occurred approximately 485 km south of the confluence of the East and West Branches of the Housatonic River. Scats were observed one month later and appeared old, having likely been buried under the snow during earlier visits. They consisted primarily of fish scales and bones, with some containing small amounts of crayfish exoskeletons. Another set of slides, tracks, and scat was observed further downstream, just north of New Lenox Road during the winter 2000 snow tracking and scent post surveys (Figure 6-3 and Figure 6-4). The individual appeared to have been attracted by the lure and deposited its scat and scent markings.

Figure 6-3 River otter forefoot track.

Figure 6-4 River otter tracks.

River otter tracks are characterized by having five toes on both front and hind feet, prominent claw marks, circular front feet, hind feet 1.5–2.5 times as long as wide, and generally large size.

An additional river otter scat was collected adjacent to Woodland Road, approximately 800 m (0.5 mile) downstream of the Yokum Brook confluence. This scat was fresh at the time of collection on 22 March 2000, and consisted of fish scales and crayfish fragments. This was an incidental observation, not the direct result of snow tracking or scent post surveys.

River otters were commonly observed at all four of the reference areas. In 1998, a group of three otters were observed at Threemile Pond. In 1999, river otter sign was seen at Ashley Lake and Washington Mountain Lake. In 2000, they were present at all four reference areas.

Ten otter scat samples were collected, seven from the PSA and three from Muddy Pond at the Hinsdale Flats SWMA reference area. Scats were composed of primarily fish scales and bones (Figure 6-5). Five of these scats contained small amounts of crayfish exoskeleton as well; total crayfish composition never exceeded 20 percent of the scat volume. These results are similar to what was expected, based on available literature.

Figure 6-5 River otter scat.

Composed of crayfish exoskeleton and fish scales

Though river otter diet consists primarily of fish, other prey, including crayfish, amphibians, turtles, and insects are also taken. Birds, especially young waterfowl, and small mammals are occasionally taken, and small amounts of plant material, such as blueberries and rose hips, are eaten (Whitaker and Hamilton 1998). Liers (1951) observed free-ranging captive river otters digging into the mud to remove frogs and turtles from hibernacula. River otters have been shown to prefer foraging in shallow water and eating primarily slow-moving, shallow-dwelling fish, such as chubs, suckers, catfish, daces, darters, and schooling fish such as bluegill and other sunfish (Whitaker and Hamilton 1998, Sheldon and Toll 1964). When studying river otters in the Adirondacks, Hamilton (Whitaker and Hamilton 1998) found fish in 70 percent of their stomachs but found only 5 percent were trout.

River otter habitat is often associated with beaver activity; beaver ponds provide an abundant supply of prey, stable water levels, den sites, and escape cover (Newman and Griffin 1994). Along with beaver activity, vertical banks, rock formations, and

backwater sloughs have been shown to be associated with denning sites for river otters. Points of land, tributary streams, fallen logs, log jams, conifer trees, and pools have all been correlated with river otter latrines (Sheldon and Toll 1964, Dubuc *et al.* 1990, Newman 1990, Swimley *et al.* 1998).

The Housatonic River in the PSA offers an abundance of habitats that fit these characteristics. However, otter sign was very infrequent, much lower occurrence than what would be expected considering the available habitats and food resources. For example, despite hundreds of hours conducting track and scent post surveys for otters and thousands of hours of field time spent characterizing the ecological communities in the PSA, very few otter or signs of otter were observed. Conversely, despite substantially fewer hours spent at these areas, otters were observed at each reference area. River otters are highly mobile and maintain territories within their home ranges. Home ranges may be quite large, up to 8.5 km^2 (22 sq mi), and extend along nearly 80 km (50 mi) of waterway shoreline (DeGraaf and Yamasaki 2001). Considering this, it is possible that the PSA lies within a river otter home range but is not a highly used portion of it (i.e., not within a maintained territory inside the home range).

3.1.2 Mink

Mink occur in a variety of wetland habitats, but their populations are greatest in marshes (Whitaker and Hamilton 1998). Mink typically forage within sight of open water, although when waterbodies are iced over, mink will often forage further inland (Kurta 1995). This is consistent with mink observation in the PSA, which occurred either in emergent marsh habitat or forested communities adjacent to the river and lake shorelines.

Mink tracks (Figure 6-6) and scat were observed at several locations in the PSA during snow tracking surveys. Tracks were distributed at each end of the PSA, occurring near the confluence of the East and West Branch Housatonic River and near Willow Creek; no observations occurred in the middle portions. One set of tracks near the confluence crossed tracks several times before blood-stained snow suggested that the mink had killed a cottontail. Tracks near Willow Creek were associated with a hole in the ice that accessed the impounded portion of the creek.

Figure 6-6 Mink tracks.

Side by side placement, five toes, and inter-digital, asymmetrical V-shaped pad are characteristic of the mustelid family.

During the fall 1999 scent post survey, an additional set of mustelid tracks and scat were observed south of the confluence of the East and West Branch Housatonic River. Due to sexual dimorphism among mustelid species, male long-tailed weasel and female mink overlap in size. Therefore, tracks alone cannot always distinguish between these species. The size of the observed tracks fell within the overlap of these two species and could not be positively identified. Scat found at this location was composed of fragments of bones and fur from a small mammal (Figure 6-7).

Figure 6-7 Mustelid scat.

Narrow, looped cords with tapered ends and dark brown coloration is characteristic of scats from the mustelid family.

Other mink observations consisted of tracks recorded at the October Mountain State Forest and Ashley Lake reference areas during 1999 and 2000 surveys. Mink tracks were

observed traversing the northwest cove of Ashley Lake on 11 March 1999. On 23 February 2000, mink tracks were observed on the western shoreline of Washington Mountain Lake near where a small brook emerges from the lake and meanders through shallow emergent marsh and wet meadow habitat.

Mink diet varies considerably with prey availability, but it consists largely of fish, crayfish, frogs, small mammals, and birds. Melquist *et al.* (1981) found that fish, mostly cyprinids 7 – 12 cm (2.8 – 4.7 inches) long, made up 59 percent of the mink's diet in Idaho. In prairie marshes of North Dakota, birds (mostly waterfowl), mammals, amphibians, and reptiles accounted for 78, 19, 2, and 1 percent of the mink's diet respectively, with the amount of prey taken closely paralleling prey availability (Eberhardt and Sargeant 1977). Other studies have also found waterfowl to be an important component of the mink's diet during the spring and early summer when young waterfowl are abundant (Melquist *et al.* 1981, Talent *et al.* 1983). Crayfish have been found to be a large component of the mink's diet in areas where they are abundant (Burgess 1978, Melquist *et al.* 1981, Allen 1986). During the winter, mammals are the primary food source for mink. In areas where muskrat are abundant, male mink may feed heavily on them (Allen 1986). Female mink are smaller and thus tend to take smaller mammals such as mice, voles, and young rabbits (Kurta 1995, and Whitaker and Hamilton 1998).

Mink have variable home range sizes, often with an average of 3.2 – 4.8 km (2 – 3 mi) in diameter (DeGraaf and Yamasaki 2001). Linear distances along shorelines have been reported to be from 1.6 – 3.6 mink per mile of shoreline (DeGraaf and Yamasaki 2001). This is greater than what was observed within the PSA. It appears that mink densities within the PSA are low, and that the observations that did occur may have been the result of individuals passing through the area from adjacent sites.

3.2 Omnivorous and Carnivorous Mammals

A wide variety of omnivorous and carnivorous mammals occur in the PSA. Coyote and fox were the most common carnivores, being recorded in nearly every habitat type in the PSA. Other carnivorous mammals observed in the PSA include bobcats, fishers, and

long-tailed weasels. Omnivorous mammals were one of the most abundant groups of mammals found in the PSA. Common omnivores observed include mice, raccoons, striped skunks, Virginia opossums, and black bears.

3.2.1 Large

Coyotes were the most common large carnivore found in the PSA. Coyotes have very broad habitat requirements and occupy a variety of habitats from open fields and agricultural lands to forested communities. Within the PSA coyotes were observed in every habitat type except for those consisting of open or deep water and spruce fir-northern hardwood forests. Lack of coyote observations inspruce fir-northern hardwood forests is likely due to the rarity of this habitat type within the PSA rather than lack of use by coyotes. In winter, coyotes more readily used the river and marsh communities for travel and hunting. Coyotes prey upon a variety of mammals, birds, herpetiles, and insects, with small mammals and rabbits being the most important food sources. Seasonally, their diet can be quite omnivorous, as they often eat berries in summer and early fall. Larger game, such as deer, is occasionally taken when coyotes are hunting cooperatively in packs. Coyote scats were commonly observed in the PSA, and they consisted of small mammals, squirrel, cottontail, and white-tailed deer fur and bones. Scats collected near the Pittsfield WWTF contained large amounts of crow feathers and pieces of plastic and other trash.

Coyotes were also common at all four reference areas. Coyotes were especially abundant at Washington Mountain Lake in the October Mountain State Forest and Threemile Pond SWMA reference areas, where their tracks were often seen intermingled with those of white-tailed deer.

Red foxes were the next most common carnivore observed in the PSA. Both red foxes and gray foxes can occupy a variety of habitats, but the red fox prefers open areas such as agricultural land and forest edges while the gray fox is more common in forested areas. Within the PSA, red foxes were recorded in many habitat types (Attachment C). While being largely carnivorous, their diet may be more omnivorous based upon the seasonal availability of insects, fruits, and nuts. Fox scat collected from the PSA contained small

mammal bones and fur and bird feathers. Foxes form small family units during breeding season but, unlike coyotes, remain solitary for the majority of the year. They vigorously defend small territories averaging 100 ha. Young foxes are taken by a variety of other carnivores and coyotes will kill adults, but otherwise they have few natural enemies.

Bobcats were observed in the PSA but were not common. Tracks and two possible dens were observed, in the vicinity of the Pittsfield WWTF. Both den sites were located near the WWTF sludge dump: one den in an open field that appeared to be abandoned and the other in the side of a dirt mound at the WWTF sludge dump. This second den appeared to have several entrances and there were recent tracks leading from the den and throughout the vicinity. Bobcat tracks were also observed on the river's edge in this area during early spring 1999 (Figure 6-8). A bobcat was sighted in Great Barrington on the Brush Hill Road Bridge in the spring of 1999, near the Threemile Pond SWMA reference area.

Figure 6-8 Bobcat tracks.

Four toes, round shape, two anterior and three posterior lobes on heel pad, and large size characterize bobcat tracks.

Terrestrial mustelid species, including the short-tailed weasel, long-tailed weasel, and fisher, were found in the PSA and, more commonly, in the reference areas. Fisher signs were found in the southern section of the PSA during both winters of snow tracking surveys. Long-tailed weasels were found near the confluence of the East and West Branch Housatonic River and six (an adult female and five young) were inadvertently caught in pit traps placed along a spit shallow emergent marsh vegetation in June 1999.

In addition, a female long-tailed weasel was captured at 46-VP-5 in June 1999. Short-tailed weasels were not recorded in the PSA, but they were common at the Ashley Lake, Threemile Pond SWMA, and Hinsdale Flats SWMA reference areas.

These mustelid species are all carnivores, preying upon a variety of small mammals. The smaller weasel species rely primarily upon mice, voles, shrews, squirrels, rabbits, and occasionally insects, birds, and amphibians. Fishers also take small mammals, but their diet also contains larger prey items such as snowshoe hares, porcupines, raccoons, and even deer. Fishers will also consume nuts, seeds, and fruits. Hawks, owls, and other carnivorous mammals will prey upon the weasels, but fishers have few natural enemies. Populations of these mustelids have been reduced due to human trapping for the fur trade, but habitat protection and stricter trapping laws have allowed populations to increase in recent years (Whitaker and Hamilton 1998).

Black bears are the largest omnivore found in the study area, typically weighing 50 – 227 kg (110 – 500 pounds), with males being larger than females (Whitaker and Hamilton 1998). Black bears use a variety of habitat types, but they were observed predominately in forested habitats in the PSA (Attachment C). They were most common in the southern part of the PSA, although one individual was observed near the confluence of the East and West Branch Housatonic River. Other observations occurred near Yokum Brook, in a shallow emergent marsh and shrub swamp community south of New Lenox Road, in the shrub swamp and rich mesic forest adjacent to Woodland Road, crossing East New Lenox Road into an open field scattered with apple trees, and on the railroad tracks just south of the New Lenox Sportsman Club. A number of black bears (Figure 6-9), including a mother and three cubs, were seen crossing Woodland Road. Tracks of an additional adult and cub were seen in the October Mountain State Forest reference area.

Figure 6-9 Black bear.

Black bears once occurred throughout the eastern United States but are now limited primarily to secluded northern forests of Maine, New Hampshire, Vermont, and New York, and south along the Appalachian Mountains into Georgia. Though carnivorous, bears are largely omnivorous, with their diet depending upon seasonal and regional food availability. They feed on buds, grasses, and forbs in the spring, and fruit and mast during the summer and fall. Insects—such as ants, wasps, bees, beetles, and their larvae—make up the largest portion of animal matter in the black bear's diet. Small mammals and fish are occasionally eaten and carrion is readily consumed (Whitaker and Hamilton 1998).

3.2.2 Small

The Virginia opossum, raccoon, and striped skunk are all common in the PSA. While all three have teeth designed for carnivory, the feeding habits of these species is opportunistic and consists of a wide range of plant and animal material.

The raccoon was the most abundant of these omnivores observed in the PSA. Raccoons occur throughout the United States, with the exception of the desert communities of the southwest, and are common to abundant throughout their range. They are found in forest communities interspersed with open fields and watercourses. Populations are often high in wetland communities, near streams, pools, and lakeshores, where they forage for crayfish, amphibians, and fish. Densities vary depending upon suitability of available

habitat ranging from one raccoon per 1.8 ha (4.4 acres) in suburban woodlands to one per 28 ha (68.4 acres) in agricultural areas (DeGraaf and Yamasaki 2001).

Within the study area, raccoons were found in most of the wetland habitats, as well as agricultural and residential areas. Their tracks were common on the point bars and mud flats along the river and near many of the vernal pools. Raccoons are opportunistic feeders, consuming a wide variety of animal matter, vegetation, seeds, and berries depending upon availability. Crayfish, earthworms, amphibians, turtle eggs and young, bird eggs (especially those of cavity nesting waterfowl such as wood ducks) and carrion are common animal food types (Whitaker and Hamilton 1998). In agricultural areas, large amounts of corn, wheat, and other grains are consumed. Raccoons have adapted well to humans and are common in urban parks and residential areas, where they often become nuisances feeding on garbage. Raccoon are dormant throughout the winter but do not enter true hibernation. They rely mainly on fat stores throughout the winter, but they will emerge to forage during periods of mild weather.

Striped skunks are less common in the PSA, being observed primarily in terrestrial habitats and high-terrace floodplain forest communities. Striped skunks are common throughout the eastern United States (Whitaker and Hamilton 1998). They can occur in a variety of habitats but prefer woodlands, meadows, and agricultural areas. Like the raccoon, striped skunks have adapted well to human presence and are often found in residential areas and trash dumps. Stripped skunks are omnivorous, their diet typically containing insects, rodents, bird eggs, carrion, garbage, seeds, fruits, and nuts. During the spring and summer, insects are the most important prey items, making up as much as 43 percent of the diet (DeGraaf and Yamasaki 2001). Fruits, grains, and nuts become more important food items in the fall and winter. Skunks are mostly inactive during winter, relying on fat stores to meet their energy needs, which are reduced by communal denning, lowered body temperatures, and decreased activity. The striped skunk's defense of spraying predators with a mephitic musk deters most attacks. However, great horn owls commonly feed on skunks, and other predators such as coyotes, bobcats, and foxes will take skunks when under food stress.

Virginia opossums were the least common of the small omnivores observed in the PSA. They were recorded in only two habitats: transitional floodplain forests and residential areas. Virginia opossums are somewhat uncommon in the New England region, as they reach their northern limit here. Virginia opossums can occur in a variety of habitats from forests to urban areas, and are often common in wet woods and swamps. Like raccoons and skunks, Virginia opossums are opportunistic feeders, eating a wide variety of plant and animal matter. They are also common in urban and residential areas, where they feed on garbage and are often killed by dogs and automobiles. Natural enemies include raptors, especially great horned owls, snakes, coyotes, bobcats, foxes, and raccoons.

3.3 Insectivorous Mammals

3.3.1 Bats

The big brown bat, silver-haired bat, red bat, hoary bat, eastern pipistrelle, and northern myotis occur within the PSA and were recorded during bat surveys. The little brown bat also occurs, but its echolocation calls are difficult to distinguish from small-footed myotis and Indiana bat. It was assumed, however, that most calls exhibiting characteristics of these three species were from little brown bats (see discussion below).

Echolocation recordings cannot give an exact number of individuals of each species present, as it is possible that one individual could be recorded multiple times. They can, however, give an estimation of relative abundance.

Table 6-1 identifies the total and relative abundance of each species recorded during surveys. As noted above, there is a large amount of overlap between the call characteristics of the little brown bat, small-footed myotis, and Indiana bat, making it extremely difficult to distinguish between these *Myotis* species using echolocation. When recording the results, these three species were all labeled as *Myotis* sp. In light of the fact that the little brown bat is typically the most abundant component of the bat community in the Northeast (Krusic *et al.* 1996, Zimmerman and Glanz 2000), it is likely that the majority of these calls in the PSA were of little brown bat. Additionally, the flight and feeding behavior of most of the bats observed during the field survey was

typical of the little brown bat. A small number of *Myotis* sp. calls, however, had parameters that suggested small-footed myotis rather than little brown bats or Indiana bats. Small-footed myotis, a species of Special Concern in Massachusetts (see Section 4.0), cannot be confirmed without having animals in hand for visual identification.

Table 6-1 1999 bat survey results.

Common Name	Transect 1			Transect 2			Transect 3			Total # of calls	Relative Abundance
	Night 1	Night 2	Night 3	Night 1	Night 2	Night 3	Night 1	Night 2	Night 3		
Big Brown bat	41	0	0	14	12	9	2	26	8	112	6%
Eastern Red bat	1	3	6	2	9	2	25	13	0	61	3%
Hoary bat	4	0	0	11	8	0	1	2	1	27	1%
Silver-haired bat	4	4	0	35	23	23	19	20	30	158	9%
Myotis sp. *	38	134	125	155	257	241	250	108	113	1421	79%
Northern myotis	0	1	1	0	3	1	12	0	0	18	1%
Eastern pipistrelle	0	1	0	0	0	0	6	3	0	10	1%
Total # of calls	88	143	132	217	312	276	315	172	152	1807	
Mean # of calls	121			268			213				

*May include little brown bat, small-footed myotis, or Indiana bat

Unknown *Myotis* sp. bats accounted for 79 percent of all echolocations recorded, and it is likely that the little brown bat made up the majority of those recordings. This may be due in part to their general abundance in the New England region and their preference to feed over and close to the water surface (Whitaker and Hamilton 1998). Both of these characteristics made them more likely to be recorded during the survey. During bat

surveys, these small bat were often seen feeding in large swarms directly above the river channel. They were most common near New Lenox Road, where the river is surrounded by open wet meadows, and over open backwaters and pools throughout the PSA. Little brown bats feed on a variety of small insects, with midges (Diptera, Chironomidea) being the staple food source. Males consume about 1.22 grams of food a day and females consume 0.93 grams (Coutts *et al.* 1973). After evening feeding, these bats return to communal roost sites where elevated temperatures aid in digestion and energy conservation. Roost sites are typically in man-made structures such as houses, barns and bridges, but tree cavities and caves are also used when available.

Little brown bats are active from April to October, after which they migrate to their hibernacula, traveling as mush as 300 km from their summer habitat. These bats hibernate in small clusters in caves, abandoned mines, and less commonly man-made structures. Most bat species have seen rapid declines in their number in recent years due to insecticide poisoning, control measures in buildings, disturbance in wintering colonies, and general habitat loss. Little brown bats and big brown bats, however, have remained abundant and even increased their populations in some areas. The success of these two species is likely due to their adaptability to human presence and their reliance upon man-made structures for roosting sites. Other studies conducted in Maine, New Hampshire, and Massachusetts found little brown bats to be the most abundant species present (Krusic *et al.* 1996, Buresch 1999, Zimmerman and Glanz 2000).

The silver-haired bat was the next most abundant species recorded. They also tend to fly near the ground and feed primarily over water. Silver-haired bats are generally uncommon in New England. Recent studies have recorded their presence, especially during fall migration when they travel from their summer habitat of northern hardwood and mixedwood forests to winter hibernacula in the southern United States, but generally report low numbers of individuals (Krusic *et al.*1996, Buresch 1999). The PSA offers prime habitat for these bats, as they prefer to feed over watercourses on emerging aquatic insects (DeGraaf and Yamasaki 2001). Silver-haired bats roost in tree cavities, under loose bark, and in furrowed bark folds, preferring willow, maple, and ash (Kurta 1995). The abundance of large silver maples with optimal roost sites in close proximity to

preferred feeding habitat may explain why silver-haired bats are relatively common in the PSA.

The big brown bat was the third most commonly recorded bat during this survey. Big brown bats are most abundant in agricultural and residential areas, where they feed over open fields, among scattered trees, along tree-lined streets, and around city street lights (DeGraaf and Yamasaki 2001). Since the bat survey was restricted to the river course, the true abundance of this species in the area may be higher. Big brown bats were most commonly recorded near the upstream-end of the PSA, where the river flows close to residential areas. Big brown bats are beetle specialists but will consume a wide variety of insects. Big brown bats, like the little brown bats, roost in man-made structures but are seldom found with little brown bats, as they prefer cooler roost sites. These bats, unlike most species, do not migrate south to hibernate. Big brown bats seldom travel more than 80 km to reach winter hibernacula and will often hibernate in buildings within close proximity to their summer roost sites (DeGraaf and Yamasaki 2001, Kurta 1995). Big brown bats are active for more of the year (March to November) than any other bat in the study area and are occasionally seen during mild periods throughout the winter.

Although the red bat is typically uncommon in the state, it was routinely detected during this survey. The PSA provides optimal habitat for both feeding and roosting locations. Red bats establish feeding territories, preferably over still water or along forest edges, within 1.2 km (.75 mi) from roost sites (DeGraaf and Yamasaki 2001). They feed on a wide variety of insects but prefer moths. Roost sites are selected in dense foliage of hardwood trees or large shrubs, such as elm, maple, cherry, and walnut, with shade above and to the side, but open below. Roost sites will differ day to day but are often in close proximity to one another. In the fall, red bats migrate south in small groups to winter hibernacula.

The hoary bat, eastern pipistrelle, and northern myotis were each recorded in low numbers in the survey. Low numbers of the hoary bat and eastern pipistrelle were expected, as they are considered uncommon in northeastern United States. Hoary bats are forest-dwelling bats with life histories similar to the red bat, except that they more commonly roost in coniferous trees. The echolocation calls of northern myotis have low

amplitude, making this species less detectable with the Anabat system (Krusic *et al.* 1996). This may account to some extent for the low number of recordings.

Bats in general have few predators, owls and hawks being the most common predators. Bats are most vulnerable in their roosts where snakes, predaceous birds (especially blue jays), and mammals (especially cats and raccoons) will prey upon them. Highest mortality rates are among the young, and falling from maternity sites is the greatest cause of death for young. Poisoning from insecticide ingestion is a common cause of mortality (Whitaker and Hamilton 1998). Bats are also at risk of bioaccumulating environmental contaminants, such as PCB and DDE, which reduce reproductive success and cause tremoring and mortality (Clark and Lamont 1976, Clark and Stafford 1981, Clark 1978). Prolonged tremoring, which is characteristic of organochlorine poisoning, can be especially lethal to bats because it can reduce fat stores needed to survive hibernation (Clark and Stafford 1981). Any disturbance during hibernation uses fat stores and reduces survival. Many bat populations have been reduced due to repeated disturbances from human recreation in caves, and some species (i.e., Indiana bat) that have large percentages of their entire population hibernating in only a few caves are at greatest risk due to this type of disturbance (Whitaker and Hamilton 1998).

3.3.2 Shrews

Masked shrews, smoky shrews, northern short-tailed shrews, and northern water shrews all occur in the PSA (Attachment C). Short-tailed shrews were the most abundant shrew in the PSA and made up 14 percent and 26 percent of small mammal captures in 1998 and 1999, respectively (see Table 6-2 in Section 3.4.2 below). They were also routinely captured in pit traps during wood frog and leopard frog studies. Masked shrews were also common but in smaller numbers than the short-tailed shrews. Smoky shrews were less common than the masked and short-tailed shrews; only a few were captured in pit traps during wood frog and leopard frog studies. The northern water shrew is rare, having been observed only once in the PSA.

The northern short-tail shrew is a large shrew commonly found in a wide variety of habitat types from open meadows to forests throughout the northeastern United States,

although its primary habitat requirement is cool, moist soil (Whitaker and Hamilton 1998). Within the PSA they can be found in most forested, shrub swamp, and wet meadows communities. Short-tailed shrews feed primarily on invertebrates, with earthworms as the most important food, followed by slugs and snails (DeGraaf and Yamasaki 2001). Amphibians, mice, and birds are occasionally eaten. The short-tailed shrew consumes some plant material—such as roots, nuts, berries, and fungi—especially during the winter when caches of such food help to conserve energy. Populations of this shrew show high annual variation, with densities ranging from 1.6 to 121 individuals per hectare but averaging 2.5 (Whitaker and Hamilton 1998, DeGraaf and Yamasaki 2001). Northern short-tailed shrews typically breed after their first year and have three litters a year ranging in size from one to seven young (Whitaker and Hamilton 1998). Adult northern short-tailed shrews captured in the PSA had lengths ranging from 114 – 137 mm and weights from 18.3 – 32.9 grams. Seventeen females were captured during trapping efforts, but only seven of these showed signs of breeding (i.e., placental scars, embryos, lactation).

The masked shrew was commonly encountered during trapping events but in low numbers. This tiny shrew is the smallest mammal occurring in the PSA. Individuals captured during small mammal surveys ranged from 92 – 107 mm long and weighted only 3.4 – 3.7 grams. The masked shrew occupies habitats ranging from moist, grassy fields to dense boreal forests. It can be found in most of the wetland and terrestrial habitat types within the PSA. Masked shrews feed on small insects, mollusks, annelids, and the carrion of larger animals. Ants often make up a large portion of their diet, as do beetle larvae, slugs, snails, and spiders (Whitaker and Hamilton 1998). Masked shrews have home ranges of 405 m^2 (0.10 acres) per individual and densities of 22 individuals per hectare with large annual variation (DeGraaf and Yamasaki 2001). Masked shrews reach sexual maturity at four months, after which they have up to three liters, averaging seven in size, each year. Two breeding female masked shrews were captured in the PSA. One individual had two fetuses and the other displayed uterine vascularization indicative of early pregnancy, but fetuses were not yet visible.

Smokey shrews were uncommon in the PSA, although they are generally common throughout New England. This species prefers shady, damp northern forests with dense ground cover and an abundance of moss-covered logs and boulders. It can, however, be found in a variety of habitats such as bogs, swamps, talus slopes, and stream banks. Within the PSA, smoky shrews were found only in red maple swamp communities. Smoky shrews feed on small leaf litter invertebrates, earthworms, and small salamanders. Population densities of 12 – 35 per hectare are most common, but densities as high as 143 per hectare have been reported (Whitaker and Hamilton 1998).

Only one northern water shrew was observed in the PSA. This was a dead individual observed washed up on the shoreline of the river in the southern part of the PSA. The northern water shrew is a species of conservation concern in Massachusetts and is uncommon throughout New England (see Section 4.0). The northern water shrew occurs in wet habitats, especially grass-sedge marshes and shrub communities along streams. It is most common in swift-flowing, coldwater mountain streams with boulders, woody debris, and tree roots to provide cover. Like all shrews, the northern water shrew is insectivorous, with stonefly, mayfly, and caddisfly larvae making up the largest part of its diet. It also consumes a variety of other invertebrates, small fish, and amphibians.

3.3.3 Moles

Two moles, eastern and star-nosed moles, were documented in the PSA, and an additional species, the hairy-tailed mole, potentially occurs there. The star-nosed mole was the most common mole species found in the PSA. This mole prefers wet areas and is an adept swimmer, with its burrows often leading directly into a stream or pool. Within the PSA, star-nosed moles were commonly found utilizing woodland vernal pools.

The eastern mole is common throughout the Atlantic coastal plain and central United States in well-drained, open grasslands. Within the PSA, an individual was recorded in the transitional floodplain forest community north of New Lenox Road. This mole may be more common in the PSA, but it is expected to occur mostly in upland, agricultural, and residential areas that were not surveyed. The hairy-tailed mole prefers well-drained soils and can be found primarily in forests but also in open grasslands that support some

shrubs. It was not observed in the PSA, although one was observed just north of the Hinsdale Flats SWMA reference area.

Earthworms are the most important food source for all of the moles. Other insects such as beetles, their larvae, snails, slugs, centipedes, millipedes, ants, and spiders are taken in smaller quantities. Plant matter will occasionally be consumed, and the eastern mole in particular may feed heavily on vegetable matter at times. The star-nosed mole will also forage under water and take aquatic insects, mollusks, crustaceans, and occasional fish.

3.4 Herbivorous Mammals

3.4.1 Large Herbivores

White-tailed deer and moose are the only large herbivores found in the PSA. White-tailed deer were found to be abundant throughout the PSA. Deer are browsers that feed on grasses, forbs, and new leaves of woody plants during the summer. They feed heavily on acorns, beechnuts, and other mast as these foods become available. During the winter they feed on buds and twigs of woody plants.

Moose were found primarily in the October Mountain State Forest reference area. Moose are uncommon in Berkshire County, but recent trends indicate an increasing population (Whitaker and Hamilton 1998). Moose are also browsers, although they tend to rely more upon trees and shrubs during the spring and summer than do deer. They are commonly found in lakes and ponds during the spring and early summer, where they feed on the aquatic vegetation.

3.4.2 Small Herbivores

Small terrestrial herbivores occurring in the PSA include snowshoe hares, cottontails, squirrels, eastern chipmunks, woodchucks, porcupines, mice, voles, and southern bog lemmings. A total of 221 small mammals representing 5 species and 121 small mammals representing 6 species were captured during 1998 and 1999, respectively (Table 6-2). White-footed mice were by far the most abundant, making up 64 percent and 62 percent of all captures. In addition to small mammal trapping, numerous small mammals were

captured in pitfall traps installed for amphibian studies, and tracks of many of these species were commonly observed during snow tracking and scent post station surveys.

Table 6-2 1998 and 1999 small mammal trapping results.

Common Name	1998 Locations					1999 Locations				
	1B	3	8	Totals	%	13	14	15	Totals	%
white-footed mouse	45	82	14	141	63.80	23	41	12	76	62.30
northern short-tailed shrew	24	5	3	32	14.48	10	18	4	32	26.23
meadow jumping mouse	0	0	0	0	0.00	1	6	0	7	5.74
meadow vole	13	24	2	39	17.65	1	0	0	1	0.82
southern red-backed vole	0	0	6	6	2.71	0	1	0	1	0.82
masked shrew	0	1	2	3	1.36	0	0	5	5	4.10
Totals	82	112	27	221		35	66	21	122	

White-footed mice inhabit a wide variety of habitats, including forest edges, brushy areas, hedgerows, and they occasionally venture into open grassland (DeGraaf and Yamasaki 2001). They were captured at all of the small mammal trapping locations and at numerous vernal pools, and were observed at all locations during snow tracking surveys. Woodland jumping mice typically occur in variety of forest habitats from spruce/fir to northern hardwoods. They are most commonly found in open, moist forests and are often found near streams (Whitaker and Hamilton 1998). Within the PSA, woodland jumping mice were observed in red maple swamp, black ash-red maple-tamarack calcareous seepage swamp, transitional floodplain forest, and high-terrace

floodplain forest communities. Meadow jumping mice typically occur in cultural grassland communities. Grassy clearings in forested regions may support small numbers of these species and they are often found in early successional forests (Whitaker and Hamilton 1998). Within the PSA they were observed in red maple swamp and transitional floodplain forest communities. Norway rats, first introduced to the United States in the late 1700's, are now abundant in residential and agricultural areas throughout the country. This species was captured during amphibian pit-trapping in red maple swamp and transitional floodplain forest communities, primarily at locations in proximity to residential areas.

While traditionally believed to be herbivores, the diets of mice vary greatly depending upon seasonal and regional availability of food sources and can include a high percentage of animal matter. Large amounts of insects (primarily ground beetles, caterpillars, cutworms, snails, and centipedes) are taken during the spring and summer. As the season progresses, the diet of these mammals shifts more towards seeds, nuts, berries, and fungus. White-footed mice are active year-round and often cache large amounts of seeds and nuts to last throughout the winter.

Meadow voles were also found to be abundant in the PSA and were routinely captured during small mammal trapping events as well as during wood frog and leopard frog studies. Adult meadow voles captured in the PSA ranged in length from 112 – 137 mm and in weight from 16.4 – 26.7 grams. Meadow voles inhabit wet meadows, regenerating pastures with shrub colonies, and wet forest openings. Within the PSA they were found in a variety of emergent and forested wetland communities (Attachment C). Meadow voles eat large quantities of green vegetation—predominately grasses, sedges, and their seeds, fleshy rootstocks, and bark—with amounts often exceeding the animal's weight in a 24-hour period. They also re-ingest their feces to extract the vitamins and nutrients broken down in the later stages of digestion (i.e., they are coprophagic). Meadow voles are among the most prolific small mammals in the eastern United States. A single female can produce as many as 17 litters in a year, with each litter containing 1 – 11 young (Whitaker and Hamilton 1998).

Southern red-backed voles are less common than the meadow voles in the PSA, having been captured only in the red maple and shrub swamp at Trapsite 8 (Map 6-7). Southern red-backed voles are a forest species and are seldom found in open areas. These voles feed on a variety of nuts, seeds, berries, green vegetation, roots, and fungi, depending upon seasonal availability. They store large amount of seeds and nuts to provide food in the winter, as they are active year-round.

All five members of the squirrel family—eastern chipmunks, red squirrels, gray squirrels, northern flying squirrels, and southern flying squirrels—that could potentially occur in the PSA were observed there. The eastern gray squirrel (Figure 6-10) was the most abundant squirrel, being seen in almost every forested habitat in the PSA. These squirrels are abundant in the eastern United States in a variety of forested and residential habitats. Some melanistic gray squirrels were occasionally observed in the PSA. These individuals have black fur on their sides and backs, with dark brown fur on their undersides. All five of the squirrels are forest-dwelling species, as trees are needed for nesting and food. The chipmunk is an exception to this, requiring burrows in the ground, under rocks, or in rotting stumps and logs. Of the squirrels, the red and southern flying squirrel are more carnivorous and are known to eat bird eggs, insects, and young vertebrates.

Figure 6-10 Eastern gray squirrel.

The eastern gray squirrel was the most common member of the squirrel family observed in the PSA.

The porcupine (Figure 6-11) is another common species of the northern forests. Within the PSA they were observed on October Mountain and along Woodland Road. Porcupines spend the majority of their time in trees, where they forage for leaves, buds, mast, and young twigs. Their diet is seasonal, with buds and young leaves being consumed in the spring and summer, mast in the fall, and the inner bark and young twigs in the winter. American beech, ash, basswood, apple, and aspen are favored species, as they build up less tannin in their leaves than other species such as maple and oak. Spruce, pine, and eastern hemlock are also consumed in the winter. Porcupines have relatively small home ranges for its size with summer ranges between 30 – 150 ha (75 – 370 acres) and a winter range of only 2.4 ha (6 acres) (Whitaker and Hamilton 1998). Porcupines have few natural enemies except fisher.

Figure 6-11 Porcupine.

Porcupines were most common in the PSA along the lower slopes of October Mountain State Forest.

Three lagomorph species—snowshoe hare, eastern cottontail, and New England cottontail—could potentially occur within the PSA. Snowshoe hares are a northern species that prefer dense coniferous forests and regenerating shrubs in mixedwood forests, and were found only at the Ashley Lake reference area. The eastern cottontail was the most abundant rabbit species found in the PSA. This species was commonly observed in all of the terrestrial habitats, floodplain forests, swamps, and wet meadows. Colonization of the eastern cottontail throughout the northeast has lead to the decline of

New England cottontails in much of their range. New England cottontails are now considered rare except in southern Maine, New Hampshire, and most of Massachusetts (Litvaitis and Litvaitis 1996). New England cottontails and eastern cottontails cannot be distinguished by their tracks or scat. Therefore all snowtracking sightings were labeled only as cottontail. Visually these two species can sometimes be separated based upon the presence of a black patch between the ears of New England cottontail and the presence of a white patch on the forehead of eastern cottontail. These characteristics, however, may be missing on approximately 50 percent of eastern cottontails (Godin 1977). Because no individuals within the PSA were observed to have the black patch, it is assumed that rabbits observed were eastern cottontails, even when the white patch was not observed.

All three of these species feed heavily on grasses and clover in the summer, and seeds and berries as they become available in the late summer and fall. Cottontails were commonly seen foraging on residential lawns and in agricultural pastureland in the PSA. Buds and twigs of shrubs, stems of blackberries, and sapling sprouts are the primary food sources in winter. During winter snow tracking rabbits were observed foraging on buckthorn, sumac, dogwood, and river grape. Rabbit species are preyed upon in large numbers by nearly all the predators occurring in the PSA, including bobcats, coyotes, foxes, fishers, minks, hawks, and owls.

The two aquatic, herbivorous mammals, American beavers and common muskrats, were both abundant throughout the PSA. American beavers can be found throughout North America in any area where suitable rivers, streams, ponds, or lakes exist. Their primary requirement is water deep enough to prevent ice from freezing to the bottom, which they often create by damming streams and seepages. They den by constructing large floating lodges, excavating bank dens or combining these methods (Figure 6-12). Beaver dens were common throughout the PSA.

Beavers are generalist feeders, consuming whatever plants are available. During the summer, aquatic plants such as pond-lilies, bur-reed, cattails, pondweed, and algae make up their diet. Bark, primarily from hardwoods, makes up the winter diet of beavers. Trees and shrubs are cut during the late summer and fall months to be cached for the winter. Food is stored underwater by anchoring it in mud near the lodge. Beavers are

communal animals, sharing lodges, workloads, and food caches. A typical colony consists of six individuals made up of a pair of adults, their recent young, and occasionally yearlings. Typical colony densities are 0.20 – .69 individuals per kilometer of stream (Whitaker and Hamilton 1998).

Figure 6-12 Beaver lodge.

Beaver lodges like this one are common along the Housatonic River and its backwaters.

Muskrats were found to be abundant throughout the PSA, occurring primarily in deep emergent marshes such as those found adjacent to the river and backwaters north of Woods Pond. Roots and stalks of cattails, three-square grass, and rushes are favorite food sources, although they will eat a wide variety of aquatic plants and may invade nearby fields to feed on herbaceous vegetation. They often build an extensive system of channels to allow for easy winter access between food sources and lodges. Lodges are built of aquatic vegetation with underwater access holes. Muskrats are territorial with a pair of muskrats defending a territory roughly 60 m (200 feet) in diameter around their lodge.

4.0 Rare, Threatened, and Endangered Mammals

Four mammal species of conservation concern could potentially occur in the PSA, only one of which was directly observed. The water shrew, small-footed myotis, and southern bog lemming are of species of Special Concern in Massachusetts, and the Indiana bat is consdidered Endangered by the State of Massachusetts and the Federal Government

(MNHESP 1999). Rare species report forms for rare mammals are provided in Attachment H.

Indiana Bat

The Indiana bat is a Federal- and State-listed Endangered species. Its status is due primarily to the limited number of winter hibernating sites. Eighty-five percent of Indiana bats hibernate in seven caves located in Missouri, southern Indiana, and Kentucky, with 50 percent in just two of those (Kurta 1995). In addition, range-wide population levels of this species have decreased drastically since 1960 (Whitaker and Hamilton, 1998). In summer, Indiana bats range throughout much of the eastern United States, from southern New Hampshire south along the Appalachian Mountains to the panhandle of Florida and west into northeastern Oklahoma.

Historically, Indiana bats may have used much of Massachusetts during the summer breeding period. The floodplain forests of the PSA are suitable foraging habitat, and large silver maples with exfoliating bark could provide suitable maternity sites. Indiana bats forage in upland and bottomland forests, although they prefer dense hillside and ridge forests. The Indiana bat spends 68 percent of its time foraging among trees, rather than over water (LaVal *et al.* 1977). A variety of small insects are consumed, with moths taken most often, followed by Coleoptera and Diptera (Whitaker and Hamilton 1998). Indiana bats were historically recorded in Berkshire, Hampden, and Worcester Counties; however, they are extremely rare in the northeast and have not been reported from Massachusetts since 1939 (MNHESP 1984).

Small-footed myotis

The small-footed myotis is listed as a species of Special Concern by the MNHESP (1999). It ranges from Ontario and southern Quebec, down the Appalachian Mountains to northern Georgia, and west into Arkansas and Oklahoma. These bats usually occur in mountainous regions. Small-footed myotis utilize buildings, overhanging rocks, and caves as summer roost and maternity sites. Suitable summer habitat is present in and adjacent to the PSA and it is likely that the small-footed myotis occurs there. Little is known about its feeding habits, although they are believed to be similar to other *Myotis*

species. Flies, beetles, bugs, leafhoppers, and flying ants have been found in their stomachs (Kurta 1995). They hibernate in caves and mines from November to March usually in the foothills of mountains, up to 610 m (2,000 feet) in elevation, in coniferous woodlands (DeGraaf and Yamasaki 2001).

Small-footed myotis have been recorded in western Massachusetts and documented twice since 1978 in Hampden County, MA (MNHESP 1984, Godin 1977), making their presence in the PSA possible. Other studies conducted in the region have reported small-footed myotis observations (Zimmerman and Glanz 2000, Krusic *et al.*1996). Given this, it is believed that some, albeit likely only a few, of the bat echolocations recorded as *Myotis* sp. during bat surveys were of small-footed myotis (Map 6-12). However, as previously mentioned, limitations of echolocation technology prevent this species from being positively identified.

Water Shrew

The water shrew is listed as a species of Special Concern by MNHESP. It occurs throughout much of Canada and the northeastern United States, from Maine to Connecticut, west to eastern New York and north-central Pennsylvania, extending south in the Appalachian Mountains. This species is also common in mountainous regions of western United States (Whitaker and Hamilton 1998).

Water shrews are usually found near open water. Their optimal habitats are small fast-flowing mountain streams with abundant cover provided by undercut banks, rocks, downed trees, and debris. However, they can also less commonly be found in slow-moving streams, graminoid meadows, beaver impoundments, and temporary pools. Water shrews have historically been collected in Berkshire County (Godin 1977) and the PSA contains habitat for this species. One dead individual was found in the downstream half of the PSA, adjacent to transitional floodplain forests (Map 6-12).

Southern Bog Lemming

The southern bog lemming is a species of Special Concern in Massachusetts. This species' range extends from Quebec, south through the Appalachians to the western

Carolinas, west throughout the Great Lakes region and into Kansas and Arkansas (Whitaker and Hamilton 1998). They are most abundant in the Great Lakes region. Southern bog lemmings can be found in a variety of habitats ranging from forests to grasslands, although their primary habitats are sphagnum bogs and areas supporting thick mosses and deep leaf mold (DeGraaf and Yamasaki 2001, Kurta 1995). The chief requirement for southern bog lemmings is green succulent monocots, primarily sedges and grasses, which almost entirely make up their diet. Some berries may be eaten when in season, as well as fungi and mosses.

The shrub swamp, wet meadow, and floodplain forests of the PSA offer potential habitat for the southern bog lemming, as do the mesic forest slopes of October Mountain, just east of the PSA. However, this species was not observed during any field investigations.

5.0 Literature Cited

Allen, A.W. 1986. Habitat suitability index models: Mink. USFWS Biological Report 82(10.127).

Auerlich, R.J., R.K. Ringer, H.L. Seagran, and W.G. Youatt. 1971. Effects of feeding coho salmon and other Great Lakes fish on mink reproduction. Canadian Journal of Zoology 5:611-616.

Bleavins, M.R., R.J. Auerlich, and R.K. Ringer. 1980. Polychlorinated biphenyls (Aroclors 1016 and 1242): effects on survival and reproduction in mink and ferrets. Archives of Environmental Contamination and Toxicology 9:627-635.

Buresch, K. 1999. Seasonal pattern of abundance and habitat use by bats on Martha's Vineyard, Massachusetts. M.S. Thesis. University of New Hampshire, Durham, NH, USA.

Burgess, S.A. 1978. Aspects of mink (*Mustela vison*) ecology in the Southern Laurentains of Quebec. MS Thesis. MacDonald College of McGill University, Montreal, Quebec, Canada.

Burt, W.H., and R.P. Grossenheider. 1976. The Peterson Field Guide Series - A Field Guide to the Mammals of America North of Mexico. Houghton Mifflin Company, Boston, MA, USA.

Clark, D.R.J. 1978. Uptake of dietary PCB by pregnant big brown bats and their fetuses. Bulletin of Environmental Contamination and Toxicology 19:707-714.

Clark, D.R.J., and T.G. Lamont. 1976. Organochlorine residues in females and nursing young of big brown bat. Bulletin of Environmental Contamination and Toxicology 15(1):1-8.

Clark, D.R.J., and C.J. Stafford. 1981. Effects of DDE and PCB (Aroclor 1260) on experimentally poisoned female little brown bats (*Myotis lucifugus*): lethal brain concentrations. Journal of Toxicology and Environmental Health 7:925-934.

Clough, G. 1987. Relations of small mammals to forest management in northern Maine. Canadian Field Naturalist 101:40-48.

Conner, M.C., R.F. Labiski, and D.R.J. Progulske. 1983. Scent-station indices as measures of population abundance of bobcats, raccoons, gray foxes, and opossums. Wildlife Society Bulletin 11:146-152.

Corben, C. 1999. AnabatV Operating Instructions and Software Installation and Usage. Titley Electronics, Ballina, Australia.

Coutts, R.A., M.B. Fenton, and E. Glen. 1973. Food intake by captive *Myotis lucifugus* and Eptesicus fuscus. Journal of Mammalogy 54:985-990.

Crampton, L.H., and R.M.R. Barclay. 1998. Selection of roosting and foraging habitat by bats in different-aged aspen mixedwood stands. Conservation Biology 12(6):1347-1358.

DeGraaf, R.M., and D.D. Rudis. 1986. New England Wildlife: Habitat, Natural History, and Distribution. General Technical Report NE-108, U.S. Dept. Agriculture, Forest Service, Northeast Forest Experiment Station, 491 pp. (N)

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH, USA.

de Oliveira, M.C. 1998. Anabat Systems Practical Guide. Dept. of Natural Resources, State of Queensland, Brisbane, QLD. 60 pp.

Dubuc, L.J., W.B. Krohn, and R.B. Owen. 1990. Predicting occurrence of river otters by habitat on Mount Desert Island, Maine. Journal of Wildlife Management 54:594-599.

Eberhardt, L.E., and A.B. Sargeant. 1977. Mink predation on prairie marshes during the waterfowl breeding season. p. 37-43. In R.L. Phillips and C. Jonkel (ed.) The 1975 Predator Symposium. Montana Forest Conservation Experiment Station, University of Montana Press, Missoula, MT, USA.

Fenton, M.B., and G.P. Bell. 1981. Recognition of species of insectivorous bats by their echolocation calls. Journal of Mammalogy 62(2):233-243.

Foley, R.E., S.J. Jackling, R.J. Sloan, and M.K. Brown. 1988. Organochlorine and mercury residues in wild mink and otter: a comparison with fish. Environmental Toxicology and Chemistry 7:363-374.

Forrest, L.R. 1988. Field Guide to Tracking Animals in Snow. Stackpole Books, Harrisburg, PA.

Godin, A.J. 1977. Wild Mammals of New England. The John Hopkins University Press, Baltimore, MD, USA, and London, UK.

Halfpenny, J., and E. Biesiot. 1986. A Field Guide to Mammal Tracking in North America. Johnson Books, Boulder, CO, USA.

Halpin, M.A. 1984. Winter habitat use and ecology of red fox in eastern Maine and the history of red fox in Maine. M.S. Thesis. University of Maine, Orono, USA.

Halpin, M.A., and J.A. Bissonette. 1988. Influence of snow depth on prey availability and habitat use by red fox. Canadian Journal of Zoology 66:587-592.

Harder, J.D., and R.L. Kirkpatrick. 1994. Physiological Methods for Wildlife Research. p. 275-306. In T.A. Bookhout (ed.) Research and Management Techniques for Wildlife and Habitats. The Wildlife Society, Bethesda, MD, USA.

Heaton, S.N., S.J. Bursian, J.P. Giesy, D.E. Tillitt, J.A. Render, P.D. Jones, D.A. Verbrugge, T.J. Kubiak, and R.J. Aulerich. 1995. Dietary exposure of mink to carp from Saginaw Bay, Michigan. 1. Effects on reproduction and survival, and the potential risk to wild mink populations. Archives of Environmental Contamination and Toxicology 28:334-343.

Humphrey, S.R., and T.L. Zinn. 1982. Seasonal habitat use by river otters and everglades mink in Florida. Journal of Wildlife Management 46:375-381.

Kirkland, G.L. 1982. Clearcuts - small mammals. p. 397. In D.E. Davis (ed.) CRC Handbook of Census Methods for Terrestrial Vertebrates. CRC Press, Boca Ratan, FL, USA.

Krusic, R.A., Y. Mariko, C.D. Neefus, and P.J. Pekins. 1996. Bat habitat use in the White Mountain National Forest. Journal of Wildlife Management 60(3):625-631.

Kurta, A. 1995. Mammals of the Great Lakes Region. University of Michigan Press, Ann Arbor, MI, USA.

LaVal, R.K., R.L. Clawson, M.L. LaVal, and W. Caire. 1977. Foraging behavior and nocturnal activity patterns of Missouri bats, with emphasis on the endangered species *Myotis grisescens* and *Myotis sodalis*. Journal of Mammalogy 58:592-599.

Litvaitis, M.K. and J.A. Litvaitis. 1996. Using mitochondrial DNA to inventory the distribution of remnant populations of New England cottontails. Wildlife Society Bulletin. 24:725-730.

Liers, E.E. 1951. Notes on the river otter (*Lutra canadensis*). Journal of Mammalogy 32:1-9.

Linhart, S.B., and F.F. Knowlton. 1975. Determining the relative abundance of coyotes by scent station lines. Wildlife Society Bulletin 3:119-124.

Lortie, J.P., and S.K. Pelletier. 1987. Distribution and abundance of breeding birds and small mammals in the high salt marsh and adjacent upland critical edge in southern Maine. Proceeding of the Maine Biological and Medical Science Symposium, Brunswick, ME, USA.

MNHP (Massachusetts Natural Heritage Program). 1984. Massachusetts Rare and Endangered Wildlife. Division of Fisheries and Wildlife, Boston, MA, USA.

Melquist, W.E., J.S. Whitman, and M.G. Hornocker. 1981. Resource partitioning and coexistence of sympatric mink and river otter populations. p. 187-200 In J.A. Chapman and D. Pursley (eds). Worldwide Furbearer Conference Proceedings, Vol I. Frostberg, MD, USA.

Murie, O.J. 1974. Animal Tracks. Second ed. Houghton Mifflin Co., Boston, MA, USA.

Newman, D.G. 1990. Habitat ecology of river otters in central Massachusetts. M.S. Thesis. University of Massachusetts, Amherst, MA, USA.

Newman, D.G., and C.R. Griffin. 1994. Wetland use by river otters in central Massachusetts. Journal of Wildlife Management 58(1):18-23.

Organ, J. 1989. Mercury and PCB residues in Massachusetts river otters: comparisons on a watershed basis. Ph.D. Dissertation. University of Massachusetts, Amherst, MA, USA.

Phillips, R.L. 1982. Red Fox (U.S.). p. 229-230. In D.E. Davis (ed.) CRC Handbook of Census Methods for Terrestrial Vertebrates. CRC Press, Boca Raton, FL, USA.

Rezendes, P. 1999. Tracking and the Art of Seeing - How to Read Animal Tracks and Signs. Second ed. HarperCollin Publishers, New York, NY, USA.

Roy F. Weston, Inc. 2000. Supplemental Investigation Work Plan for the Lower Housatonic River, General Electric (GE) Housatonic River Project, Pittsfield, Massachusetts. Volumes 1 and 2. Prepared for U.S. Army Corps of Engineers, North Atlantic Division, New England District, Concord, MA, USA.

Sheldon, W.G., and W.G. Toll. 1964. Feeding habits of the river otter in a reservoir in central Massachusetts. Journal of Mammalogy 45:449-454.

Smithwood, D.A. 2002. Taxonomic and Age Determination of Fish Scales Extracted from River Otter (*Lutra canadensis*) Scat Specimens Collcted in the Housatonic River Watershed, Massachusetts, February through March 2000. Office of Fisher Assistance, U.S. Fish and Wildlife Service, Laconia, NH, USA.

Swimley, T.J., T.L. Serfass, R.P. Brooks, and W.M. Tzilkowski. 1998. Predicting river otter latrine sites in Pennsylvania. Wildlife Society Bulletin 26(4):836-845.

Talent, L.G., R.L. Jarvis, and G.L. Krapu. 1983. Survival of mallard broods in south-central North Dakota. Condor 85(1):74-78.

Whitaker, J.O., Jr., and W.J. Hamilton Jr. 1998. Mammals of the Eastern United States. 3rd ed. Cornell University Press, Ithaca, NY, USA.

Wren, C.D., D.B. Hunter, J.F. Leatherland, and P.M. Stoakes. 1987. The effects of polychlorinated biphenyls and methylmercury, singularly and in combination on mink. II: reproduction and kit development. Archives of Environmental Contamination and Toxicology 16:449-454.

Zimmerman, G.S., and W.E. Glanz. 2000. Habitat use by bats in eastern Maine. Journal of Wildlife Management 64(4):1032-1040.

SECTION IV ATTACHMENTS

Attachment A Natural Community Profiles

acidic_brownwater_lake.PDF

blackash_redmaple_tamarack_swamp.PDF

calcareous_seepage_marsh.PDF

clear_softwater_lake.PDF

cultural_grassland.PDF

deep_emergent_marsh.PDF

high_gradient_stream.PDF

high_terrace_floodplain_forest.PDF

low_gradient_stream.PDF

medium_gradient_stream.PDF

moderately_alkaline_lake.PDF

mud_flat.PDF

northern_hardwood_hem_pine_forest.PDF

red_maple_swamp.PDF

redoak_sugarmaple_transition_forest.PDF

rich_mesic_forest.PDF

riverine_point_bar.PDF

shallow_emergent_marsh.PDF

shrub_swamp.PDF

spring.PDF

spruce_fir_hardwood_forest.PDF

successional_hardwood_forest.PDF

transitional_floodplain_forest.PDF

wet_meadow.PDF

woodland_vernal_pool.PDF

Acidic Brownwater Lake/Pond

MNHESP State Rank: Unranked

PHYSICAL

Hydrology Ponded with water depth exceeding 2 m (6.5 ft).

Soil Inundated, with soft organic muck substrate.

Topography Located in drainage basins.

Elevation Usually occurring above 448 m (1470 ft) in Berkshire County.

Form Natural or man-made (i.e., impoundments) lakes in areas with acidic bedrock such as schist or gneiss. Shoreline areas adjacent to peatlands, which provides organic acids that discolor the water.

DOMINANT PLANT SPECIES[1]

Canopy Absent.

Subcanopy Absent.

Shrubs Absent.

Herbs Canada bluejoint, lurid sedge, soft rush, tiny pondweed, ribbonleaf pondweed, and common bladderwort.

Climbing Plants Absent.

Bryophytes Prevalent around periphery of community, *Sphagnum* a common genus.

Notes Dark-stained water limits light for submerged aquatic plant growth.

COMMON ANIMAL SPECIES[2]

Mammals Snowshoe hare, raccoon, red fox, coyote, white-tailed deer, and meadow vole.

Birds Tree swallow, bank swallow, barn swallow, Canada goose, mallard, American black duck, and green-winged teal.

[1] Scientific names provided in Attachment F.
[2] Scientific names provided in Attachment C.

Herpetiles American toad, spotted salamander, eastern newt, pickerel frog, and green frog.

Fish Unknown.

Notes Olive-sided flycatcher, a rarely sighted bird in the study area, was observed at the edge of this community.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank Unranked.

Rare Species[3] Common moorhen (SC).

Distribution in MA More common in the western and higher elevation portions of the state.

Distribution in the Study Area None observed.

Variation None observed.

Synonyms Lacustrine Open Water, Lacustrine Aquatic Bed, Lacustrine Unconsolidated Bottom (Cowardin *et al*. 1979).

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

[3] State rank and status follow MNHESP 1999.

Black Ash–Red Maple–Tamarack Calcareous Seepage Swamp

MNHESP State Rank: S2

PHYSICAL

Hydrology Temporarily to seasonally flooded, saturated near surface or with standing water in depressions, or seeps.

Soil Mineral soils with redoximorphic features, often with a surface layer of well-decomposed organic material.

Topography Pronounced pit and mound topography varying to undulating and relatively flat.

Elevation Occurring from 294 to 296 m (965 ft to 971 ft) in the primary study area.

Form Forested swamps in groundwater discharge areas with high pH substrate.

DOMINANT PLANT SPECIES[1]

Canopy Red maple, black ash, bur oak, and, at one site, eastern hemlock and white pine.

> **Characteristics** Tree size varies with hydrology, wetter sites with smaller trees (15–25 cm (6–10 in) diameter and canopies less than 15 m (49 ft) tall) compared to drier sites (some trees exceeding 50 cm (19.5 in) and crowns to 25 m (82 ft) tall).

Subcanopy American hornbeam, red maple, black ash.

> **Characteristics** Subcanopy poorly developed except at wetter sites.

Shrubs Witch-hazel, buttonbush, northern arrowwood, silky dogwood, winterberry, and mountain laurel.

> **Characteristics** Shrub layer poorly developed except at wetter sites where shrubs often formed dense colonies.

[1] Scientific names provided in Attachment F.

Herbs Sensitive fern, royal fern, brome-like sedge, and rough-leaved goldenrod common at drier sites, false water-pepper, moneywort, common water-purslane, and lesser duckweed (in pools) found at wetter sites.

> **Characteristics** Variable and dependant on hydrology.

Climbing Plants Absent.

Bryophytes Largely absent.

Notes Mountain laurel a common shrub in calcareous seepage swamps that contained conifer trees in the canopy.

COMMON ANIMAL SPECIES[2]

Mammals White-footed mouse, northern short-tailed shrew, beaver, mink, fisher, white-tailed deer, coyote, and black bear.

Birds Wood duck, warbling vireo, veery, ovenbird, northern waterthrush, black-capped chickadee, and great-crested flycatcher.

Herpetiles Wood frog.

Fish Absent.

Notes Mustelids, specifically mink and fisher, often used this community, or its edge, during the winter season.

[2] Scientific names provided in Attachment C.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S2.

Rare Species[4] Gray's sedge (S2), Eastern Black Currant (S4), hemlock-parsley (S3), and bur oak (S3).

Distribution in MA Restricted to the western half of the state.

Distribution in the Study Area Largely limited to the west side of the Housatonic River downstream of Yokum Brook confluence.

Variation Three plant associations existed: (1) Very wet sites with small canopy trees and no conifers, located near the river channel; (2) Very wet sites with small canopy trees, including conifers, located at the base of slopes; and (3) relatively drier sites with large trees located near the river channel.

Synonyms Palustrine Forested (Cowardin *et al.* 1979); Circumneutral Hardwood Swamp (Weatherbee and Crow 1992).

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.

Calcareous Seepage Marsh

MNHESP State Rank: S2

PHYSICAL

Hydrology Temporarily to seasonally flooded, saturated to the surface or with standing water up to 20 cm (8 in) deep (particularly in the depressions).

Soil Mineral soils with a surface layer of well-decomposed organic material exceeding 50 cm (19.5 in) deep.

Topography Relatively level basins and shores.

Elevation Site located at 440 meters (1443.5 ft).

Form Herb-dominated wetlands, similar in many ways to deep emergent marshes, but enriched with high pH groundwater.

DOMINANT PLANT SPECIES[1]

Canopy Absent.

Subcanopy Absent.

Shrubs Sweet gale, hoary willow, beaked willow, pussy willow, silky willow, and shrubby cinquefoil.

> **Characteristics** Most species confined to edge of community.

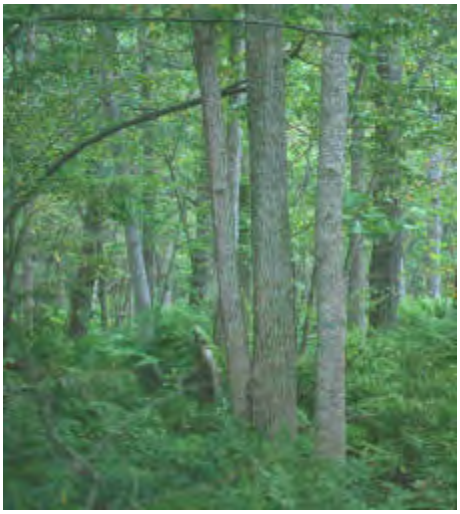
Herbs Wire sedge, oblong bulrush, broad-leaved cattail, beaked sedge, marsh cinquefoil, marsh fern, and marsh St. Johnswort.

> **Characteristics** Dominated by grass-like plants.

Climbing Plants Absent.

Bryophytes Present, forming a mat over the organic soil.

[1] Scientific names provided in Attachment F.



Notes Yellow water-lily, pitcher plant, leatherleaf, buckbean, and northern bladderwort present in and around small pools within the calcareous seepage marsh.

COMMON ANIMAL SPECIES[2]

Mammals Masked shrew.

Birds Red-winged blackbird, swamp sparrow, and yellow warbler.

Herpetiles Wood frog, bull frog, spring peeper, American toad, painted turtle, and snapping turtle.

Fish Absent.

Notes As this community is closely associated with Muddy Pond, many terrestrial animals using the pond likely use the calcareous seepage marsh as well.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S2.

Rare Species[4] Hoary willow (S?) and oblong bulrush (unranked).

Distribution in MA Restricted to the Housatonic River and Connecticut River valleys.

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.

Distribution in the Study Area Adjacent to Muddy Pond in Hinsdale.

Variation None observed.

Synonyms Palustrine Emergent (Cowardin *et al.* 1979); Robust Emergent Marsh, in part (Weatherbee and Crow 1992).

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

Clear Softwater Lake/Pond

MNHESP State Rank: Unranked

PHYSICAL

Hydrology Ponded with water depth exceeding 2 m (6.5 ft).

Soil Inundated, with mineral and organic substrate.

Topography Located in drainage basins.

Elevation Usually occurring between 448 and 622 m (1470 and 2041 ft) in Berkshire County.

Form Lakes in areas with acidic bedrock such as schist or gneiss. Shorelines sometimes abruptly transitioning to upland communities. Exposed bedrock or course mineral soil is a common shoreline substrate.

DOMINANT PLANT SPECIES[1]

Canopy Absent.

Subcanopy Absent.

Shrubs Absent.

Herbs Water lobelia, spiny-spored quillwort, grass-leaved arrowhead, common pipewort, narrow-leaved bur-reed, snail-seed pondweed, alga pondweed, Oakes pondweed, and yellow water-lily.

Climbing Plants Absent.

Bryophytes Largely absent.

Notes Many aquatic plants have a rosette growth form.

COMMON ANIMAL SPECIES[2]

Mammals Snowshoe hare, white-tailed deer, porcupine, American beaver, coyote, mink, fisher, black bear, and river otter.

[1] Scientific names provided in Attachment F.
[2] Scientific names provided in Attachment C.

Birds Swallows and waterfowl.

Herpetiles Eastern newt and green frog.

Fish Unknown.

Invertebrates Crayfish.

Notes Few surveys performed in summer season.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank Unranked.

Rare Species None observed.

Distribution in MA Unknown.

Distribution in the Study Area Several occurrences in October Mountain State Forest and nearby highland areas.

Variation None observed.

Synonyms Lacustrine Open Water, Lacustrine Aquatic Bed, Lacustrine Unconsolidated Bottom (Cowardin *et al.* 1979).

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Cultural Grassland

MNHESP State Rank: Unranked

PHYSICAL

Hydrology Upland.

Soil Mineral soils with oxidized soils and lacking redoximorphic features.

Topography Relatively level.

Elevation Occurring from 294 to 298 meters (964.5 to 978 ft) in the primary study area.

Form Open, upland fields dominated by grass-like herbs that are periodically disturbed (mowed).

DOMINANT PLANT SPECIES[1]

Canopy Absent.

Subcanopy Absent.

Shrubs Pussy willow, beaked willow, red-osier dogwood, and staghorn sumac.

> **Characteristics** Shrubs sparse and stunted when occurring in the open, often confined to dense colonies along the edge of the grassland.

Herbs Reed fescue, Timothy, Kentucky blue-grass, poverty grass, little bluestem, tall goldenrod, common milkweed, wild carrot, common evening primrose, spreading dogbane, common flat-topped goldenrod, and spotted knapweed.

> **Characteristics** Vegetation usually dense on mesic sites managed for agriculture and sometimes sparse on xeric sites.

Climbing Plants Absent.

Bryophytes Largely absent from managed areas.

[1] Scientific names provided in Attachment F.

Notes This community shows a high percentage of non-native species, especially mesic, in formerly or actively farmed areas.

COMMON ANIMAL SPECIES[2]

Mammals White-footed mouse, meadow vole, big brown bat, white-tailed deer, and red fox.

Birds Canada goose, bobolink, eastern kingbird, American crow, tree swallow, song sparrow, and American Robin.

Herpetiles Northern leopard frog.

Fish Absent.

Notes Snow goose, a rarely sighted species in the primary study area, was seen in autumn flocks of Canada geese in this community.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank Unranked.

Rare Species None observed.

Distribution in MA Primarily found in the eastern and central portions of the state.

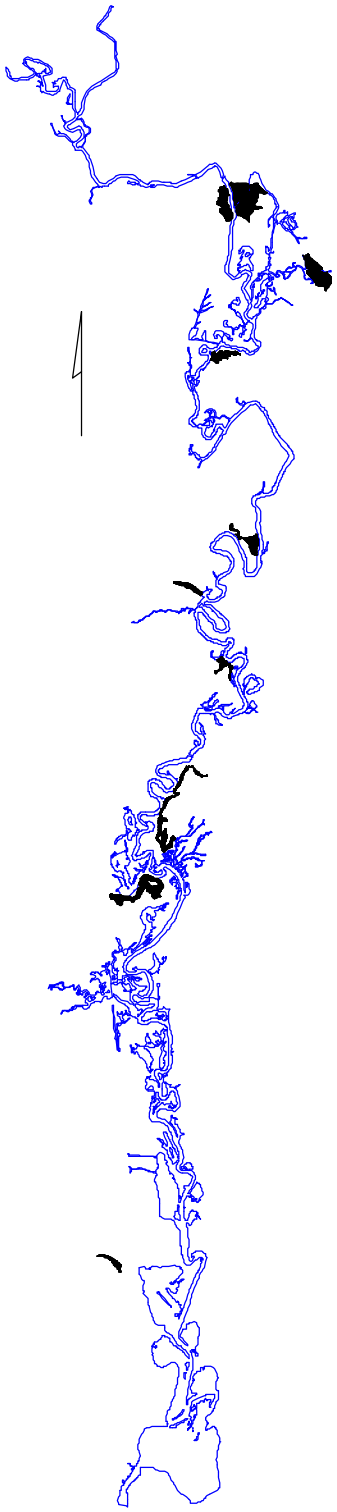
Distribution in the Study Area Limited in the primary study area to the vicinity of the New Lenox Road.

Variation Community varies with use and moisture regime.

Synonyms Old Field (Weatherbee 1996).

REFERENCES

[2] Scientific names provided in Attachment C.



Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

Deep Emergent Marsh

MNHESP State Rank: S4

PHYSICAL

Hydrology Permanently saturated and often inundated with 10 – 60 cm (.32 – 24 in) of standing water.

Soil Mineral soils with a surface layer of well-decomposed organic matter.

Topography Shallow basins, lake and stream margins.

Elevation Occurring from 294 – 298 m (965 – 977 ft) in the primary study area.

Form Wetlands dominated by robust, emergent, often grass-like, vegetation.

DOMINANT PLANT SPECIES[1]

Canopy Red maple.

> **Characteristics** Limited to one or few trees scattered throughout community.

Subcanopy Absent.

Shrubs Silky dogwood, buttonbush, and speckled alder

> **Characteristics** Shrub layer sparse or confined to small colonies within deep emergent marsh.

Herbs Broad-leaved cattail, common reed, giant bur-reed, pickerel weed, tuckahoe, common arrowhead, purple loosestrife, sweet-flag, yellow water-lily, and bulblet-bearing water-hemlock.

> **Characteristics** Variable, though usually dense and always the dominant layer.

Climbing Plants Absent.

Bryophytes Largely absent.

[1] Scientific names provided in Attachment F.

Notes Variations occurred based on elevation and hydrology (lake or stream). Purple loosestrife is a non-native and invasive species of this community.

COMMON ANIMAL SPECIES[2]

Mammals Muskrat and raccoon.

Birds Great blue heron, Virginia rail, red-winged blackbird, mallard, green heron, song sparrow, and yellow warbler.

Herpetiles Eastern newt, northern leopard frog, bull frog, green frog, snapping turtle, and painted turtle.

Fish Chain pickerel, largemouth bass, bluegill sunfish, yellow perch, and cyprinids.

Notes Fish present in flooded deep emergent marshes that are adjacent to lakes and streams.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S4.

Rare Species[4] Hard-stem bulrush (S?), oblong bulrush (unranked), and common moorhen (special concern).

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.

Distribution in MA Found throughout most of the state with the greatest concentrations in central and eastern Massachusetts.

Distribution in the Study Area Frequent along Housatonic River in downstream portion of primary study area and in backwater areas.

Variation Three additional associations observed in characteristic settings: (1) Marshes on the shores of moderately alkaline lake/ponds dominated by hard-stem bulrush or oblong bulrush; (2) marshes in backwater areas with a high proportion of shorter, broad-leaved and floating-leaved plants; and (3) marshes in former lake basins dominated by wool-grass and three-way sedge

Synonyms Palustrine Emergent (Cowardin *et al.* 1979); Robust Emergent Marsh (Weatherbee and Crow 1992).

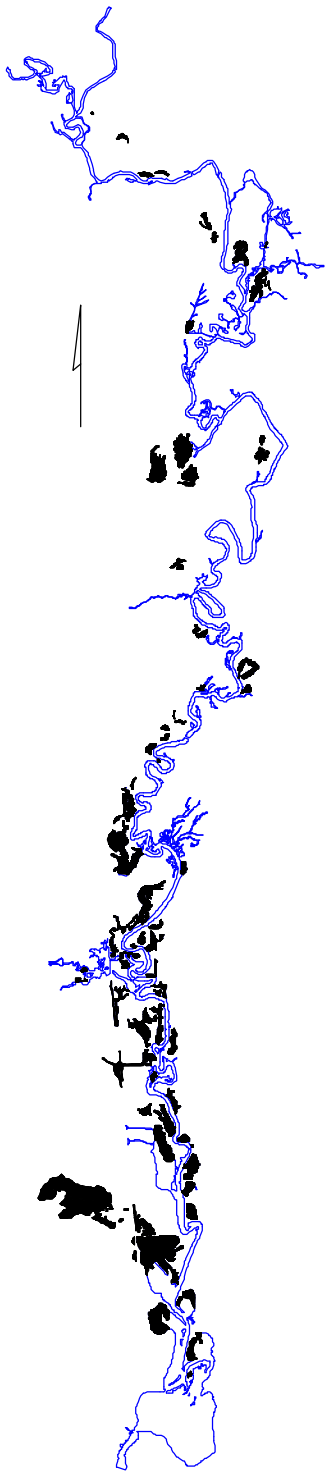
REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.



High-Gradient Stream

MNHESP State Rank: Unranked

PHYSICAL

Hydrology Flowing water.

Soil Ledge, cobble, gravel, and sand.

Topography Scoured channel on moderate to steep slopes with abrupt drops.

Elevation Mostly occurring above 300 m (984 ft) elevation in the October Mountain State Forest.

Form Moderate to quick flowing streams with some turbulent water.

DOMINANT PLANT SPECIES[1]

Canopy Absent, though frequently shaded by adjacent trees.

Subcanopy Absent, except at edge of community.

Shrubs Absent, except at edge of community.

Herbs Absent except at edge of community.

Climbing Plants Absent.

Bryophytes Often present at margin of springs.

Notes Vegetation highly dependent on form (e.g., rivulet or pond) and permanence of source through the season.

COMMON ANIMAL SPECIES[2]

Mammals Raccoon and woodland jumping mouse.

Birds Black throated blue warbler, veery, blue-headed vireo, and eastern phoebe.

Herpetiles Northern two-lined salamander and dusky salamanders.

Fish Brook trout.

Invertebrates Caddisfly and stonefly.

Notes Small size of community occurrences limits use by larger vertebrates.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank Unranked.

Rare Species[3] Spring salamander (SC).

Distribution in MA Common in portions of state with topographic relief.

Distribution in the Study Area Most occurrences located on slopes within October Mountain State Forest.

Variation Bank morphology, substrate size, and stream features (e.g., riffle, run, and pool) can be substantially different depending on elevational gradient.

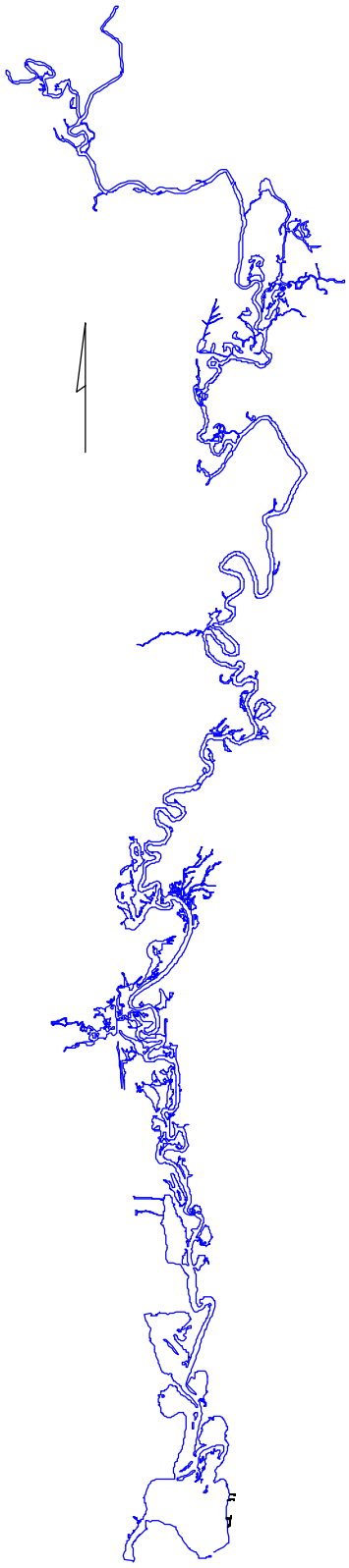
Synonyms Riverine Open Water, Riverine Aquatic Bed, Riverine Unconsolidated Bottom (Cowardin *et al*. 1979).

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

[1] Scientific names provided in Attachment F.
[2] Scientific names provided in Attachment C.
[3] State rank and status follow MNHESP 1999.



High-Terrace Floodplain Forest

MNHESP State Rank: S2

PHYSICAL

Hydrology Temporarily flooded.

Soil Mineral soils with redoximorphic features within 60 cm (24 in) of the surface.

Topography Relatively level to undulating terrain, sometimes with evident floodwater channels cutting through the forest.

Elevation Occurring at 294 m (965 ft) in the primary study area.

Form Rich, forested community along high banks of medium to large rivers that receives floodwater flows during high-water events.

DOMINANT PLANT SPECIES[1]

Canopy Basswood, white ash, sugar maple, and black cherry.

Subcanopy American hornbeam.

Shrubs Choke cherry, common buckthorn, Morrow's honeysuckle, and Japanese barberry.

> **Characteristics** Shrub layer generally sparse except for dense colonies of non-native species (latter three species).

Herbs Wild leek, spring beauty, trout lily, Dutchman's breeches, white snakeroot, zig-zag goldenrod, ostrich fern, jumpseed, long-beaked sedge, bottlebrush grass, and pubescent sedge.

> **Characteristics** Dominated by spring ephemerals (first four herbs listed above) during the early season then changing dramatically with emergence of later-appearing species.

Climbing Plants Largely absent.

Bryophytes Largely absent.

[1] Scientific names provided in Attachment F.

Notes Spring ephemeral species appearing prior to leaf emergence of canopy species and complete most of life cycle by early summer and disappear soon after (dieing back to underground storage organs). Non-native woody shrubs are prevalent in portions of this community.

COMMON ANIMAL SPECIES[2]

Mammals Gray squirrel and white-tailed deer.

Birds Wood thrush, veery, blue-headed vireo, black-capped chickadee, American crow, and ovenbird.

Herpetiles Wood frog, spotted salamander, and northern leopard frog.

Fish Absent.

Notes Vernal pools located in this community were used by breeding amphibians (in vernal pools).

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S2.

Rare Species[4] Early blue cohosh (S?), black maple (S3), and downy wild-rye (S2).

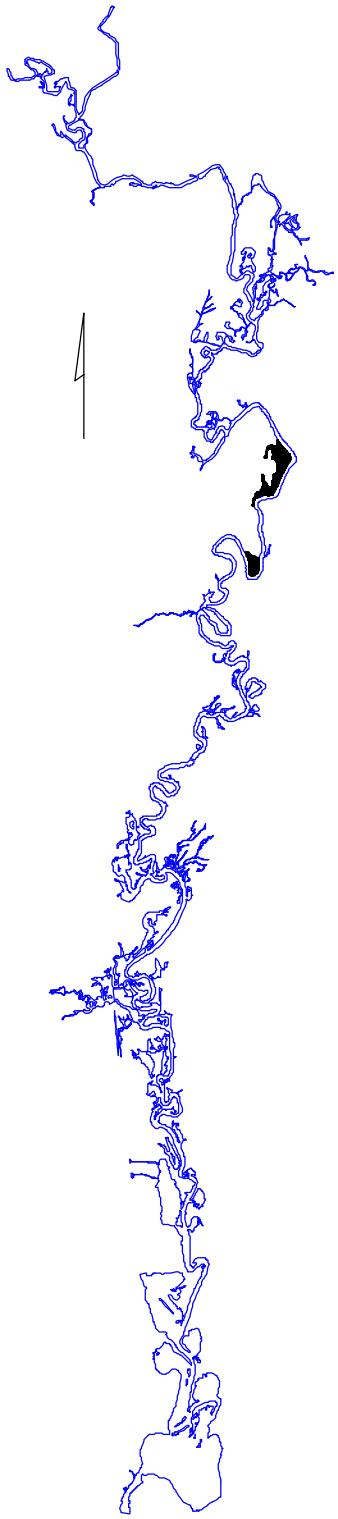
[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.

Distribution in MA Found throughout much of Massachusetts, though with the highest concentrations in the western half of the state.

Distribution in the Study Area Large stands limited to a stretch of river upstream of the Pittsfield Waste Water Treatment Plant outfall, though small inclusions infrequently found in Transitional Floodplain Forests in upper half of primary study area.

Variation None observed.

Synonyms Palustrine Forested (Cowardin *et al.* 1979); Floodplain Forest (Weatherbee and Crow 1992).



REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

Low-Gradient Stream

MNHESP State Rank: Unranked

PHYSICAL

Hydrology Flowing water.

Soil Fine sand, silt, or organic matter, depending on stream velocity.

Topography Relatively level valley floor without abrupt drops or turbulent water.

Elevation Occurring from 294 – 295 m (965 – 968 ft) in the primary study area.

Form Slow-moving, meandering river. Water depth is commonly 2 – 3 m (6.5 – 10 ft).

DOMINANT PLANT SPECIES[1]

Canopy Absent.

Subcanopy Absent.

Shrubs Absent.

Herbs Common hornwort, Canada waterweed, giant bur-reed, narrow-leaved bur-reed, green-fruited bur-reed, water stargrass, large-leaved pondweed, star duckweed, Eurasian milfoil, and crisped pondweed.

Climbing Plants Absent.

Bryophytes Largely absent.

Notes Floating leaved plants, such as yellow water-lily, common near backwater areas.

COMMON ANIMAL SPECIES[2]

Mammals Little brown myotis, silver-haired bat, muskrat, and beaver.

Birds Belted kingfisher, tree swallow, barn swallow, northern rough-winged swallow, great blue heron, Canada goose, mallard, wood duck,

red-winged blackbird, common grackle, and song sparrow.

Herpetiles Northern leopard frog, eastern newt, bull frog, and painted turtle.

Fish Bluegill, pumpkinseed sunfish, golden shiner, spottail shiner, largemouth bass, common carp, goldfish, yellow perch, white sucker, and brown bullhead.

Invertebrates Fairy shrimp and fingernail clams in vernal pools.

Notes Black ducks use river in winter. Rock bass, black crappie, blacknose dace, fallfish, and northern pike were additional fish observed.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank Unranked.

Rare Species None observed.

Distribution in MA Throughout much of state except in areas with pronounced topographical relief.

Distribution in the Study Area Mainstem of the Housatonic River, best developed downstream of New Lenox Road.

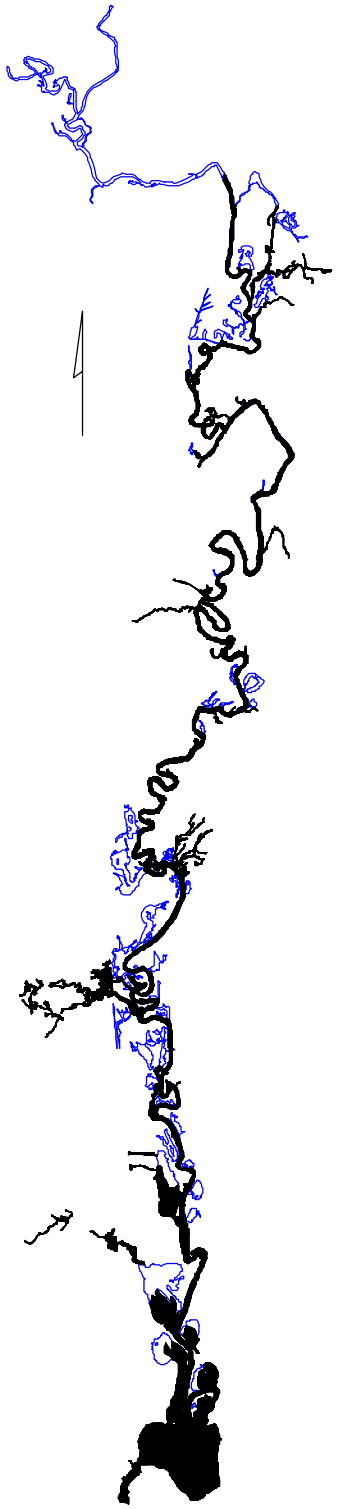
Variation Portion of Housatonic River between Pittsfield Waste Water Treatment Facility and New Lenox Road represents a transition area between medium-gradient stream and low-gradient stream.

Synonyms Riverine Open Water, Riverine Aquatic Bed, Riverine Unconsolidated Bottom (Cowardin *et al*. 1979).

[1] Scientific names provided in Attachment F.
[2] Scientific names provided in Attachment C.

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.



Medium-Gradient Stream

MNHESP State Rank: Unranked

PHYSICAL

Hydrology Flowing water.

Soil Cobble, gravel, and sand.

Topography Scoured channel on moderately sloped valley floor with some small, abrupt drops and mildly turbulent water.

Elevation Mostly occurring above 295 m (968 ft) elevation on mainstem Housatonic River and East Branch Housatonic River.

Form Moderate speed, small river with riffles, runs, and pools. Water depth commonly 0.5 – 1.5 m (1.5 – 5 ft).

DOMINANT PLANT SPECIES[1]

Canopy Absent, though often shaded by adjacent canopy of silver maple.

Subcanopy Absent.

Shrubs Absent.

Herbs Crisped pondweed, Eurasian milfoil, and narrow-leaved bur-reed.

> **Characteristics** Aquatic vegetation sparse and restricted to scattered colonies.

Climbing Plants Absent.

Bryophytes Absent.

Notes Most vegetation restricted to edge of channel.

[1] Scientific names provided in Attachment F.

COMMON ANIMAL SPECIES[2]

Mammals Raccoon and beaver.

Birds Mallard, spotted sandpiper, American robin, and common grackle.

Herpetiles Eastern newt.

Fish Bluegill, pumpkinseed sunfish, spottail shiner, yellow perch, white sucker, and fallfish.

Notes Many species of fish common to low-gradient stream were found in medium-gradient stream, notable exceptions were goldfish and common carp, which were not found in medium-gradient stream. Black ducks used river in winter. Mink and river otter have been rarely sighted in this community.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank Unranked.

Rare Species[3] Small-footed myotis (SC) and skillet clubtail (SC).

Distribution in MA Throughout much of the state.

[2] Scientific names provided in Attachment C.
[3] State rank and status follow MNHESP 1999.

Distribution in the Study Area East and West Branches of the Housatonic River, mainstem Housatonic River upstream of Pittsfield Wastewater Treatment Facility outflow.

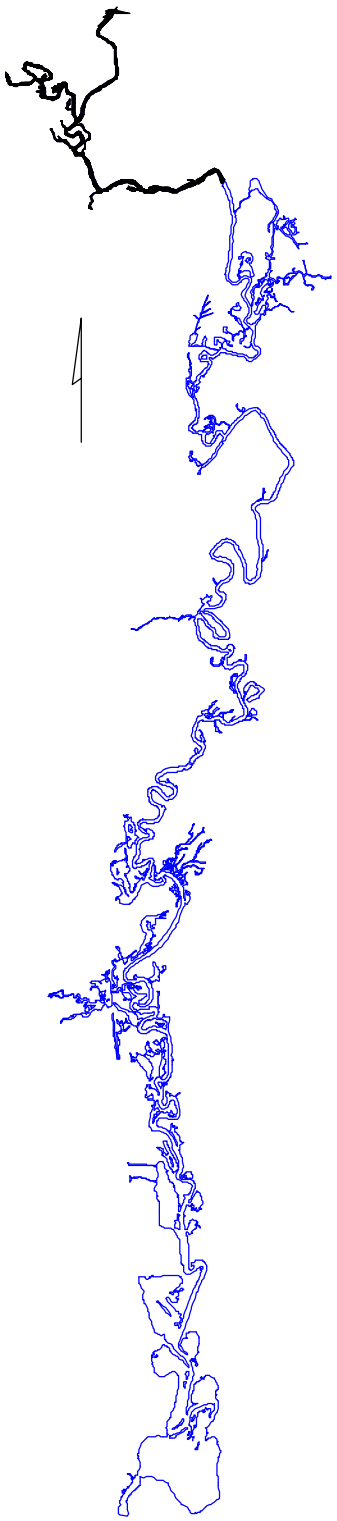
Variation Bank morphology, substrate size, and river features (e.g., riffle, run, and pool) can be substantially different depending on elevational gradient.

Synonyms Riverine Open Water, Riverine Aquatic Bed, Riverine Unconsolidated Bottom (Cowardin *et al.* 1979).

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.



Moderately Alkaline Lake/Pond

MNHESP State Rank: Unranked

PHYSICAL

Hydrology Ponded with water depth exceeding 2 meters.

Soil Inundated, upper horizons organic over silt and fine sand.

Topography Gently sloped shore.

Elevation Usually occurring between 221 and 391 meters (725 and 1283 ft) in Berkshire County, sites in study area at 276 – 440 meters (905 – 1443 ft).

Form Lakes in areas influenced by high pH bedrock—limestone (pH ranges from 7.0 – 9.0). Bottom substrate usually soft.

DOMINANT PLANT SPECIES[1]

Canopy Absent.

Subcanopy Absent.

Shrubs Absent.

Herbs Common hornwort, common water-nymph, Canada waterweed, tape-grass, long-beaked water crowfoot, tiny pondweed, floating pondweed, flatstem pondweed, red pondweed, Eurasian milfoil, and crisped pondweed.

> **Characteristics** Variable, but often dense. Rosette-forming species usually absent.

Climbing Plants Absent.

Bryophytes Largely absent.

Notes Invasive species tend to be prevalent in this community. The latter two herbs are non-native and invasive.

[1] Scientific names provided in Attachment F.

COMMON ANIMAL SPECIES[2]

Mammals Long-tail weasel, mink, river otter, and raccoon.

Birds Great blue heron, tree swallow, bank swallow, barn swallow, northern rough-winged swallow, wood duck, Canada goose, and mallard.

Herpetiles Green frog, pickerel frog, American toad, bullfrog, eastern newt, wood frog, snapping turtle, and painted turtle.

Fish Bluegill, pumpkinseed sunfish, largemouth bass, yellow perch, chain pickerel, brown bullhead, and golden shiner.

Invertebrates Eastern elliptio, eastern floater, and many arthropods.

Notes Dragonfly community well developed.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank Unranked

Rare Species[3] Hard-stem bulrush and oblong bulrush.

Distribution in MA Unknown.

[2] Scientific names provided in Attachment C.
[3] State rank and status follow MNHESP 1999.

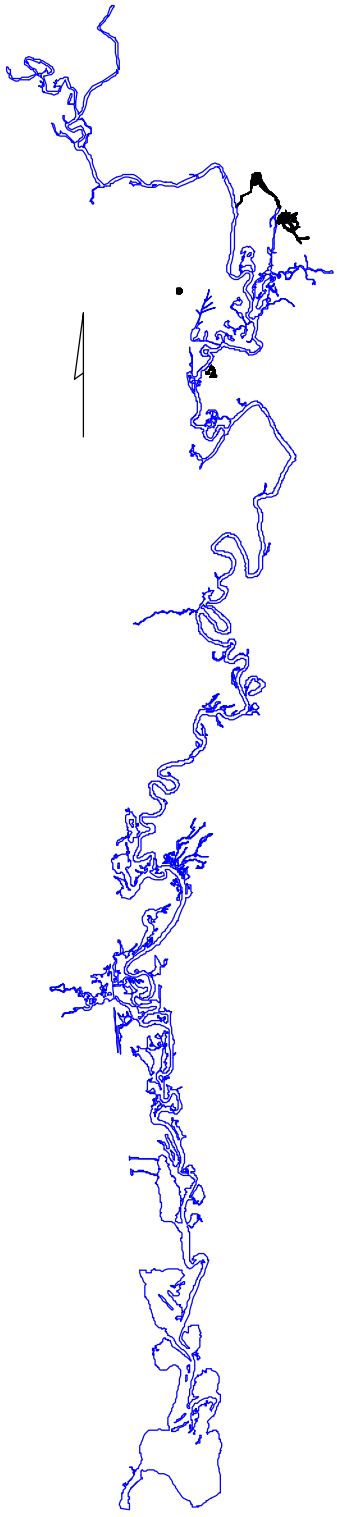
Distribution in the Study Area Confined to the central valley region in areas of limestone bedrock. Examples include Threemile Pond, Silver Lake, and Woods Pond.

Variation None observed.

Synonyms Lacustrine Open Water, Lacustrine Aquatic Bed, Lacustrine Unconsolidated Bottom (Cowardin *et al.* 1979).

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.



Mud Flat

MNHESP State Rank: S4

PHYSICAL

Hydrology Temporarily flooded and permanently saturated.

Soil Mucky mineral soils

Topography Relatively level to gently sloped basins.

Elevation Occurring from 295 to 298 m (968 to 978 ft) in the primary study area.

Form Sparsely vegetated, exposed mud at the edges of permanent pools or in the basins of temporary pools.

DOMINANT PLANT SPECIES[1]

Canopy Absent, though often shaded by neighboring silver maple.

Subcanopy Absent.

Shrubs Bottonbush and silky dogwood.

> **Characteristics** Confined to the edge of the community.

Herbs Northern water-plantain, common arrowhead, American bur-reed, needle spikesedge, threeway sedge, southern water-plantain, false water-pepper, water-parsnip, long-stalked monkey flower, water-purslane, and wool-grass.

> **Characteristics** Density of vegetation dependent on length of exposure, the longer the mudflat is exposed, the greater the areal cover of herbaceous plants.

Climbing Plants Absent.

Bryophytes Absent.

Notes Plants emerge in summer after water levels recede and substrate is exposed.

[1] Scientific names provided in Attachment F.

COMMON ANIMAL SPECIES[2]

Mammals Beaver, muskrat, and raccoon.

Birds Spotted sandpiper, solitary sandpiper, least sandpiper, great blue heron, Canada goose, song sparrow, common grackle, and red-winged blackbird.

Herpetiles Wood frog.

Fish Absent.

Notes Many species of animals pass through community while traveling to and from vernal pools.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S4.

Rare Species[4] Mudflat spikesedge (S2) and wapato (S1).

Distribution in MA Found throughout the state, with greatest concentrations in the major river valleys.

Distribution in the Study Area Found in and near vernal pools, sometimes adjacent to the river channel, within the Housatonic River valley.

Variation None observed.

Synonyms Palustrine Unconsolidated Shore, Riverine Unconsolidated Shore (Cowardin *et al.* 1979).

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Northern Hardwoods–Hemlock–White Pine Forest

MNHESP State Rank: S5

PHYSICAL

Hydrology Upland

Soil Mineral soils with oxidized soils lacking redoximorphic features.

Topography Relatively level to uneven ground.

Elevation Near 294 m (964 ft) in the primary study area and up to 546 m (1791 ft) in the October Mountain State Forest.

Form Upland forests with a mixture of broad-leaved and needle-leaved trees.

DOMINANT PLANT SPECIES[1]

Canopy Red oak, eastern hemlock, white pine, and sugar maple.

> **Characteristics** Variable as to dominance of canopy species, one or more species may be absent from a given site.

Subcanopy Eastern hemlock and American beech.

> **Characteristics** Usually poorly developed.

Shrubs Hobblebush, striped maple, mountain maple, and Canada elder.

Herbs Christmas fern, shining ground-fir, evergreen woodfern, Canada mayflower, bracken fern, Swan's sedge, wintergreen, southern running-pine, ground-pine, and partridge berry.

> **Characteristics** Variable and dependant on canopy dominants.

Climbing Plants Absent.

Bryophytes Largely absent.

[1] Scientific names provided in Attachment F.

Notes Variation between sites in the Housatonic River floodplain and on slopes of October Mountain State Forest occur (see Variation).

COMMON ANIMAL SPECIES[2]

Mammals White-footed mouse, northern short-tailed shrew, beaver, mink, fisher, white-tailed deer, coyote, and black bear.

Birds Hermit thrush, ovenbird, black-throated green warbler, yellow-rumped warbler, and blue-headed vireo.

Herpetiles Wood frog, American toad, and eastern garter snake.

Fish Absent.

Notes Blackburnian warbler, a rarely sighted bird in the primary study area, observed in this community.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S5.

Rare Species[4] Cluster sanicle (S2).

Distribution in MA Found throughout most of the state, excluding much of the coastal plain.

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1998.

Distribution in the Study Area Limited to a few upland occurrences in the 10-year floodplain north of New Lenox Road and north of Yokum Brook confluence, common on western slopes of October Mountain State Forest.

Variation Two association observed: (1) Sites in the 10-year floodplain with red oak, eastern hemlock, and white pine in the overstory and (2) sites in the October Mountain State Forest with primarily sugar maple and eastern hemlock in the overstory.

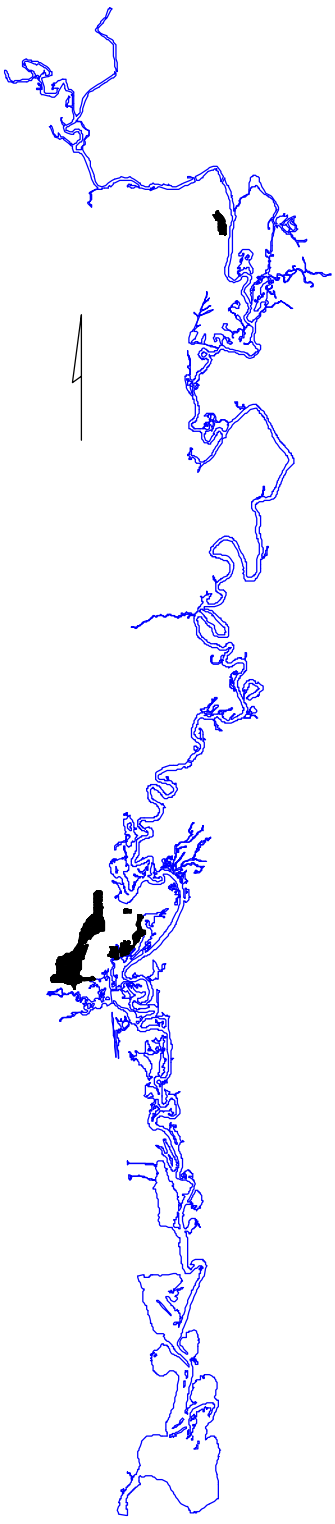
Synonyms Mesic Acidic Oak/Conifer Forest (Weatherbee and Crow 1992).

REFERENCES

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.



Red Maple Swamp

MNHESP State Rank: S5

PHYSICAL

Hydrology Seasonally flooded and saturated for part of the growing season.

Soil Mineral soils with redoximorphic features, histic epipedons rarely present.

Topography Generally flat or undulating surface.

Elevation Mostly at 296 – 298 m (971 – 978 ft) in primary study area.

Form Closed canopy, forested landscape located in drainage basins, near seepage discharges on slopes, and adjacent to streams. Usually located further from river than transitional floodplain forest.

DOMINANT PLANT SPECIES[1]

Canopy Red maple, swamp white oak, gray birch, and black cherry.

> **Characteristics** Trees often 30 – 50 cm (12 – 20 in) diameter. Canopy height 13 – 20 m (43 – 66 ft) tall. Trees 25 – 60 years old.

Subcanopy Red maple and gray birch.

> **Characteristics** Usually poorly developed and consisting of small trees.

Shrubs Northern arrowwood, winterberry, swamp dewberry, and silky dogwood.

> **Characteristics** Variable in density and sometimes forming dense thickets.

Herbs Royal fern, cinnamon fern, New York fern, interrupted fern, drooping wood-reed, and calico aster.

> **Characteristics** Ferns often dense, except in low, wet areas.

Climbing Plants Carrion flower.

Bryophytes Limited in distribution, *sphagnum* in wet depressions.

COMMON ANIMAL SPECIES[2]

Mammals White-footed mouse, northern short-tailed shrew, southern red-backed vole.

Birds Yellow-breasted sapsucker, northern waterthrush, eastern wood pewee, veery, and chestnut-sided warbler.

Herpetiles Wood frog, spotted salamander, snapping turtle, and eastern garter snake.

Fish Absent.

Notes Many herpetiles use vernal pools within this community. Predatory reptiles and great blue herons also feed in the vernal pools.

[1] Scientific names provided in Attachment F.

[2] Scientific names provided in Attachment C.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S5.

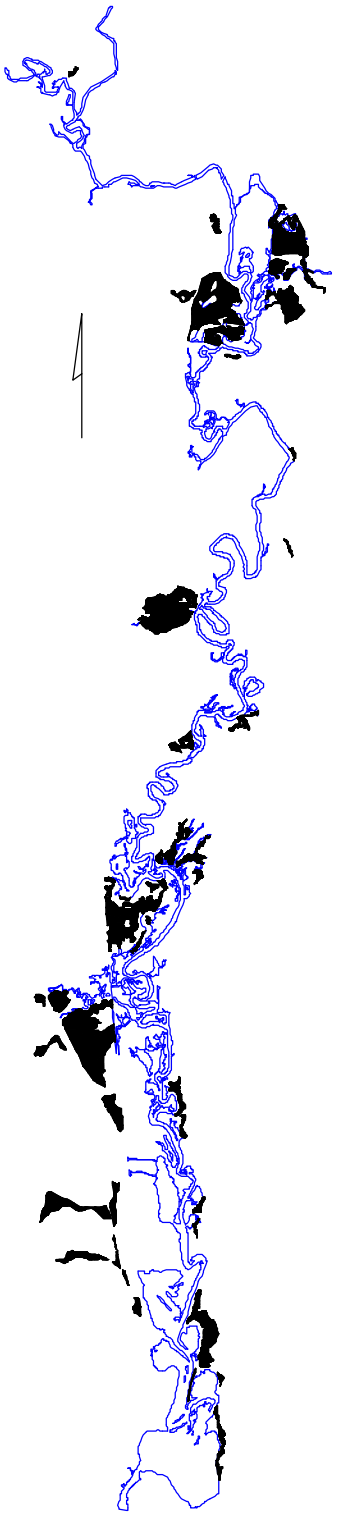
Rare Species[4] Crooked-stemmed aster (S3), Jefferson Salamander (SC), and northern four-toed salamander (SC).

Distribution in MA Primarily known from the eastern and central portion of the state.

Distribution in the Study Area Major occurrences are downstream of the Pittsfield Waster Water Treatment Plant outfall and upstream of Yokum Brook confluence.

Variation Those swamps occurring near the Housatonic River channel are transitional to alluvial red maple swamps, a community known from eastern Massachusetts.

Synonyms Palustrine Forested (Cowardin *et al.* 1979); Circumneutral hardwood swamp (Weatherbee and Crow 1992).



REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1998.

Red Oak–Sugar Maple Transition Forest

MNHESP State Rank: S4

PHYSICAL

Hydrology Upland.

Soil Mineral soils with oxidized soils and lacking redoximorphic features.

Topography Relatively level to sloping.

Elevation Located at approximately 296 – 300 meters (971 – 984 ft) in the primary study area.

Form Upland forest with species transitional to between southern and northern types.

DOMINANT PLANT SPECIES[1]

Canopy Red oak, white ash, sugar maple, American beech, eastern hemlock, cherry birch.

> **Characteristics** Larger canopy trees ranged from 75 – 95 cm (30 – 37 in) in diameter and stood over 20 meters (66 ft) tall.

Subcanopy American hornbeam.

> **Characteristics** Sparse.

Shrubs Maple-leaved viburnum and witchhazel.

> **Characteristics** Sparse, providing a park-like aspect to the community.

Herbs New York fern, hay-scented fern, Christmas fern, white wood aster, and wild sarsaparilla.

Climbing Plants Absent.

Bryophytes Largely absent.

[1] Scientific names provided in Attachment F.

Notes Sites located close to urban Pittsfield with a high proportion of non-native species in the shrub and herb strata.

COMMON ANIMAL SPECIES[2]

Mammals White-footed mouse, northern short-tailed shrew, gray squirrel, white-tailed deer.

Birds Wood thrush and blue-headed vireo.

Herpetiles Wood frog and American toad.

Fish Absent.

Notes Noted bird species are those that use mature, intact occurrences of this community.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S4.

Rare Species None observed.

Distribution in MA Found throughout most of the state (excluding much of the coastal plain).

Distribution in the Study Area Limited to a few, widely scattered occurrences in the primary study area.

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.

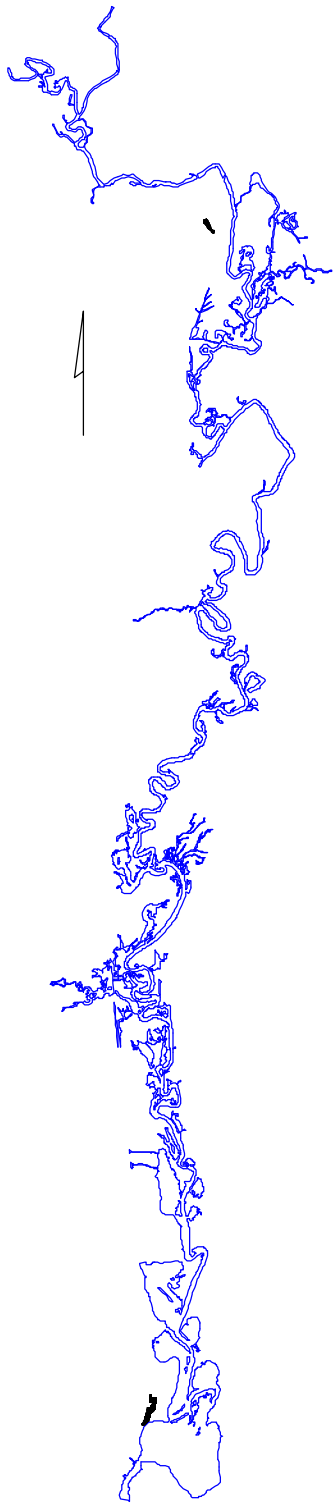
Variation Sites near urban Pittsfield disturbed and vegetated by Morrow's honeysuckle, winged burning bush, red-osier dogwood, common scouring-rush, wood bluegrass, and calico aster in the understory.

Synonyms Mesic Northern Hardwood Forest, in part (Weatherbee and Crow 1992).

REFERENCES

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.



Rich Mesic Forest

MNHESP State Rank: S3

PHYSICAL

Hydrology Upland, though sometimes with seepages.

Soil Mineral soils with oxidized soils lacking redoximorphic features except seepages.

Topography Moderately to steeply sloped (greater than 25 degrees), usually rocky hillsides.

Elevation Occurring above 300 m (984 ft).

Form Broad-leaved forests near the base of slopes or in valleys, commonly with east- or south aspect.

DOMINANT PLANT SPECIES[1]

Canopy Sugar maple, white ash, basswood, eastern hemlock.

> **Characteristics** Mature, large-diameter trees present in community.

Subcanopy Sugar maple.

> **Characteristics** Poorly developed.

Shrubs Choke cherry and alternate-leaved dogwood.

> **Characteristics** Often sparse or patchy, providing a park-like appearance to the community.

Herbs Plantain-leaved sedge, wide-leaved sedge, maidenhair fern, toothwort, early blue cohosh, bloodroot, round-lobed hepatica, wild ginger, Dutchman's breeches, squirrel corn, wild leek, spring beauty and, trout lily.

> **Characteristics** Variable and dependant on hydrology.

[1] Scientific names provided in Attachment F.

Climbing Plants Absent.

Bryophytes Largely absent.

Notes Spring ephemeral plants common in community and dominate the herb layer in early season.

COMMON ANIMAL SPECIES[2]

Mammals Gray squirrel, eastern chipmunk, white-tailed deer, and black bear.

Birds Wood thrush, rose-breasted grosbeak, and blue-headed vireo.

Herpetiles Wood frog and American toad.

Fish Absent.

Notes Melanistic gray squirrels also observed.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S3.

Rare Species[4] Early blue cohosh (S?).

Distribution in MA Found throughout much of the state.

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.

Distribution in the Study Area Largely limited to rocky, hardwood slopes in or adjacent to the October Mountain State Forest.

Variation None observed.

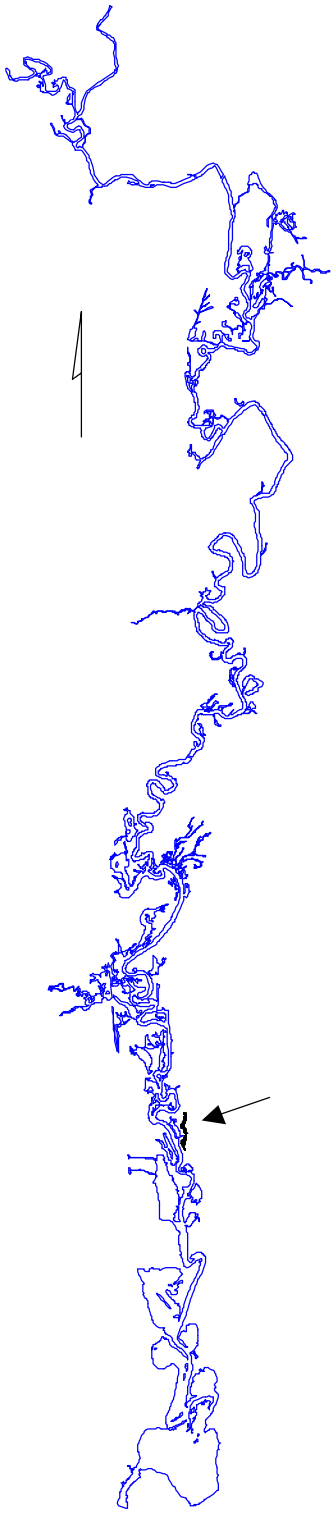
Synonyms Rich Mesic Forest (Weatherbee and Crow 1992).

REFERENCES

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.



Riverine Point Bar and Beach

MNHESP State Rank: S3

PHYSICAL

Hydrology Seasonally flooded and often saturated to near surface.

Soil Moist or wet sand and silt, sometimes with organic substrate intermixed creating a mucky sand.

Topography Gently to moderately sloped beaches.

Elevation Occurring from 296 – 294 m (971 – 965 ft) in the primary study area.

Form Beaches and bars at the edge of the river channel. Variable in size from year to year, but generally less than 20 m (66 ft) long. Often occurring on or near bends in the river where water flow slows and deposits fluvial particles (i.e., point bars, aggrading bars).

DOMINANT PLANT SPECIES[1]

Canopy Absent.

Subcanopy Absent.

Shrubs Absent.

Herbs False nutsedge, awned nutsedge, Canada lovegrass, false pimpernel, water-purslane, common cocklebur, Pennsylvania smartweed, smooth creeping lovegrass, and devil's beggar ticks.

> **Characteristics** Variable in species composition depending on particle size and soil moisture. Many of the plants late appearing as community is inundated in early season.

Climbing Plants Absent.

Bryophytes Absent.

[1] Scientific names provided in Attachment F.

Notes Creeping bentgrass and reed canarygrass are common plants from medium-gradient sections of the Housatonic River. Purple loosestrife is a non-native and invasive plant that sometimes occurred at upper edge of community.

COMMON ANIMAL SPECIES[2]

Mammals Raccoon and muskrat.

Birds Spotted sandpiper, great blue heron, red-winged blackbird, common grackle, and song sparrow.

Herpetiles Northern leopard frog.

Fish Absent.

Invertebrates Used by dragonflies as metamorphosis sites.

Notes Many species of mammal appear to move through this community as evidenced by abundance of tracks.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S3.

Rare Species[4] Mudflat spikesedge (S2).

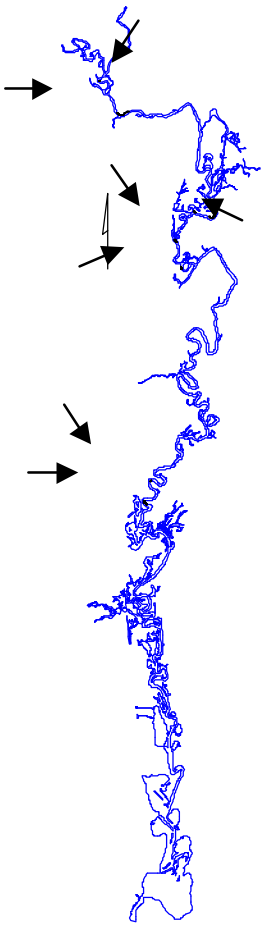
[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.

Distribution in MA Primarily from Connecticut River Valley.

Distribution in the Study Area Found sporadically from urban Pittsfield to upstream of the Yokum Brook confluence. Examples are noted on the figure here (see meander survey maps for complete detailed locations).

Variation Differences occur between sites regarding amount of intermixed organic matter and substrate moisture (e.g., saturated, moist, surface layer dry).

Synonyms Riverine Unconsolidated Shore (Cowardin *et al.* 1979).



REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Shallow Emergent Marsh

MNHESP State Rank: S4

PHYSICAL

Hydrology Saturated to surface or inundated to 25 cm (10 in) (or more during wet periods).

Soil Mineral soils overlain with a layer of well-decomposed peat.

Topography Located in basins.

Elevation Approximately 295 m (968 ft) in primary study area.

Form Small- to moderate-sized open wetlands in low areas of the Housatonic River floodplain. Many vernal pools in the primary study area are this community. Sometimes with a marginal band of mud flat community as water levels recede mid-summer.

DOMINANT PLANT SPECIES[1]

Canopy Absent, though silver maple often overhangs and shades community.

Subcanopy Absent.

Shrubs Silky dogwood, buttonbush, silky willow, and meadowseet.

> **Characteristics** Usually sparse and intermixed, though dense shrub colonies can occur in patches.

Herbs False water-pepper, woolgrass, dotted smartweed, cuckoo-flower, common arrowhead, purple loosestrife, water parsnip, and northern water-plaintain.

> **Characteristics** Floating aquatics (e.g. lesser duckweed) sometimes present in pools with more permanent water. Cuckoo-flower and purple loosestrife are non-native and invasive species.

Climbing Plants Absent.

[1] Scientific names provided in Attachment F.

Bryophytes Largely absent.

Notes Shallow emergent marshes occurring in abandoned beaver flowages dominated by rice cut-grass and tussock sedge.

COMMON ANIMAL SPECIES[2]

Mammals Meadow vole, white-tailed deer, and common muskrat.

Birds Great blue heron, wood duck, common yellowthroat, red-winged blackbird, common grackle, and song sparrow.

Herpetiles Marshes in forested areas utilized by wood frog, spotted salamander, painted turtle, and snapping turtle. Marshes located in open fields and abandoned beaver flowages utilized by northern leopard frogs, eastern newts, and green frogs.

Fish Absent.

Notes Long-tailed weasel, rarely sighted in the primary study area, was observed in this community. Northern harriers foraged in this community.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S4.

Rare Species[4] Wapato (S1), northern harrier (T), and American bittern (E).

Distribution in MA Throughout state, but with highest concentrations in eastern half of state, and locally abundant in Central Valley region.

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.

Distribution in the Study Area Many vernal pools in study area and most of the less-managed grass-dominated habitats near the river channel. Common in beaver influenced areas near Threemile Pond.

Variation Shallow emergent marshes in beaver impoundments with a characteristically different flora than those in vernal pools and other inundated areas associated with the Housatonic River.

Synonyms Palustrine Emergent (Cowardin *et al.* 1979); Robust Emergent Marsh, in part (Weatherbee and Crow 1992).

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

Shrub Swamp

MNHESP State Rank: S5

PHYSICAL

Hydrology Temporarily to permanently flooded.

Soil Mineral soils with redoximorphic features, sometimes with a surface layer of well-decomposed organic material.

Topography Variable, though often with some form of pit and mound topography present.

Elevation Occurring mostly from 294 – 300 m (966 – 984 ft) in the primary study area.

Form Shrub-dominated wetlands with or without a sparse, broken canopy.

DOMINANT PLANT SPECIES[1]

Canopy Red maple, silver maple, black willow, and gray birch.

Characteristics Absent or sparse.

Subcanopy Red maple.

Characteristics Absent or sparse.

Shrubs Silky dogwood, winterberry, speckled alder, meadowsweet, buttonbush, northern arrowwood, silky willow, and pussy willow.

Characteristics Well developed and sometimes so dense as to impede travel.

Herbs Sensitive fern, calico aster, cinnamon fern, rough-stemmed goldenrod reed canary grass, blue-joint grass, and purple loosestrife.

Characteristics Variable and dependant on density of shrub stems.

Climbing Plants Largely absent, though rough bedstraw and evening nightshade sometimes present.

Bryophytes Largely absent.

[1] Scientific names provided in Attachment F.

Notes Additional shrubs found in community variants include autumn willow, steeplebush, swamp dewberry, red raspberry, and highbush blueberry.

COMMON ANIMAL SPECIES[2]

Mammals White-footed mouse, meadow vole, and eastern cottontail.

Birds Yellow warbler, common yellowthroat, gray catbird, and common grackle.

Herpetiles Wood frog and spotted salamander.

Fish Absent.

Notes Rusty blackbird, an uncommonly sighted bird in the primary study area that occurs as a disjunct breeding colony in western Massachusetts, was often observed in this community.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S5
Rare Species[4] Bristly crowfoot (S2) and autumn willow (S3).

Distribution in MA Found throughout the state.

Distribution in the Study Area Distributed throughout the study area.

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1998.

Variation Several plant associations existed in addition to that normally seen in the primary study area: (1) Permanently inundated sites dominated by buttonbush; (2) higher elevation sites dominated by swamp dewberry, red raspberry, steeplebush, and meadowsweet (3) groundwater enriched sites with autumn willow, shrubby cinquefoil, silky willow, and pussy willow; (4) former agricultural areas dominated by red-osier dogwood and various willows; and (5) wet meadows dominated by highbush blueberry.

Synonyms Palustrine Scrub Shrub (Cowardin *et al*. 1979); Circumneutral Shrub Swamp (Weatherbee and Crow 1992).

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

Spring

MNHESP State Rank: Unranked

Physical

Hydrology Still or intermittently flowing water.

Soil Mineral or organic.

Topography Located on or at base of slopes or in a small depressions.

Elevation Mostly occurring above 300 m (984 ft) elevation in the October Mountain State Forest.

Form Occurs as a small rivulet of water emerging from slope side or as a tiny pond.

Dominant Plant Species[1]

Canopy Absent, though frequently shaded by adjacent trees.

Subcanopy Absent.

Shrubs Absent.

Herbs Golden saxifrage, lesser duckweed, slender mannagrass, and common bladderwort.

Climbing Plants Absent.

Bryophytes Often present at margin of springs.

Notes Vegetation highly dependent on form (e.g., rivulet or pond) and permanence of source through the season.

Common Animal Species[2]

Birds Mytle warbler, northern water thrush, and ovenbird.

Herpetiles Wood frog, spotted salamander, and eastern newt.

Fish Cyprinids present in larger springs connected to streams.

Invertebrates Arthropods breed in the larger, more permanent springs.

Notes Small size of community limits use by larger vertebrates.

Conservation, Distribution, and Notes

MNHESP State Rank Unranked.

Rare Species None observed.

Distribution in MA Common in portions of state with topographic relief.

Distribution in the Study Area Most occurrences located on or at the base of slopes within October Mountain State Forest.

Variation None observed.

Synonyms None.

[1] Scientific names provided in Attachment F.
[2] Scientific names provided in Attachment C.

Spruce–Fir–Northern Hardwood Forest

MNHESP State Rank: S4

PHYSICAL

Hydrology Upland.

Soil Mineral soils with oxidized soils and lacking redoximorphic features.

Topography Uneven ground and sometimes rocky.

Elevation Sampled occurrences at 540 and 576 m (1771 and 1890 ft).

Form Mixed conifer–hardwood forest of middle to upper elevations.

DOMINANT PLANT SPECIES[1]

Canopy Red spruce, white spruce, red maple, black cherry, balsam fir, white birch, and American beech.

> **Characteristics** Canopy often dense and creating a deeply shaded understory.

Subcanopy Mountain ash, smooth shadbush, yellow birch, and balsam fir.

> **Characteristics** Poorly to moderately developed.

Shrubs Mountain maple, witch-hazel, beaked hazelnut, and balsam fir.

> **Characteristics** Sparse.

Herbs Canada mayflower, ground-pine, gold thread, blue-bead lily, painted trillium, evergreen wood fern, and wild sarsaparilla.

> **Characteristics** Often sparse due to deep shade produced by canopy.

Climbing Plants Absent.

[1] Scientific names provided in Attachment F.

Bryophytes Usually well-developed and comprised of *Leucobryum*, *Polytrichum*, and *Sphagum* (near wetland edge).

Notes Understory variable in areal cover and dependent, at least in part, on density of canopy. Considerable areas devoid of vegetation and covered by conifer leaf litter.

COMMON ANIMAL SPECIES[2]

Mammals Red squirrel, snow-shoe hare, coyote, fisher, and white-tailed deer.

Birds Golden-crowned kinglet, black-throated blue warbler, ovenbird, hermit thrush, and red-breasted nuthatch.

Herpetiles Wood frog, American toad, spotted salamander, and spring peeper.

Fish Absent.

Notes Community adjacent to aquatic areas used by breeding amphibians and therefore important for adult stages.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S4.

Rare Species None observed.

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.

Distribution in MA Primarily found in the northern and western portion of the state.

Distribution in the Study Area Found in higher elevation portions of October Mountain State Forest and small stands adjacent to Ashley Lake.

Variation One site dominated by white spruce, which is unusual in the state (red spruce is common).

Synonyms Mesic northern conifer forest (as to the lower elevation forms) (Weatherbee and Crow 1992).

REFERENCES

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

Successional Northern Hardwood Forests

MNHESP State Rank: S5

PHYSICAL

Hydrology Upland.

Soil Mineral soils (sand in sampled occurrence) with oxidized soils and lacking redoximorphic features.

Topography Variable, sometimes disturbed.

Elevation Occurring near 298 m (978 ft) in the primary study area.

Form Early successional forests growing on formerly disturbed sites (fire, silvicultural treatments).

DOMINANT PLANT SPECIES[1]

Canopy Quaking aspen, white pine, white birch, gray birch, and cherry birch.

> **Characteristics** Canopy trees relatively small (mostly less than 25 cm (10 in) diameter, less than 12 meters (39 ft) tall, up to 30 years old).

Subcanopy Quaking aspen and white birch.

Shrubs Beaked willow, pussy willow, and heart-leaved willow.

Herbs Canada bluegrass, common scouring rush, early goldenrod, common St. Johnswort, glaucous king devil, sweet-clover, yarrow, cypress-spurge, cow vetch, and squarrose white aster.

> **Characteristics** Often sparse and patchy.

Climbing Plants Absent.

[1] Scientific names provided in Attachment F.

Bryophytes Largely absent.

Notes Canopy of this community usually comprised of species capable of rapid, long-distance dispersal (e.g., birch, pine) or with extremely long-lived fruits that can lie dormant until next disturbance (e.g., cherry).

COMMON ANIMAL SPECIES[2]

Mammals Eastern cottontail and white-tailed deer.

Birds Gray catbird, downy woodpecker, eastern towhee, and American robin.

Herpetiles Wood frog and painted turtle.

Fish Absent.

Notes Sandy soils used by painted turtles for nest sites.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S5.

Rare Species[4] Variegated scouring–rush (S3).

Distribution in MA Found throughout most of the state.

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.

Distribution in the Study Area Rather limited in primary study area and found mostly around borrow pits, edges of residential lots, and near abandoned fields.

Variation Sites vary in terms of age and canopy composition.

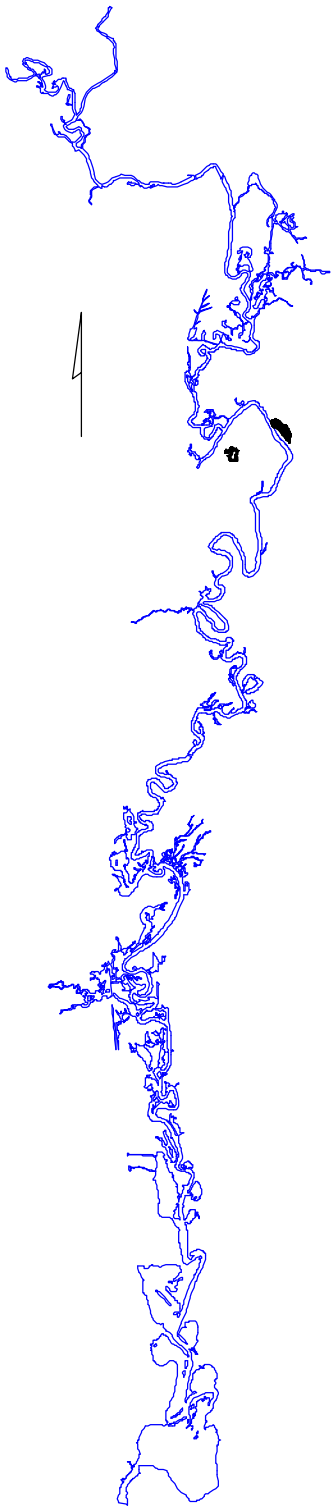
Synonyms Mesic Northern Hardwood Forest, in part (Weatherbee and Crow 1992).

REFERENCES

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.



Transitional Floodplain Forest

MNHESP State Rank: S2

PHYSICAL

Hydrology Temporarily flooded.

Soil Mineral soils with redoximorphic features within 60 cm (24 in) of the surface.

Topography Generally flat or undulating surface.

Elevation Occurring from 294 – 298 m (965 – 977 ft).

Form Forested adjacent to river channels areas that are flooded during high-water events. Frequently with vernally flooded depressions that are utilized by a host of breeding amphibians. Scoured, sandy flood channels often are found within the forest.

DOMINANT PLANT SPECIES[1]

Canopy Silver maple, boxelder, American elm, red maple, and eastern cottonwood.

> **Characteristics** Tree size and age varies by site. Trees usually 25 – 65 cm (9 – 26 in) in diameter, some eastern cottonwood over 100 cm (39 in). Canopy height often 20 m (66 ft) or more. Tree age often less than 60 years.

Subcanopy Small canopy species, American hornbeam, and dotted hawthorn.

> **Characteristics** Usually sparse or absent, but sometimes well developed in former agricultural areas where dominated by dotted hawthorn.

Shrubs Silky dogwood, red-osier dogwood, common buckthorn, and Morrow's honeysuckle.

> **Characteristics** Often sparse and creating a park-like atmosphere. Latter two species non-native and invasive.

[1] Scientific names provided in Attachment F.

Herbs Ostrich fern, wood-nettle, sensitive fern, false-nettle, Moneywort, cuckoo-flower, garlic-mustard, and dames-rocket.

> **Characteristics** Variable and dependent on site hydrology. Dense stands of robust herbs often present. Latter four species non-native and invasive.

Climbing Plants Wild cucumber and river grape.

Bryophytes Largely absent.

Notes The scoured meander scars are free of water for most of the season and commonly vegetated by ditch-stonecrop, water-pepper, wirestem muhly, and yellow wood-sorrel.

COMMON ANIMAL SPECIES[2]

Mammals White-footed mouse, meadow vole, northern short-tailed shrew, gray squirrel, eastern cottontail, beaver, mink, river otter, raccoon, white-tailed deer, red fox, coyote, and black bear.

Birds Downy woodpecker, eastern tufted titmouse, and Veery. Red-bellied woodpecker and Baltimore oriole, relatively rare in the primary study area, were seen in this community.

Herpetiles Wood frog, spotted salamander, northern leopard frog, green frog, spring peeper, painted turtle, and snapping turtle.

Fish Absent.

[2] Scientific names provided in Attachment C.

Notes Turtles were predatory species that moved to the pools when abundant frog larvae were present. Beavers foraged extensively in this community. Several coyote kills of cottontail seen. Fairy shrimp and fingernail clams occurred in vernal pools within this community.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S2.

Rare Species[4] Eastern black currant (S4) and wood turtle (SC).

Distribution in MA Primarily from the western half of the state.

Distribution in the Study Area Most dominant forested community north of Yokum Brook; becomes limited to narrow strips along the river bank south of Yokum Brook confluence.

Variation Silver maple is dominant canopy tree but boxelder locally abundant, especially below confluence. Eastern cottonwood prevalent on East Branch Housatonic River.

Synonyms Palustrine Forested (Cowardin *et al.* 1979); Floodplain Forest (Weatherbee and Crow 1992).

REFERENCES

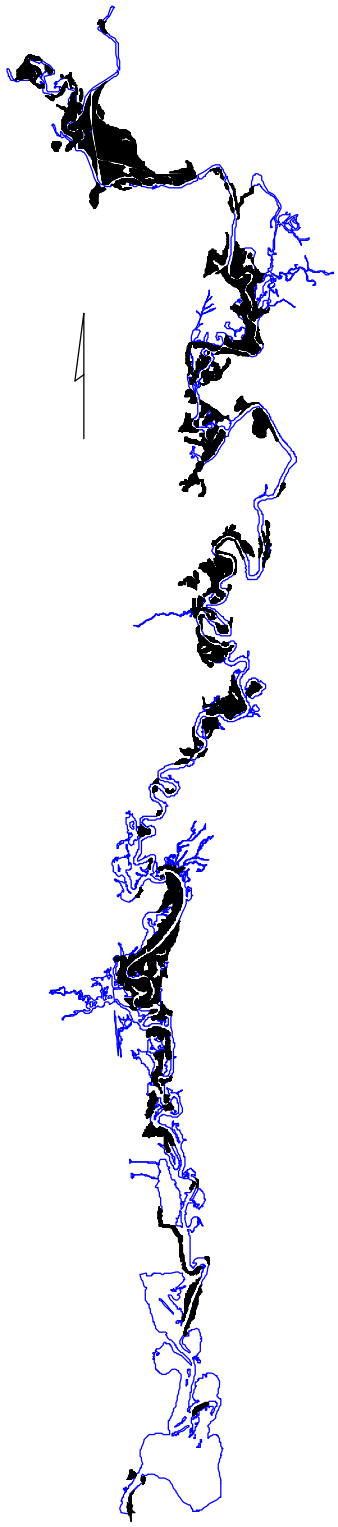
Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.

[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.



Wet Meadow

MNHESP State Rank: S4

PHYSICAL

Hydrology Temporarily flooded and seasonally saturated.

Soil Mineral soils with redoximorphic features, sometimes with a surface layer of well-decomposed organic material.

Topography Level to gently-sloped basins and low areas.

Elevation Occurring mostly from 296 – 300 m (971 – 984 ft) in the primary study area.

Form Herb dominated wetlands with saturated soils that have been disturbed by repeated mowing or grazing.

DOMINANT PLANT SPECIES[1]

Canopy Black willow, silver maple, and boxelder

> **Characteristics** Limited to one or a few trees at the edge of river channel.

Subcanopy Absent.

Shrubs Red raspberry, pussy willow, silky dogwood, and red-osier dogwood

> **Characteristics** Shrubs confined to small colonies within wet meadow community or forming a marginal fringe.

Herbs Reed canarygrass, spotted touch-me-knot, Canada blue-joint, lakeside sedge, spotted joe-pye weed, swamp milkweed, common milkweed, and stinging nettle.

> **Characteristics** Variable and dependent on hydrology and frequency of disturbance.

[1] Scientific names provided in Attachment F.

Climbing Plants Wild morning glory and wild cucumber.

> **Characteristics** Sparse.

Bryophytes Largely absent.

Notes Relatively drier sites often with a higher proportion of non-native species.

COMMON ANIMAL SPECIES[2]

Mammals White-footed mouse and meadow vole.

Birds American kestrel, eastern kingbird, song sparrow, willow flycatcher, and yellow warbler.

Herpetiles Northern leopard frog.

Fish Absent.

Notes Community important for foraging raptors such as northern harrier and Cooper's hawk.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S4.

Rare Species[4] Fringed gentian (S4) and variegated scouring-rush (S3).

Distribution in MA Found throughout the state.

[2] Scientific names provided in Attachment C.
[3] State rank follows Swain and Kearsley 2000.
[4] State rank and status follow MNHESP 1999.

Distribution in the Study Area Found in formerly farmed areas adjacent to the Housatonic River.

Variation Two additional plant associations observed: (1) Frequently disturbed site on compacted soils with jointed rush, creeping bentgrass, lakeside sedge, heart-leaved willow, and reed fescue; and (2) groundwater enriched site with many calciphilic plants such as grass-of-Parnassus, green-keeled cotton-grass, water avens, and shrubby cinquefoil.

Synonyms Palustrine Emergent (Cowardin *et al.* 1979); Circumneutral Graminoid Marsh, in part (Weatherbee and Crow 1992).

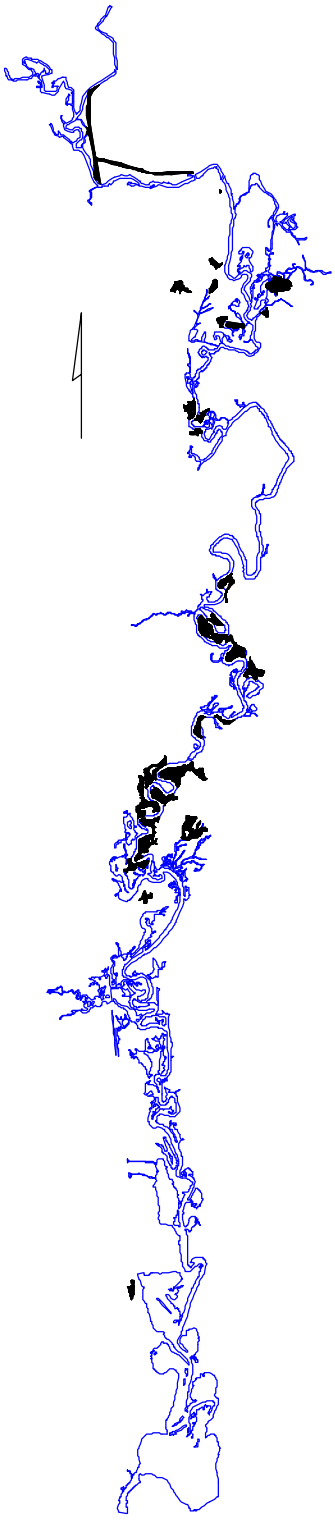
REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Massachusetts Natural Heritage and Endangered Species Program. 1999. Massachusetts Natural Heritage Atlas: 2000-2001 Edition. Division of Fisheries and Wildlife, Westborough, MA, USA.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

Weatherbee, P.B., and G.E. Crow. 1992. Natural plant communities of Berkshire County, Massachusetts. Rhodora 94:171-209.



Woodland Vernal Pool

MNHESP State Rank: S3

PHYSICAL

Hydrology Seasonally flooded.

Soil Mineral soils with redoximorphic features, sometimes with a surface layer of well-decomposed organic material.

Topography Shallow to deep depressions.

Elevation Primarily found above 325 meters (1066 ft) in the study area, with some lower occurrences in the Threemile Pond State Wildlife Management Area.

Form Temporary pools in upland forest settings.

DOMINANT PLANT SPECIES[1]

Canopy Red maple.

> **Characteristics** Either adjacent to or sometimes within the pool.

Subcanopy Absent.

Shrubs Winterberry and silky dogwood.

> **Characteristics** Usually a minor component of the vegetation and limited to small colonies.

Herbs Vary by site and none are characteristic of vernal pools.

Climbing Plants Absent.
Bryophytes Largely absent.

Notes Woodland Vernal Pools are sparsely vegetated and generally do not have a defining flora.

COMMON ANIMAL SPECIES[2]

Mammals Raccoon.
Birds Common grackle, American robin, and red-winged blackbird.

[1] Scientific names provided in Attachment F.
[2] Scientific names provided in Attachment C.

Herpetiles Wood frog, spotted salamander, American toad, and garter snake.

Fish Absent.

Notes Common invertebrates in high quality pools include fairy shrimp and fingernail clams.

CONSERVATION, DISTRIBUTION, AND NOTES

MNHESP State Rank[3] S3.

Rare Species None observed.

Distribution in MA Found throughout the state.

Distribution in the Study Area Limited to upland settings, such as found in the October Mountain Forest and Threemile Pond State Wildlife Management Area.

Variation None observed.

Synonyms Palustrine Unconsolidated Bottom (Cowardin *et al.* 1979).

REFERENCES

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Government Printing Office.

Swain, P.C., and J.B. Kearsley. 2000. Classification of the Natural Communities of Massachusetts. Massachusetts Natural Heritage and Endangered Species Program, Westborough, MA, USA.

[3] State rank follows Swain and Kearsley 2000.

Attachment B Animal Profiles

EcoRiskProfile_american_bittern.PDF

EcoRiskProfile_american_robin.PDF

EcoRiskProfile_bald_eagle.PDF

EcoRiskProfile_brown_bullhead.PDF

EcoRiskProfile_common_moorhen.PDF

EcoRiskProfile_great_blue_heron.PDF

EcoRiskProfile_kingfisher.PDF

EcoRiskProfile_largemouth_bass.PDF

EcoRiskProfile_leopard_frog.PDF

EcoRiskProfile_mink.PDF

EcoRiskProfile_osprey.PDF

EcoRiskProfile_red_fox.PDF

EcoRiskProfile_river_otter.PDF

EcoRiskProfile_short-tailed_shrew.PDF

EcoRiskProfile_tree_swallow.PDF

EcoRiskProfile_water_shrew.PDF

EcoRiskProfile_wood_frog.PDF

American Bittern

Botaurus lentiginosus

DESCRIPTION

The American bittern is a medium-sized, stocky heron of freshwater marshes. The bird is cryptically colored aiding its stand and wait hunting behavior. Adult birds are brown above with varying amounts of black flecking and heavily streaked with vertical brown and white stripes below. A black malar stripe extends down the neck. Flight feathers are a contrasting dark brown to black. American bitterns have relatively short legs for the Ardeidae family and demonstrate a less active feeding strategy. Bitterns are often observed standing motionless in tall emergent vegetation, bill held horizontal while eyes are focused downward to spot prey. Bitterns are most similar in appearance to immature night-herons (*Nycticorax* sp.).

BODY SIZE

The body length of the American bittern averages 23 – 34 inches as measured from bill to tip of tail. Body weight typically averages 370 to 500g (Gibbs *et al*. 1992). Male bitterns are slightly larger than females. Male wing length typically ranges from 10.5 – 11.6 inches. Female wing lengths range from 9.4 – 10.5 inches.

In The Primary Study Area: No American bitterns were collected in the study area, and there were no other local or regional data available on body size.

DISTRIBUTION

The American bittern is distributed widely throughout northern and central North America (Figure 1). Bitterns are more common in the northern portion of their range and have experienced declines throughout the southern and central areas. American bitterns are a Nearctic species with breeding range that includes Newfoundland and the Canadian Provinces to central British Columbia

Photo by: Scott Robinson

Figure 1. Range of American bittern in North America

southward through the central United States (Figure 1). Breeding bird survey data indicates that the densest nesting populations occur in southeastern Ontario, Southern Saskatchewan, the northern end of the central valley of California, and prairie pothole states. Highest nesting densities in Massachusetts occur in northeastern Essex County. Less dense populations occur in the Sudbury River valley and locations in Berkshire and Plymouth Counties. In winter months, the American bittern's range includes the southeastern United States, coastal areas along the Gulf of Mexico, and throughout California. The winter range extends as far south as Central America and includes the Greater Antilles and Cuba. In Massachusetts, individuals commonly linger through early winter months in coastal marshes.

MIGRATION

Fall migration of American bittern populations in the eastern United States begins in mid-Fall, with most individuals having departed Massachusetts by the end of November. Little data have been collected regarding migration routes, but it is likely that New England populations follow the coast south using coastal wetlands as stopover locations. American bitterns are nocturnal migrants and are believed to migrate singly or in groups of 2 – 3 birds (Cramp and Simmons 1977 as cited in Gibbs *et al.* 1992). Massachusetts breeding individuals typically return to nesting areas in mid-March (Forbush 1925).

HABITAT

American bitterns utilize freshwater wetland systems with a diversity of vegetation classes, especially aquatic bed, emergent, and scrub-shrub. Favored habitats include a high interspersion of open water and plant cover. A preference has been documented for impounded wetlands such as beaver flowages over wetland basins of glacial origin (Gibbs 1992). Survey work in North Dakota demonstrated higher density of nesting birds within fen-type wetlands that maintained connections to other wetland areas and did not occur as isolated basins in the landscape (Dechant *et al.* 2001). Breeding territories in Minnesota were found to have an average water depth of 4 inches, average vegetation height of 4.5 feet, and grass and sedge density of 114 stems per square meter (Hanowski and Niemi 1986 as cited in Dechant *et al.* 2001). In Maine, a preference for emergent and open water wetlands associated with dense scrub-shrub wetlands such as alder thickets has been documented (Palmer 1949).

In The Primary Study Area: Table 1 contains a summary of the literature review and observational data on the use by American bitterns of the natural community types found within the primary study area.

HOME RANGE AND TERRITORIALITY

American bittern home range sizes vary with geographic area, availability of preferred wetland habitat and prey species. Wetlands

Table 2. Habitat use by American bitterns in the primary study area

Habitat Codes and Natural Community Classifications																				
Wetland Habitats													Terrestrial Habitats							
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
	B	B	B					B	B	B	B									

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

larger than 7.5 acres were found to be preferred by breeding pairs in Michigan (Brown and Dinsmore 1986 as cited in Dechant *et al.* 2001). A study of 20 radio-tagged bitterns in Minnesota measured average home range to be approximately 315 acres. In the same study, the birds stayed within a 61-acre core use area for more than 50% of the time they were monitored (Azure 1998 as cited in Dechant *et al.* 2001). Little data have been published on bittern territoriality. It has been reported that males within 550 yards will respond to each other's calls and will aggressively chase one another if encountered (Gibbs *et al.* 1992).

BREEDING

Pair bond formation begins as birds arrive back in breeding areas during April. In Massachusetts egg laying and brooding takes place between May 1 and June 13 (Veit and Petersen 1993). The occurrence of several nests within male territories has been documented and suggests that polygamy may be common (Brewster 1924 as cited in Gibbs *et al.* 1992). Year to year breeding site fidelity is likely, but not well documented. A study in Minnesota tracked males on territories and found 4 of 7 male birds returned to the same home range over successive years, but females did not (Azure 1998 as cited in Dechant *et al.* 2001). A similar study found no site fidelity among dispersing juvenile birds (Brininger 1996 as cited in Dechant *et al.* 2001).

American bittern nests are typically built in dense emergent vegetation over water depths ranging from 2 – 8 inches. Nests consist of a 6- to 10-inch high platform of reeds, sedges, or grasses bent down and lined with fine grasses (Forbush 1925). Nest construction is completed by the female (Baicich and Harrison 1997). Incubation begins once the first egg is laid. Clutch sizes range from 2 – 7 eggs, but are typically 3 – 5 eggs. Incubation requires 24 days per egg and is completed by the female (DeGraaf and Yamasaki 2001). Chicks leave the nest 1 – 2 weeks after hatching, but remain in the area for four weeks and continue to be fed only by the female (Palmer 1949).

GROWTH AND DEVELOPMENT

No information regarding juvenile growth rates has been published. Limited records of captive birds document a food intake of approximately 24g dry weight of food per day (Rhoades and Duke 1975 as cited in Gibbs *et al.* 1992).

MOLT

Juvenile birds go through a partial prebasic molt at sometime between the months of August and November. At this time the juvenile retrices and primaries are retained. Adult, second-year, birds undergo a complete basic molt also during the late Summer and Fall. Primary feathers are replaced irregularly (Palmer 1962 as cited in Gibbs *et al.* 1992).

FOOD HABITS AND DIET

Unlike other herons, bitterns do not actively pursue prey. Using cryptic coloration, bitterns will generally stand and wait for prey to approach, or walk slowly until prey is encountered. American bitterns are generally crepuscular in their feeding habits, and will use dim light to their benefit (Gibbs *et al.* 1992). Most foraging takes place along the margin of ponds or open water in dense vegetation. American bitterns exploit a wide variety of prey items allowing them to hunt in varying habitats.

An analysis of stomach contents based on 160 individual specimens estimates that diets consist of insects (23%), amphibians (21%), fish (21%), crayfish (19%), small mammals (10%), and snakes (5%) (Cottam and Uhler 1945, as cited in Gibbs *et al*. 1992). Insect prey taken has been found to consist primarily of dragonflies and nymphs (Odonata), giant waterbugs (Belastomatidae), water scorpions (Nepidae), water beetles (Dytiscidae), and grasshoppers (Orthopter) (Gibbs *et al.* 1992). Fish species taken vary with availability at

specific sites, but include sticklebacks (Gasterosteidae), eels (*Anguilla* sp.), catfish (*Ameirus* sp.), pickerel (*Esox* sp.), sunfish (Centrarchidae), suckers (Catostomatidae), killifish (Cyprionodontidae), and perch (*Perca* sp.).

POPULATIONS AND DEMOGRAPHY

Survivorship: Little banding data exists. Only 959 American bitterns have been banded in the US, and only 80 band recoveries have been reported. The oldest bird recovered was at least 8 years old (Clapp *et al.* 1982 as cited in Gibbs *et al.* 1992).

Age at Maturity and Life Span: No data exists that verifies age at first breeding, but similar species including the Eurasian bittern (*Botaurus stellaris*) are able to breed during their second year (Cramp and Simmons 1977 as cited in Gibbs *et al.* 1992).

Enemies: Little is known regarding predation of bitterns. It is likely that raccoons (*Procyon lotor*) prey on eggs and nestlings when nests are accessible due to low water levels. Adult birds may also be taken by avian predators such as peregrine falcons (*Falco peregrinus*) or great horned owls (*Bubo virginianus*).

STATUS

General: American bittern populations have been declining since the 1960's primarily as a result of habitat loss and wetland degradation. The bittern was listed by the US Fish and Wildlife Service (USFWS) as a Nongame Species of Management Concern in 1987 and was included on the National Audubon Society's Blue List in 1976 (Tate 1986 as cited in Gibbs *et al.* 1992). The State of Massachusetts has included the American bittern on its list of endangered species. In Massachusetts, only 17 nesting sites were verified during the Massachusetts Breeding Bird Atlas project surveys conducted between 1976 and 1980 (Veit and Petersen 1993).

In The Primary Study Area: American bitterns were infrequently observed in the primary study area in suitable habitats during the 1998 – 2000 field surveys (Figure 2).

REFERENCES

Azure, D.A. 1998. Aspects of American Bittern Ecology in Northwest Minnesota. MS Thesis. University of North Dakota, Grand Forks, ND, USA.

Baicich, P.J., and C.J.O. Harrison. 1997. The Guide to the Nests, Eggs, and Nestlings of North American Birds. 2nd ed. Academic Press, San Diego, CA, USA.

Brewster, W. 1924. The Birds of the Lake Umbagog Region of Maine. Bulletin of the Museum of Comparative Zoology, No. 66. Harvard University, Cambridge, MA, USA.

Brininger, W.L., Jr. 1996. The Ecology of the American Bittern in Northwest Minnesota. MS Thesis. St. Cloud State University, St. Cloud, MN, USA.

Brown, M., and J.J. Dinsmore. 1986. Implications of marsh size and isolation for marsh bird management. Journal of Wildlife Management 50:392-397.

Clapp, R.B., M.K. Klimkiewicz, and J.H. Kennard. 1982. Longevity records of North American birds: Gaviidae through Alcidae. Journal of Field Ornithology 53:81-124.

Cottam, C., and F.M. Uhler. 1945. Birds in Relation to Fishes. US Fish and Wildlife Service Leaflet, No. 272.

Cramp, S., and K. Simmons. 1977. Handbook of the Birds of Europe, the Middle East, and North Africa; the Birds of the Western Palearctic. Vol. 1. Oxford University Press, Oxford, England.

Dechant, J.A., M.L. Sondreal, D.H. Johnson, L.D. Igl, C.M. Goldade, A.L. Zimmerman, and B.R. Euliss. 2001. Effects of Management Practices on Grassland Birds: American Bittern. Northern Prairie Wildlife Research Center, Jamestown, ND, USA. URL http: //www.npwrc.usgs.gov/resource/literatr/grasbird/ambi/ambi.htm (Version 17FEB2000).

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH, USA.

Forbush, E.H. 1925. Birds of Massachusetts and Other New England States. Vol. 1. Massachusetts Department of Agriculture, Commonwealth of Massachusetts, MA, USA.

Gibbs, J.P., S. Melvin, and F.A. Ried. 1992. American Bittern (*Botaurus lentiginosus*). p. 1-11. *In* A. Poole, P. Stettenheim and F. Gill (ed.) The Birds of North America, No. 18. The Birds of North America, Inc, Philadelphia, PA, USA.

Hanowski, J.M., and G.J. Niemi. 1986. Habitat Characteristics for Bird Species of Special Concern. Unpublished report to Minnesota Department of Natural Resources, St. Paul, MN, USA. 50pp.

Palmer, R.S. 1949. Maine Birds. Vol. 102. Bulletin of the Museum of Comparative Zoology, Harvard College, Cambridge, MA, USA.

Palmer, R.S. 1962. Handbook of North American Birds. Vol. 1. Yale University Press, New Haven, CT, USA.

Rhoades, D.D., and G.E. Duke. 1975. Gastric function in a captive American bittern. Auk 92:786-792.

Tate, J., Jr. 1986. The Blue List for 1986. American Birds 40:227-236.

Veit, R.R., and W.R. Peterson. 1993. Birds of Massachusetts. Massachusetts Audubon Society, Lincoln, MA, USA.

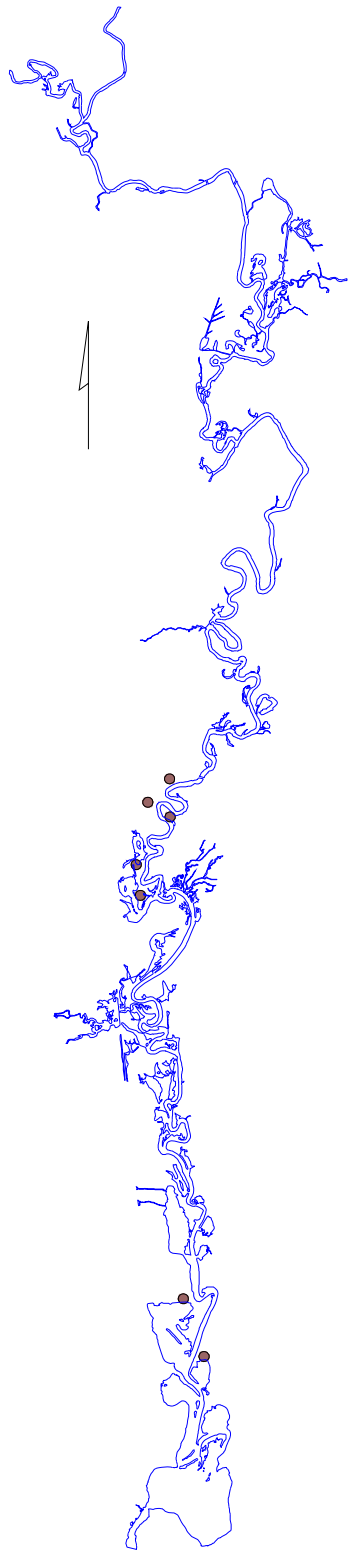


Figure 2. American bittern sightings in the primary study area

American Robin

Turdis migratorius

DESCRIPTION

The American robin is the largest member of the Thrush Family in North America. It is one of the most well known birds in the United States, seen in both rural and urban settings, and commonly thought of as a harbinger of spring. Mature male birds have cinnamon-red to brick-red underparts, gray to gray-brown upperparts, dark heads, white throats streaked with black, small white crescent marks above and below the eyes, and a yellow bill. Mature female birds are similar, but with plumage paler overall. Juvenile birds are somewhat similar, but have dark spotting on the underparts, pale spotting on the upperparts and wing coverts, entirely white throat, and less defined white markings around the eye.

BODY SIZE

The American robin is a familiar perching bird comparable in size to northern cardinals and blue jays. It has a mean total length and weight of 25 cm and 77 g, respectively. Mean wing length of birds from the eastern and north-central United States is 124.7 mm. Mean tail length (through measurement of median tarsel length) of birds from the eastern coastal plain is 33.0 mm. Males are larger than females in most measurements throughout the range. For example, examination of 26 adult birds in winter season from New York yielded a mean female body mass of 83.6 g, which was 2.6 g less than males (Sallabanks and James 1999).

In The Primary Study Area: There are no body size data available for American robins from the primary study area.

DISTRIBUTION

The American robin is found throughout most of North America. It is absent only from extreme northern Alaska, Canada, and Greenland, outside of rare vagrant individuals.

Figure 1. Range of American robin in North America.

The American robin has also been sighted as a rare vagrant in several European countries. It is extremely adaptable, occurring in a wide array of ecosystems and ascending to 3,500 meters in Mexico. Its far-ranging distribution and variable forging habits are shared with few other birds in North America (Sallabanks and James 1999).

The American robin occurs as a breeding population over most of North America. In

addition to extreme northern North America, where the American robin is absent altogether, only a few areas of the far southern United States and portions of Central America are not utilized as breeding territory by this species. The breeding range of the American robin can be divided into two regions: areas that are inhabited by birds during the winter (though not necessarily the same individuals) and areas that are not. The boundary between the United States and Canada forms an approximate line that separates these two regions. South of this line, American robins can be found as over-wintering populations. Conversely, the boundary between the United States and Mexico forms an approximate line that separates year-round range from wintering only range. South of this line, which includes southern Florida, Louisiana, and Texas, and a portion of the desert southwest, American robins do not breed (Sallabanks and James 1999).

Seven subspecies of the American robin are currently recognized (Phillips 1991). New England's breeding population is *Turdus migratorius migratorias*. This subspecies has the largest range of any race, occupying most of the northern half of the United States and Canada (except the Maritime Provinces).

MIGRATION

Large seasonal migrations occur over most of North America. Individuals are thought to respond, in part, to food resource availability and weather. Migrations are, therefore, complex and are not simple north-south movements of individuals. Furthermore, American robins do not appear to be confined to north-south movement. Individuals from a similar wintering area can be found in widely scattered, northern locations in the summer, indicating extensive east-west movement (Sallabanks and James 1999). This species appears to be more nomadic than other species as it does not always return to the same breeding area in subsequent seasons (Stevenson and Anderson 1994).

Vernal migrations generally begin with aggregations of large wintering roosts. These aggregations shift their location in response to food depletion and cold fronts. In late February, individuals begin to move northward toward breeding sites. American robins follow the general northward progress of the mean daily three degrees Celsius isotherm, reaching Massachusetts by March (Tyler 1949). Conspicuous flocks appear in the spring on manicured lawns and other snow-free terrestrial areas (Sallabanks and James 1999).

Autumnal migrations of the American robin begin with individual birds becoming more gregarious. Movements begin in Massachusetts around early August. Resident summer birds, however, will not have completely left until late October (Tyler 1949). New England does possess wintering populations of American robins, and, therefore, individuals are occasionally seen where bare ground and fruit-bearing plants are present.

Migratory behavior is a genetically programmed trait that predisposes American robins toward flocking and seasonal movement. Hand-reared fledglings were noted to develop restlessness at dusk during the time wild birds were aggregating in roosts (Eiserer 1979). Winter migrations sometimes consist of more than one species. Very large flocks mixed with species of blackbirds have been observed (James and Neal 1986). Migrations tend to occur more commonly during the day, as American robins strike television towers less frequently than many regular nocturnal migrants (Stevenson and Anderson 1994).

HABITAT

American robins can be found in closed canopy forests, woodlands, fields, and residential areas. They are most commonly observed, however, foraging in the summer season in cleared areas with short herbs, such

as natural forest openings, lawns, and recently cleared or burned stands. Studies have shown that American robins frequently breed in suburban areas, riparian forests, and early successional forests (Martin 1973, Hutto 1995, Sallabanks 1995). As would be expected, some variation does occur continent-wide, and various closed-canopy conifer communities are preferred in the western United States (Sallabanks and James 1999).

Wintering habitat is quite similar to breeding habitat, though populations will largely have originated from more northern or higher elevation sites (Sallabanks and James 1999). American robins will move in flocks to areas with food resources. This includes suburban areas, south-facing slopes, and other sites with small, fleshy fruits.

Nesting occurs within specific microsites contained by the breeding habitat (Sallabanks and James 1999). Though there is tremendous variation, some patterns do emerge. First nests of the season are likely to be low in conifer trees, many nests less than three meters from the ground. Later nests, however, are more likely to be higher and placed in deciduous trees. Nests are usually constructed to be sheltered from rain beneath the layer with largest volume of foliage and firmly supported. Buildings, cliffs, ground thickets, tree stumps, and road banks are additional sites where American robins occasionally nest.

In The Primary Study Area: Data on habitat use by American robins from the Housatonic River ecological characterization studies are summarized in Table 1. American robins were observed in many areas of the primary study area. Although they could be seen flying over or temporarily roosting in most locations, only certain areas and natural communities were routinely used for foraging. American robins were most frequent in canopy openings and areas with short herbs near or adjacent to suburban and residential areas. Mowed lawns, power line rights-of-way, agricultural fields, and fallow pastures were commonly used habitats. Transitional floodplain forests were also used, but these areas were primarily adjacent to fields and house lots and lacking dense, robust herbs. Winter use of the study area by American robins was more restricted to suburban lots and shrub edges where small, fleshy fruits persisted on plants.

Table 1. Habitat use by American robins in the primary study area

Habitat Codes and Natural Community Classifications																				
Wetland Habitats													Terrestrial Habitats							
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
		B		B	B	B	B	B			B	B	B	B	B	B	B	B	B	B

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

HIBERNATION

American robins use seasonal migration to avoid cold stresses.

HOME RANGE AND TERRITORIALITY

The home range size of the American robin is dependent on several factors, including population density and season (Sallabanks and James 1999). Breeding range area for 33 pairs in New York was approximately 0.3 – 0.5 acres in New York (Howell 1942). An area of approximately 1.0 acre was reported from Wisconsin by Young (1951). An area as large as 2.0 acres was reported from Tennessee by Pitts (1984). Males use a combination of song and aggressive displays to defend breeding territories. Displays include charging and run-and-pause movements. It is thought that American robins maintain individual distances of at least one body length except in feeding aggregations (Kemper 1971).

Winter territoriality occurs in the form of fruit defense (Sallabanks and James 1999). Territorial displays target other American robins as well as other species of birds. Pietz and Pietz (1987) observed a single American robin defending a fruit-laden apple tree from cedar waxwings. The robin could successfully repel up to 15 cedar waxwings. Sallabanks (1993) documented feeding behavior differences between American robins feeding within their defended territory and robins that were intruding on defended territories. Resident birds fed longer, more slowly, and ingested more fruits than intruding birds.

BREEDING

Males usually arrive a few days earlier than females to the northeastern United States. Pair formation occurs shortly thereafter. During this time, testes contain developing spermatocytes, and ovarian follicles are enlarged (Kemper and Taylor 1981). Females then begin nest construction, which normally takes 5 – 7 days for the first nest of the season. Several factors affect the construction time including weather, which affects the availability of mud. Nests later in the season can be built in shorter periods of time. Female bird mass prior to egg laying is 8.4 percent reproductive tissue (largely eggs) (Howell 1942). The first egg is laid about 3 – 4 days after nest completion.

Female American robins construct a cup-shaped nest from mud mixed with grasses and small twigs (Canadian Wildlife Service 2001). Additional materials include string, cloth scraps, and paper. The first clutch of eggs is produced in spring or early summer. During peak egg laying of the first brood, males are fully spermatogenic and females have enlarging follicles or have ovulated at least once (Kemper and Taylor 1981). Dates of first clutch were 6 April to 24 July for south-central New York (Howell 1942) and 10 May to 6 July for northern Maine (Knupp *et al.* 1977). Females lay one egg a day for 3 – 4 days (usually 4). Incubation normally lasts 12 – 14 days after the last egg is laid.

American robins normally produce two broods each season, though three broods each season does occur and is more common in the southern United States. In south-central New York, 15 percent of observed pairs (n=27) were estimated to rear three broods (Howell 1942). The mean number of young produced per successful nest in Maine is 2.5 (n=38) (Knupp *et al.* 1977). Thirty-five percent of nests in Maine and 54 percent of nests in Illinois were estimated to produce young (Sallabanks and James 1999).

GROWTH AND DEVELOPMENT

Eggs are subelliptical to oval and have a mean length and weight of 28.4 mm and 6.3 grams (n=30), respectively, in south-central New York populations (Howell 1942). The eggs are incubated by body heat facilitated by a vascularized patch on the abdomen of the female. The female incubates for periods of about 40 minutes, where after she stands on the rim of the nest, turns eggs, and flies off for a break. During the incubation period, male

American robins may bring food to female, but this is unusual. Eggs generally hatch in the order they were laid over a period of 2 – 3 days (Kendeigh 1952). Each chick takes about 24 hours to hatch and breaks free of the egg by pipping a ring of fractures around the circumference of the egg with its egg tooth. Female American robins carry off egg shell fragments and may eat them. Hatchling mass ranges from 4.1 – 6.7 grams (mean=5.5 g) (Howell 1942).

Female American robins brood young for a few days after hatching until nestlings develop homeothermy. After approximately seven days, the female does not remain on the nest at night (Kendeigh 1952). Most American robins begin to feed their first brood in mid-May in New England (Sallabanks and James 1999). Nestlings are fed regurgitated food for the first four days after hatching (Tyler 1949). Both parents feed nestlings, delivering 6 – 7 feedings each hour to a single nestling, totaling 35 – 40 total feedings a day to each nestling. During the nesting period, adults take care of nest sanitation by eating, or later, carrying away fecal sacs produced by the nestlings (Hurd *et al.* 1991).

American robin chicks commonly fledge on day 13 (range = 9 – 16) after hatching. Nest mates leave the nest within a 24-hour period. Fledgling birds wander off for a short distance from the nest and are fed by the parents for a period of at least three weeks. Female American robins follow the fledglings at first, later only the male does. The female will begin a second nest at which time the male leads the juvenile birds to a communal roost site. At four weeks of age, juvenile birds can manage independently (Sallabanks and James 1999).

FOOD HABITS AND DIET

American robins are insectivorous and frugivorous. They eat a wide variety of invertebrates and fruit, depending on availability of food resources. American robins forage on the ground for terrestrial invertebrates and fallen fruits and in vegetation for foliar invertebrates and fruit. The proportion of animal *versus* plant matter in the diet of American robins is heavily influenced by season. While fruit constitutes less than 10% of the diet in the spring (median values), fruit accounts for more than 90% of the diet in fall and winter (Wheelwright 1986). Summer diet proportions are intermediate between spring and fall/winter values.

Fruits of cherry (*Prunus*), dogwood (*Cornus*), sumac (*Rhus*), blackberry and raspberry (*Rubus*), greenbriar (*Smilax*), and blueberry (*Vaccinium*) are the most frequently eaten plants. American robins use clues such as fruit crop size, fruit size, and fruit pulpiness when deciding which fruits to consume (Sallabanks 1993). Butterflies and moths (Lepidoptera), ground beetles (Carabidae), snout beetles (Curculionidae), scarab beetles (Scarabaeidae), ants (Formicidae), and click beetles (Elateridae) are the most commonly eaten insects (Wheelwright 1986). Earthworms are an important food item in the spring.

Early nestlings are fed regurgitated food consisting of soft invertebrates, such as beetle larvae and earthworm parts, and fruits. As much as 30 percent of the food content may be plant material. Later nestlings can be fed more intact food items and are capable of dealing with indigestible parts (i.e., they can regurgitate the seeds of cherries) (Sallabanks and James 1999).

Some sectors of the nest receive more food than others due to the direction parents are likely to approach the nest. Nestlings, therefore, compete with one another for favorable positions in the nest (McRae *et al.* 1993). American robin nestlings also compete with each other by begging. Nestlings that start begging earlier, hold neck higher, and place beak closer to the parents beak receive more food (Smith and Montgomerie 1991).

American robins lack an anatomically distinguishable crop. They do, however,

possess an extendable esophagus that acts similar to a crop. American robins have been observed packing fruits into their esophagus in response to abnormally low temperatures. Storage of food in an extendable esophagus may allow birds to overcome constraints of food-processing by the digestive tract to avoid death by freezing in winter periods (Sallabanks 1997).

ENERGETICS AND METABOLISM

Food ingestion rates for adult American robins has been estimated at 1,070 kcal/kg/d (SD = 220) (Hazelton *et al.* 1984 as cited in USEPA 1993).

POPULATIONS AND DEMOGRAPHY

Survivorship: Rate of survival of fledgling American robins to 1 November was calculated to be 25 percent (Young 1955). After the first six months of life, there is a 52 percent mortality rate in all age cohorts. There is, therefore, a nearly complete turnover of populations after six years (Farner 1945, 1949).

Age at Maturity and Life Span: American robins are capable of breeding in the first breeding season following hatching. One wild bird was documented to survive over 13 years, though most are not likely to live longer than 6 years (Farner 1945, 1949).

Mortality and Enemies: American robins experience most nest failures at the egg stage rather than fledgling stage (Kendeigh 1942). Nest failures are most commonly due to predation or desertion caused by disturbance or bad weather. Small mammals of the families Scuridae (squirrels) and Cricetidae (New World mice) are common predators of American robin eggs. Other nest or fledgling predators include jays, snakes, and falcons. Nest parasitism does occur by brown-headed cowbirds (*Molothrus ater*) that remove an egg before depositing one of their own in the host nest. American robins, however, do recognize brown-headed cowbird eggs and routinely puncture them with their bill and then expel them from the nest. House wrens are known to puncture or dent American robin eggs (Sallabanks and James 1999).

Adults are killed by predators, poisoning, and infectious disease. Accipiters are the major avian predators of American robins, and include sharp-shinned hawk (*Accipter striatus*), Cooper's hawk (*Accipiter cooperii*), and northern goshawk (*Accipiter gentiles*). As American robins frequent suburban areas, house cats can be a major predator (Sallabanks and James 1999).

American robin die-offs due to DDT use has been documented (Hickey and Hunt 1960, Wilson 1978). Furthermore, reduced nest success is observed in regions with DDT use. Pesticides and treatment of lawns with insecticides has also been shown to have negative effects on American robin populations (Sallabanks and James 1999).

At least four diseases are known to cause mortality in American robins, including *Yersinia tuberculosis*, avian pox, and an unidentified protozoan (Sallabanks and James 1999). Body parasites such as lice, flies, ticks and mites, and internal parasites such as worms are common. In southern New York, the American robin is heavily infested with the tick *Ixodes dammini* and is found to carry the Lyme disease spirochete *Borrelia burgdorferi* (Battaly and Fish 1993).

STATUS

General: American robins are capable of using a wide variety of open and forested habitats, as well as suburban areas. As a result, they are common throughout their range, including New England.

In The Primary Study Area: American robins were found in many of the natural communities occurring in the primary study area. They were most common, however, in open fields and rights-of-way associated with residential development in the upstream two-

thirds of the primary study area. American robins were abundant on lawns and at edges of lots adjacent to the ten-year floodplain. Figure 2 shows the locations where American robins were observed during the 1998 – 2000 field surveys.

REFERENCES

Battaly, G.R., and D. Fish. 1993. Relative importance of birds species as hosts for immature *Ixodes dammini* (*Acari, Ixodidae*) in a suburban residential landscape of southern New York. Journal of Medical Entomology 30:740-747.

Canadian Wildlife Service. 2001. Hinterland Who's Who - American Robin. URL http:/www.cws-scf.ec.gc.ca/hww-fap/arobin/robin.html.

Eiserer, L.A. 1979. Roost time restlessness in captive American robins (*Turdus migratorius*). Animal Learning Behavior 7:406-412.

Farner, D.S. 1945. Age groups and longevity in the American robin. Wilson Bulletin 57:56-74.

Farner, D.S. 1949. Age groups and longevity in the American robin: comments, further discussion, and certain revisions. Wilson Bulletin 61:68-81.

Hazelton, P.K., R.J. Robel, and A.D. Dayton. 1984. Preferences and influences of paired food items on energy intake of American robins (*Turdus migratorius*) and gray catbirds (*Dumetella carolinensis*). Journal of Wildlife Management 48:198-202.

Hickey, J.J., and L.B. Hunt. 1960. Initial songbird mortality following a Dutch elm disease control program. Journal of Wildlife Management 24:259-265.

Howell, J.C. 1942. Notes on the nesting habits of the American robin (*Turdus migratorius* L.). American Midland Naturalist 28:529-603.

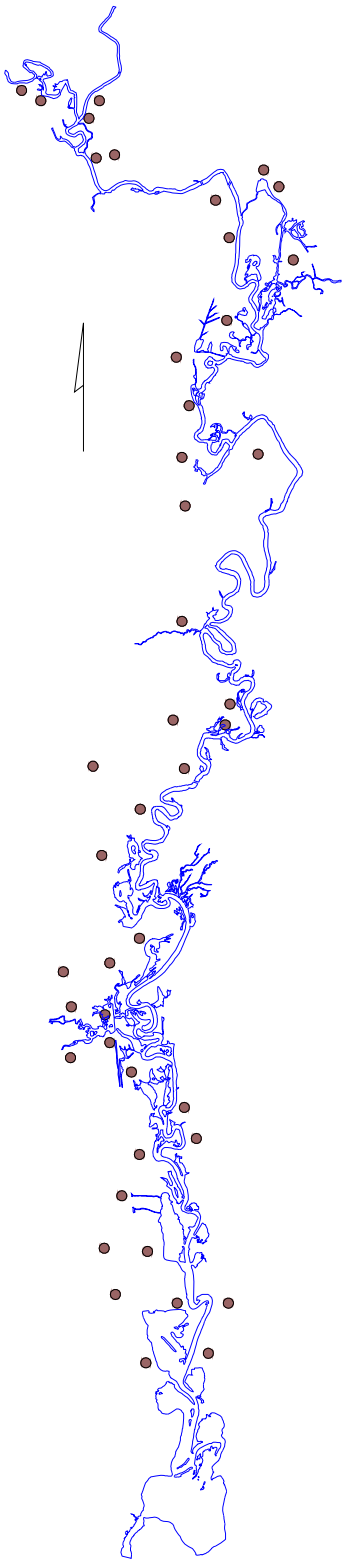


Figure 2. American robin sightings in the primary study area.

Hurd, P.L., P.J. Weatherhead, and S.B. McRae. 1991. Parental consumption of nestling feces: good food or sound economics? Behavioral Ecology 2:69-76.

Hutto, R.L. 1995. The composition of bird communities following stand-replacement fires in northern Rocky Mountain conifer forests. Conservation Biology 9:1-19.

James, F.C., and J.C. Neal. 1986. Arkansas Birds, Their Distribution and Abundance. University of Arkansas Press, Fayetteville, AR, USA.

Kemper, D.L. 1971. The Breeding Biology of the American Robin (*Turdus migratorius*) in Southwestern British Columbia. MS Thesis. University of British Columbia, Vancouver, BC, Canada.

Kemper, D.L., and J.M. Taylor. 1981. Seasonal reproductive changes in the American robin (*Turdus migratorius*) of the Pacific Northwest. Canadian Journal of Zoology 59:212-217.

Kendeigh, S.C. 1942. Analysis of losses in the nesting of birds. Journal of Wildlife Management 6:19-26.

Kendeigh, S.C. 1952. Parental care and its evolution in birds. III. Biological Monographs 22:1-356.

Knupp, D.M., R.B. Owen Jr., and J.B. Dimond. 1977. Reproductive biology of the American robin in northern Maine. Auk 94:80-85.

Martin, K. 1973. Breeding Density and Reproductive Success of Robins in Relation to Habitat Structure on Logged Areas of Vancouver Island, British Columbia. MS Thesis. University of Alberta, Edmonton, Canada.

McRae, S.B., P.J. Weatherhead, and R. Montgomerie. 1993. American robin nestlings compete by jockeying for position. Behav. Ecol. Sociobiol. 33:101-106.

Phillips, A.R. 1991. The Known Birds of North America and Middle America: Distributions and Variations, Migrations, Changes, Hybrids, etc., Part II. A.R. Phillips, Denver, CO, USA.

Pietz, M.A.J., and P.J. Pietz. 1987. American robin defends fruit resource against cedar waxwings. Journal of Field Ornithology 58:442-444.

Pitts, T.D. 1984. Description of American robin territories in northwest Tennessee. Migrant 55:1-6.

Sallabanks, R. 1993. Hierarchical mechanisms of fruit selection by an avian frugivore. Ecology 74:1326-1336.

Sallabanks, R. 1995. Effects of wildfire on breeding bird communities in coniferous forests of northwestern Oregon. Unpublished annual report. Sustainable Ecosystems Institute, Meridian, ID, USA.

Sallabanks, R. 1997. Packing fruits at dusk: fuel storage in an American robin wintering in western Oregon. Northwestern Naturalist 78:62-64.

Sallabanks, R., and F.C. James. 1999. American Robin (*Turdus migratorius*). p. 1-27. *In* A. Poole and F. Gill (ed.) The Birds of North America. The Birds of North America, Inc, Philadelphia, PA, USA.

Smith, H.G., and R. Montgomerie. 1991. Nestling American robins compete with siblings by begging. Behav. Ecol. Sociobiol. 29:207-312.

Stevenson, H.M., and B.H. Anderson. 1994. The Birdlife of Florida. University Presses of Florida, Gainesville, FL, USA.

Tyler, W.M. 1949. Eastern Robin. p. 14-45. *In* A.C. Bent (ed.) Life Histories of North American Thrushes, Kinglets, and Their Allies. United States National Museum Bulletin, No. 196. United States National Museum, Washington, DC, USA.

USEPA. 1993. Wildlife Exposure Factors Handbook. Volume 1 of 2. EPA/600/R-93/187a. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC, USA.

Wheelwright, N.T. 1986. The diet of American robins: an analysis of US Biological Survey records. Auk 103:710-725.

Wilson, G.D. 1978. Reproductive biology of American robins following a Dutch elm disease control program. Proceedings of the Iowa Academy of Sciences 85:91-96.

Young, H. 1951. Territorial behavior in the eastern robin. Proceedings of the Linnaean Society 58-62:1-37.

Young, H. 1955. Breeding behavior and nesting of the eastern robin. American Midland Naturalist 53:329-352.

Bald Eagle

Haliaeetus leucocephalus

DESCRIPTION

The bald eagle is one of the largest and most conspicuous bird of prey in North America, second in size only to the California condor (*Gymnogyps californianus*). Its distribution is largely limited to North America, and two subspecies are tentatively recognized based on size and geographic range: the larger, northern subspecies *H. l. alascanus* and the smaller southern subspecies *H. l. leucocephalus*. Although there is disagreement on the validity and biological basis of subspecies differentiation, this account focuses on the northern subspecies, which is generally considered to include those birds breeding north of latitude 40°N (Buehler 2000). Although the wintering ranges of the two subspecies overlap, it can be assumed that only the northern subspecies occurs in the primary Housatonic study area.

The bald eagle is currently protected under the U.S. Endangered Species Act. It is federally-listed as "Threatened" in all of the 48 lower states, but is more-restrictively listed as "Endangered" (i.e., more at risk) by several New England states, including Massachusetts, Vermont, New Hampshire, and Connecticut (Massachusetts Division of Fisheries and Wildlife 2000, Degraaf and Yamasaki 2001). See Status section below for more details.

BODY SIZE

Body size of the bald eagle varies widely, with the largest birds found in the northern part of the range. Females are about 25% larger than males. Total length for adults ranges from 71 – 96 cm, with an average of 81 cm (bill tip to tail tip) for more northerly populations. Juvenile bald eagles are larger, but lighter in weight than adults of the same sex. Weights of adults and juveniles vary from 3.0 kg to over 7 kg (USEPA 1993, Buehler 2000, Canadian Fish and Wildlife Service 2000).

Figure 1. Range of the bald eagle in North America

In The Primary Study Area: No bald eagles were captured or collected in the Housatonic study area, and no site-specific or regional body size data were found.

DISTRIBUTION

The bald eagle has a breeding range from Alaska west across much of Canada, with extensive breeding populations along the Atlantic coast from the Maritime Canada to Florida and in the Great Lakes states and the Pacific Northwest (Figure 1). Breeding populations are building in the Rocky Mountains and along the Gulf Coast, and localized, spotty populations are found in all

of the lower 48 states except Rhode Island and Vermont. The winter range of the bald eagle encompasses most of the lower 48 states as well as southern portions Canada and the coastal areas of Alaska and British Columbia (Buehler 2000, Canadian Fish and Wildlife Service 2000, DeGraaf and Yamasaki 2001).

In Massachusetts, bald eagles breed and winter at the Quabbin Reservoir (part of the Connecticut River) and the Assawompsett Pond system, and overwinter along the Merimack River and along coastal shores of Cape Cod, Buzzard's Bay, Martha's Vineyard, and Nanatucket Island. They can occur anywhere within the state, especially during spring and fall migrations (Massachusetts Division of Fisheries and Wildlife 2000). They also winter in Connecticut along the Connecticut and Housatonic rivers and the large reservoirs in the Northwestern Hills (DeGraaf and Yamasaki 2001).

MIGRATION

The migration pattern of the bald eagle is complex, dependent on the age of the individual (i.e., immature vs. adult), the location of the breeding site, food availability, and the severity of the winter at the breeding site (Buehler 2000). It is thought that breeding pairs migrate independently, but may rejoin at the wintering grounds. Immatures move nomadically year round, and it is difficult to distinguish their migration movements from their dispersal movements. In winter, adults in northern portions of the range migrate out of areas where lakes and rivers freeze over completely, but appear to stay as far north as the availability of open water and reliable food supplies allow (USEPA 1993). These wintering areas may contain resident as well as migratory individuals. The far north breeding populations often migrate south in winter to areas with abundant food, such as the Mississippi and Missouri rivers, the Pacific Northwest, and the Chesapeake Bay.

Most adult winter migrations in the Northeast occur late August through early December, with peak adult migration the first half of September and peak immature migrations coming later and lasting until mid November. Northern birds return to the breeding areas in the spring as soon as weather and food availability allow, which may be as early as January or as late as March (Buehler 2000).

HABITAT

Habitat use by bald eagles varies somewhat depending on the region, but proximity to large bodies of water with suitable foraging opportunities is critical. As such, they are generally restricted to coastal areas, lakes, and rivers. Preferred breeding sites are in forested areas adjacent to water in areas with minimal human disturbance. Large, tall conifers are often chosen for nesting, perching, and roosting. In some areas, the distance of the nest site to water is not as critical as the quality of available foraging habitat and the amount of human activity. The average distance from the nest tree to human development is >1,600 ft, with the minimum distance about 300 ft. Relatively open canopies, some type of habitat edge, and the availability of super-story trees providing good access to nests and stout horizontal perching branches are preferred habitat features for breeding pairs (USEPA 1993, Buehler 2000, DeGraaf and Yamasaki 2001).

During migrations, habitat use is most closely tied with food availability and avoidance of human activity. Stopover sites typically have traditional roost trees in suitable habitats. Winter habitats are similar to other times of year, including available open water or other food sources (i.e., carrion), and suitable roost sites that provide protection from wind and precipitation. Some communal roost sites are located long distances from aquatic foraging areas, particularly in the western states. Social interactions (i.e., information exchange) may also play a role in roost-site selection (Buehler 2000, DeGraaf and Yamasaki 2001).

A radio-tagging study in Chesapeake Bay in Maryland (Buehler *et al.* 1991c) determined the relationship between bald eagle distribution and human activity. Less than 5% of the 1,117 radio locations occurred within developed areas (i.e., $\geq$ 4 buildings per 9.1 acres within 1,640 ft of the shoreline), even

though over 18% of the potential eagle habitat was considered developed. The greater the building density, the less the eagle used those shoreline areas. Mean eagle flush distances elicited by approaching boats were 869 ft in winter and 575 ft in summer, and there were no significant differences in flush distances between adults and immatures.

In The Primary Study Area: Table 1 contains a summary of the literature review and observational data on the use by bald eagles of the natural community types found within the primary study area.

HOME RANGE AND TERRITORIALITY

Home range sizes of bald eagles vary widely depending on the area, season, availability of and distance to food resources, and the breeding status of the individual (Buehler 2000). Breeding adults in Saskatchewan utilized home ranges no smaller than 1,730 acres in size (Gerrard *et al*. 1992a). Garrett *et al*. (1993) reported that average home range sizes during breeding season on the Columbia River, OR, was 5,337 acres.

Immature bald eagles generally occupy much larger areas than breeding adults, presumably because they are not tied to a nest site. Nonbreeding birds hatched on the northern Chesapeake Bay ranged throughout the Chesapeake area year round, and some traveled to Maine and Maritime Canada in summer and returned in the winter (Buehler *et al*. 1991). Two radio-tracked immatures, one from the Southwest U.S. and one from the Great Lakes area, were shown to use summer ranges of more than 13.6 million acres each, with winter home ranges of more than 5 million for one and 9 million acres for the other (Buehler 2000).

Griffin and Baskett (1985) reported winter home range sizes of juvenile and adult bald eagles in Missouri to be 4,522 acres (± 3,608 SD) and 4,645 acres (± 2,224 SD), respectively. Craig *et al*. (1988) reported that linear foraging distances for eagles wintering on the Connecticut River ranged from 1.9 to 4.3 miles. Eagles that roost together in large numbers in winter share a common foraging home range (USEPA 1993).

Table 1. Habitat use by bald eagle in the primary study area

Habitat Codes and Natural Community Classifications																						
Wetland Habitats													Terrestrial Habitats									
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES		
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development		
Y	Y	Y	Y																			

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed

VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

Shading = observed in study area

Bald eagles are territorial, most notably during the breeding season. Both sexes will exhibit defense behavior towards eagles that intrude on their nesting territory during the incubation and brooding periods. The rest of their home range is not defended. Defenses include posturing (e.g., perching conspicuously), threat vocalizations, and sometimes chasing. Territorial defense generally ceases following fledging of the young, and birds often roost communally at the wintering sites without exhibiting territorial behavior (Buehler 2000).

Estimates of bald eagle territory size vary. In a Minnesota study designed to elicit defensive behaviors, the average territory radius for 10 pairs was about 1,900 ft, which would be approximately 247 acres if a circular territory is assumed (Mahaffy and Frenzel 1987). Stalmaster (1987) indicated a typical territory size of 247 – 494 acres, while Gerrard *et al.* (1992) reported a minimum territory size for a radio-tagged pair of 988 acres.

BREEDING

Courtship begins mid to late winter among northern populations. In Massachusetts, the breeding and nesting season begins in March (Massachusetts Division of Fisheries and Wildlife 2000). Bald eagles have one brood per year throughout their range. Courtship involves a spectacular array of aerial displays. Bald eagle pairs are thought to be monogamous, and pair bonds probably remain intact year to year until one of the mates dies (Harmata 1984, Buehler 2000). Nest building or maintenance begins about 1 – 3 months before egg-laying, with the males generally bringing sticks and other materials to the female for her placement within the nest. The same nest sites are used in successive years (up to 35 years recorded), though pairs may use alternate nests within the territory, particularly after nesting failure or disturbance. Nests can become very large after repeated use (Buehler 2000, DeGraaf and Yamasaki 2001).

In Massachusetts, eggs are laid in late March to early April. Clutch size ranges from 1 – 3, but is typically 2. Eggs are laid one at a time, with one or more days in between successive eggs. Laying is usually completed in 3 – 6 days, and the female does about 75% of the incubation. Re-laying can occur, particularly when there are nest failures early in nesting season. The incubation period is 35 days, with the first egg laid being the first to hatch. Differences in hatch dates give first hatchling a competitive advantage over later arrivals (Buehler 2000, Massachusetts Division of Fisheries and Wildlife 2000). Most 3-egg clutches do not produce 3 fledglings because the last-borne chick dies of starvation (Gerrard and Bortolotti 1988).

GROWTH AND DEVELOPMENT

Competition for food among the nestlings is intense, particularly when the parents are not able to provide enough food for all of their young. The oldest sibling uses its greater size to get most of the food, sometimes causing the younger siblings to starve. Gerrard and Bortolotti (1988, as cited in Buehler 2000) reported weights from one nest were 477, 260, and 80 g for 9-day-old, 8-day-old, and 6-day-old siblings, respectively. Sibling competition is greatest early in the nesting season when size differences are greatest (Bortolotti 1986, as cited in Buehler 2000). This behavior increases the likelihood that at least one of the chicks will survive to fledge.

The young eaglets are born covered with down, but begin to grow flight and body feathers in the first 2 – 4 weeks. Growth is rapid, with maximum average growth (at 3 – 4 weeks of age) of 102 g/d for males and 130 g/d for females recorded in a Saskatchewan study (Bortollotti 1984, as cited in Buehler 2000). Both parents bring food to the nest, at first tearing off pieces for the young birds. At about 6 weeks old, nestlings begin to tear off food and feed themselves (Palmer *et al.* 1988). The female parent may do the majority of feeding after the first 2 weeks. Adults deliver food several times a day.

Nest departure occurs at about 8 – 14 weeks. Prior to first flights, the young eaglets flap their wings to develop strength and coordination, moving about in the nest or to

adjacent limbs. Some first flights are unsuccessful, and the young may spend time (e.g., days or weeks) on the ground until gaining flight ability. Parents will continue to feed these birds.

Even after flight ability is gained, nestlings may use the nest as a feeding platform for several weeks (Buehler 2000). The fledglings associate with other young and adults for several weeks prior to dispersal, and may still be fed by adults and do not catch live prey for up to 6 weeks after leaving the nest. Hunting skills may be developed by trial and error rather than learned from parents. (Kussman 1977, as cited in Buehler 2000).

After their initial dispersal, immature bald eagles spend about 4 years exploring until they develop adult plumage. Dispersal direction from the nest area is variable, even among siblings. In Maine, the newly fledged birds dispersed to the coast, generally southward (McCullough 1986). Immatures show little fidelity to any one area, but move in response to food availability and weather in patterns that may repeat year after year (Buehler 2000).

FOOD HABITS AND DIET

Bald eagles are opportunistic feeders, eating a variety of animals either taken as live prey or scavenged as carrion. Fish is the preferred food throughout the range and often makes up a large proportion of the total diet (Stalmaster 1987). Depending on availability, scavenged dead or dying fish will be utilized more than live fish due to the bald eagle's limited fishing ability. When fishing, eagles will choose shallow water where fish are more likely to be close to the surface. Benthic-dwelling fish species (e.g., bullheads) are probably most often taken dead, floating on the surface (Mersmann 1989, as cited in Buehler 2000). Bald eagles often take advantage of fish kills associated with natural or human-caused events (e.g., post-spawning salmon mortality, summer oxygen-depletion kills, hydroelectric turbine outfalls) (Knight and Knight 1983, Buehler 2000). Availability plays a large role in regard to which fish species are taken. In some wintering areas, eagles will congregate in large numbers to feed on readily available food, particularly fish.

Many other types of food are opportunistically utilized by bald eagles throughout their range, including mammals, birds, reptiles, crustaceans, and sometimes garbage. Virtually any dead aquatic or terrestrial animal is a potential food. Eagles also prey on live animals such as waterfowl, gulls, shorebirds, muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), hares (*Lepus* spp.), squirrels, and small mammals. Deer and sometimes livestock carcasses are utilized when available (Todd *et al*. 1982, Knight and Knight 1983, USEPA 1993, Buehler 2000). Todd *et al*. (1982) identified 64 species of vertebrates and 2 species of invertebrates in nest-site food remains of Maine bald eagles, with fish making up >75% of the items. Fish were more common food items at the inland nest sites, while mammals use was greatest at the coastal sites.

Bald eagles forage by direct capture, scavenging, or stealing food from other animals. Eagles most often hunt in flight or from perches. They will often steal food from other eagles as well as from osprey (*Pandion haliaetus*), herons, and sometimes mammals. Adults are more successful than immatures at capturing live prey. Food piracy is more common in the non-breeding season (Todd *et al*. 1982, Knight and Knight 1983, Buehler 2000). Eagles also will displace mammals and other birds at carrion sites (McCollough *et al*. 1994). Foods are most often taken to a nearby perch or brought to the nest for consumption, though if left undisturbed, eagles will feed on large items on the ground. Eagles can gorge and store food in their crops to be digested over several days. Prolonged fasting in captivity (16 or more days) has been observed with little adverse health effects (Stewart 1970, as cited in Buehler 2000).

Because bald eagles scavenge dead or dying prey, they are susceptible to contaminants such as pesticides, toxic chemicals, and lead shot that may be present in these foods. In addition, bald eagles are vulnerable to biomagnification of contaminants because of their position in the food chain (USEPA 1993).

ENERGETICS AND METABOLISM

Stalmaster and Gessaman (1982, as cited in Buehler 2000) measured energy requirements of captive bald eagles and found that daily gross energy intake, existence metabolism, and excretory energy were 425.5, 341.9, and 83.6 kJ/kg at 5°C, respectively, though it is estimated that energy and food requirements would be 10% higher in the wild (Stalmaster and Gessaman 1984, as cited in Buehler 2000). Ecological metabolism estimates based on food consumption of wintering eagles on the Connecticut River (Craig *et al*. 1988) were 1,873 kj/bird/d (SD = 72) for adult daily energy budget and 2,249 kj/bird/d (SD = 77) for adult daily energy consumption. Stalmaster and Gessaman (1984) reported a basal metabolic rate of captive bald eagles, as measured by oxygen consumption at various ambient conditions, to be 11.595 kJ/g/h. The metabolic rate was inversely related to ambient temperature, and increased in response to induced rainfall.

MOLT

Immature bald eagles go through a sequence of plumages before attaining the distinctive adult plumage at 4.5 to 5.5 years of age. Plumage is highly variable depending on the season and age. McCollough (1989) and Buehler (2000) present comprehensive descriptions of the plumage stages and molting sequences for the various immature through adult stages.

Adult bald eagles molt every year, though it is thought that some feathers may be retained for 2 years. Juveniles (through the 1st-year) and immatures (years 2 through about 4.5 – 5.5) also undergo annual molts. Molting begins in the spring of the year and continues through summer and fall (total time = ±6 months) in northern populations (McCollough 1989).

POPULATIONS AND DEMOGRAPHY

Survivorship and Mortality: Survivorship likely varies somewhat among eagle populations and regions, though the data that have been collected suggests excellent survival for most age classes. In Maine, McCollough (1986) found that at least 73% of juveniles survived their first year. In Chesapeake Bay (MD and VA), Buehler *et al*. (1991a) found that the mean minimum survival per year for 39 eagles (tagged as 8- to 10-week-old eaglets) from 1984 to 1990 was 91% (95% CI = 86 – 96%) and mean maximum survival was 98% (95% CI = 96 – 100%). All 39 survived the first year, and survival estimates were similar for most age classes up to age 6. There were only 2 documented cases of mortality in addition to the 9 eagles whose radio signals were lost. Buehler (2000) suggests that, as a species, bald eagles may typically follow the survival patterns of other raptors, where survival is lowest in the first year followed by increasing survival to adulthood. Adult survival has been found to be high in other regions, including 100% in Florida (Wood 1992) and 88% in Alaska (Bowman *et al*. 1995). Migratory populations may have slightly lower survivorship (Buehler 2000).

Human activities account for the greatest single cause of bald eagle mortality. Wood *et al*. (1990, as cited in Buehler 2000) reported that 68% of 1,428 individuals necropsied from 1963 to 1984 had died as a result of human activity of some type. Direct causes of mortality include accidental or intentional trapping, shooting, and poisoning. Indirect human-caused mortalities include primarily those from collisions with vehicles and powerlines, exposure to pesticides and contaminants, and ingestion of lead and plastic.

Pesticides and contaminants have a high potential to affect bald eagles because of the high trophic level that this species occupies (i.e., as it relates to the concept of biomagnification). In the last century, bald eagles have been subjected to a wide variety of chemical pollutants in the environment, experiencing both direct poisoning and decreased reproduction. DDE (1.1-dichloro-2,2-*bis*(p-chlorophenyl)ethylene), a metabolite of the pesticide DDT (1,1,1-trichloro-2,2-*bis*(p-chlorophenyl)ethylene), has been linked to reproductive failures and eggshell thinning in bald eagles and other raptors. Anthony *et al*. (1993) found that high levels of DDE and

PCBs were associated with eggshell thinning and decreased productivity among bald eagles in the Columbia River Estuary. They also found detectable levels of these substances in the blood of nestlings, indicating that eagles can be exposed early in life. There is speculation that PCBs (polychlorinated biphenyls) also contribute to reproductive failure through eggshell thinning, but their effects on reproduction are not well understood (Buehler 2000).

Cyclodiene pesticides, particularly Dieldrin, have been implicated in mortality of bald eagles from the Midwest from the late 1960s to the early 1980s. Other types contaminants and heavy metals also pose a continual threat to eagles, who often become poisoned when they consume prey that has been sickened or poisoned by consumption of these materials. Lead poisoning is also relatively common in eagles, the source being lead shot in waterfowl and lead fishing sinkers (Buehler 2000).

Age at Maturity and Life Span: The majority of bald eagles reach sexual maturity at 5.5 years of age, though it has been shown that they are capable of first breeding as young as 3 years of age. Breeding may occur at the earlier ages in populations that are below their carrying capacity, or may not begin until as late as 6 or 7 years in dense populations. Bald eagles have been shown to live up to 28 years in the wild and 36 years in captivity (Buehler 2000).

Enemies: Adult bald eagles have few natural enemies. Eggs, nestlings, and fledglings are susceptible to predation by avian and mammalian predators, including hawks, owls, ravens, crows, gulls, raccoons, black bears, and others. Diseases and parasites have been identified, though relatively little is known about their incidence or effect on mortality. Neither predation nor natural diseases are considered significant sources of mortality among bald eagles (Buehler 2000).

STATUS

General: Declines in bald eagle populations beginning in the mid 1800's led to the passage in 1940 of the Federal Bald Eagle Protection Act (16 U.S.C. 688). Further declines resulting from DDT exposure and habitat loss from the 1940s to the 1960s prompted the listing of the southern subspecies (i.e., those populations south of the 40th parallel) under the Endangered Species Preservation Act of 1966. In 1978, protection was expanded to bald eagles in all 48 lower states, with a few northern states' populations listed as Threatened and the rest as Endangered. The ban on DDT in the 1970s, enforcement of the Endangered Species Act, and active, ongoing restoration and management efforts by the U.S. Fish and Wildlife Service have allowed most bald eagle populations in the lower 48 states to rebound dramatically. Because of the healthy population increases and range expansions, the bald eagle was downgraded in 1995 to Threatened at the federal level in all of the lower 48 states. In New England, however, the states of Massachusetts, Vermont, New Hampshire, and Connecticut still list the species as Endangered due to the low numbers of breeding pairs in their respective states (Massachusetts Division of Fisheries and Wildlife 2000).

Bald eagle populations throughout the species' range have been increasing steadily since conservation efforts began. Buehler (2000) reports that the population estimate in 1980 was 70,000 birds in North America. The current (1999) estimate for all of North America is on the order of 100,000 individuals, with the greatest numbers still in Alaska and British Columbia. A 66% increase in the number of adults in Alaska from 1967 to 1997 is attributed to reduced mortality rather than elimination of DDT effects, because DDT was not a problem in Alaska. Populations in Alaska, Florida, Michigan, Minnesota, Wisconsin, Washington, and Oregon may be at or near carrying capacity, while other areas (e.g., New Hampshire and Connecticut) have fewer than 3 breeding pairs each (Buehler 2000).

Bald eagles were confirmed as successfully breeding in Massachusetts in 1989, after being absent for more than 80 years. This followed a reintroduction program in the mid-1980s in which 41 young eagles from Michigan and Canada were brought to Quabbin Reservoir in

the central part of the state. As of 1995, there were 9 pairs known to be nesting in the state, with nests located at Quabbin Reservoir, Connecticut River, and Plymouth County (Massachusetts Division of Fisheries and Wildlife 2000).

In The Primary Study Area: Bald eagles were observed only infrequently during the 1998, 1999, and 2000 field surveys in the study area. A total of 7 sightings were recorded (Figure 2), including both adults and immatures. Sightings were limited to the spring and fall seasons. Eagles were seen feeding in Woods Pond and in backwaters north of the pond. No nesting is known to occur within the primary study area

REFERENCES

Anthony, R.G., M.G. Garrett, and C.A. Schuler. 1993. Environmental contaminants in bald eagles in the Columbia River Estuary. Journal of Wildlife Management 57(1):10-19.

Bortolotti, G.R. 1984. Physical development of nestling bald eagles with emphasis on the timing of growth events. Wilson Bulletin 96:524-542.

Bortolotti, G.R. 1986. Evolution of growth rates in eagles: sibling competition vs. energy considerations. Ecology 67:182-194.

Bowman, T.D., P.F. Schempf, and J.A. Bernatowicz. 1995. Bald eagle survival and populations dynamics in Alaska after the Exxon Valdez oil spill. Journal of Wildlife Management 59:317-324.

Buehler, D.A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). p. 1-39. *In* A. Poole and F. Gill (ed.) The Birds of North America. Vol. 506. The Birds of North America, Inc., Philadelphia, PA, USA. (N)

Buehler, D.A., J.D. Fraser, J.K.D. Seegar, G.D. Therres, and M.A. Byrd. 1991a. Survival rates and population dynamics of bald eagles on Chesapeake Bay. Journal of Wildlife Management 55(4):608-613.

Buehler, D.A., T.J. Mersmann, J.D. Fraser, and J.K.D. Seegar. 1991b. Differences in distribution of breeding, nonbreeding, and migrant bald eagles on the northern Chesapeake Bay. Condor 93:399-408.

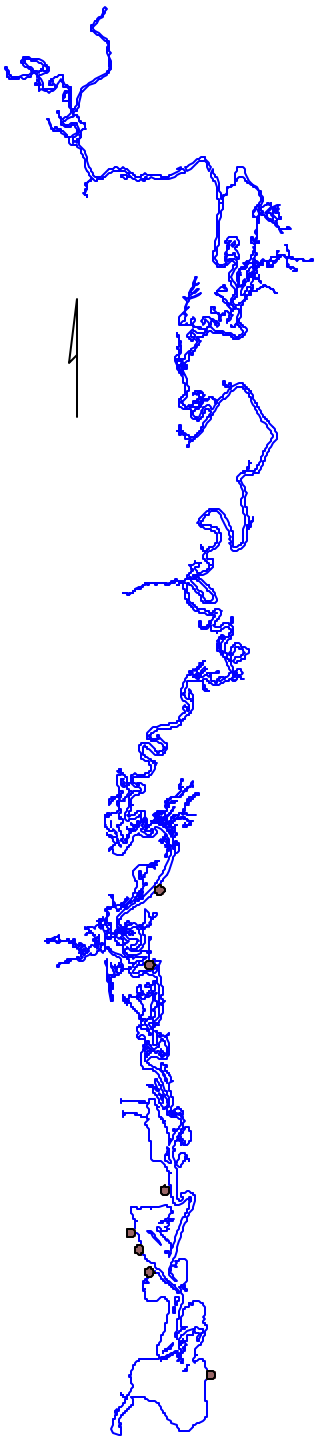


Figure 2. Bald eagle sightings in the primary study area, from 1998 – 2000 field studies.

Buehler, D.A., T.J. Mersmann, J.D. Fraser, and J.K. Seegar. 1991c. Effects of human activity on bald eagle distribution on the northern Chesapeake Bay. Journal of Wildlife Management 55(2):282-290.

Canadian Fish and Wildlife Service. 2000. Hinterland Who's Who: Bald Eagle. URL http:/www.cws-scf.ec.gc.ca/hww-fap/bald/bald.html.

Craig, R.J., E.S. Mitchell, and J.E. Mitchell. 1988. Time and energy budgets of bald eagles wintering along the Connecticut River. Journal of Field Ornithology 59:22-32.

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH.

Gerrard, J.M., and G.R. Bortolotti. 1988. The Bald Eagle: Haunts and Habits of a Wilderness Monarch. Smithsonian Institution Press, Washington, D.C., USA.

Gerrard, J.M., P.N. Gerrard, G.R. Bortolotti, and E.H. Dzus. 1992a. A 24-year study of bald eagles on Besnard Lake, Saskatchewan. Journal of Raptor Research 26:159-166.

Gerrard, J.M., A.R. Harmata, and P.N. Gerrard. 1992b. Home range and activity of a pair of bald eagles breeding in northern Saskatchewan. Journal of Rapter Research 26:229-234.

Griffin, C.R., and T.S. Baskett. 1985. Food availability and winter range sizes of immature and adult bald eagles. Journal of Wildlife Management 49:592-594.

Harmata, A.R. 1984. Bald eagles of the San Luis valley, Colorado: their wintering ecology and spring migration. Ph.D. Dissertation. Montana State University, Bozeman, MT, USA.

Knight, S.K., and R.L. Knight. 1983. Aspects of food finding by wintering bald eagles. Auk 100:477-484.

Kussman, J.V. 1977. Post-fledgling behavior of the northern bald eagle (*Haliaeetus leucochephalus*), in the Chippewa National Forest, Minnesota. Ph.D. Thesis. University of Minnesota, Minneapolis, MN, USA.

Mahaffy, M.S., and L.D. Frenzel. 1987. Elicited territorial responses of northern bald eagles near active nest sites. Journal of Wildlife Management 51:551-554.

Massachusetts Division of Fisheries and Wildlife. 2000. Natural Heritage and Endangered Species Program. Westborough, MA. URL http:/www.state.ma.us/dfwele/dfw/nhesp/.

McCollough, M.A. 1986. The post-fledging ecology and population dynamics of bald eagles in Maine. Ph.D. Dissertation. University of Maine, Orono, ME, USA.

McCollough, M.A. 1989. Molting sequence and aging of bald eagles. Wilson Bulletin 101:1-10.

McCollough, M.A., C.S. Todd, and R.B. Owen. 1994. Supplemental feeding program for wintering bald eagles in Maine. Maine Wildlife Society Bulletin 22:147-154.

Mersmann, T.J. 1989. Foraging ecology of bald eagles on the northern Cheasapeake Bay with an examination of techniques used in the study of bald eagle food habits. M.S. Thesis. Virginia Polythechnic Institute and State University, Blacksburg, VA, USA.

Palmer, R.S., J.S. Gerrard, and M.V. Stalmaster. 1988. Bald Eagle. p. 187-237. *In* R.S. Palmer (ed.) Handbook of North American Birds. Vol. 4. Yale University Press, New Haven, CT, USA.

Stalmaster, M.V. 1987. The Bald Eagle. Universe Books, New York, NY, USA.

Stalmaster, M.V., and J.A. Gessaman. 1982. Food consumption and energy requirements of captive bald eagles. Journal of Wildlife Management 46:646-654.

Stalmaster, M.V., and J.A. Gessaman. 1984. Ecological energetics and foraging behavior of overwintering bald eagles. Ecological Monographs 54:407-428.

Stewart, P.A. 1970. Weight changes and feeding behavior of a captive-reared bald eagle. Bird-banding 41:103-110.

Todd, C.S., L.S. Young, R.B. Owen, and F.J. Gramlich. 1982. Food habits of bald eagles in Maine. Journal of Wildlife Management 46:636-645.

USEPA. 1993. Wildlife Exposure Factors Handbook. Volume 1 of 2. EPA/600/R-93/187a. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC, USA.

Wood, P.B. 1992. Habitat use, movements, migration patterns, and survival of subadult bald eagles in North Florida. Ph.D. Dissertation. University of Florida, Gainesville, FL, USA.

Wood, P.B., D.A. Buehler, and M.A. Byrd. 1990. Raptor Status Report - Bald Eagle. p. 13-21. *In* B.G. Pendleton (ed.) Proceedings of the Southeast Raptor Management Symposium and Workshop. National Wildlife Federation, Washington, DC, USA.

Brown Bullhead

Ameiurus nebulosus (formerly *Ictalurus nebulosus*)

DESCRIPTION

The brown bullhead is a medium-sized member of the catfish family. It is considered a warm water fish and inhabits both fresh and brackish waters. It is an extremely hardy fish. The brown bullhead is easily identified by its distinctive barbells, thick rounded body, large somewhat flattened head, scaleless dark brown skin, mottled sides, cream-colored belly, square caudal fin, and sharp, saw-toothed spines at the base of the dorsal and pectoral fins.

BODY SIZE

Brown bullheads average 230 – 305 mm and rarely exceed 457 mm (Mugford 1969). A typical adult weighs approximately 454 g, but they may reach as much as 1,816 g (Scarola 1987).

In the Study Area: During the 2000 fish biomass survey in the primary study area, 142 brown bullheads where captured from reaches 5C, Woods Pond, and its associated backwaters. Table 1 shows the captures for each reach by size class. The length of brown bullheads captured ranged from 57 to 336 mm with a mean of 231.9 mm (SD = 75.9). The weights ranged from 3.2 to 496.5 g with a mean of 223.1 g (SD = 144.4).

Table 1. Brown bullhead captures from the primary study area in 2000

Reach	Size class					Total
	YOY	I	II	III	IV	
5C	0	0	1	2	10	13
Backwaters	0	1	2	1	28	32
Woods Pond	12	18	6	12	48	96
Total	12	19	9	15	86	141

Size classes (mm): YOY (Young of the Year)= <100, I = 101–150, II = 151–200, III = 201–250, IV = 251+ (adapted from Klarberg and Benson 1975)

Figure 1. Range of brown bullhead in North America

DISTRIBUTION

Brown bullheads are native to eastern and central North America from Nova Scotia and New Brunswick to the Great Lakes region and south to Alabama. They have also been introduced throughout the United States (McClane 1978). Figure 1 above shows their indigenous range in North America.

MIGRATION

Brown bullheads do not migrate seasonally or to breed. In northern portions of their range, they likely move to slightly deeper waters in which to hibernate (see below) and escape winter ice.

HABITAT

Brown bullheads are found in lakes, ponds, impoundments, and low-gradient streams, with shallow water and muddy bottoms. Brown bullheads are typically benthic dwellers and can tolerate lower oxygen levels and higher water temperatures (up to 31.6°C) than most other fish species (FishBase 2001). Brown bullheads survive low-oxygen conditions (i.e., levels as low as one part per

million) by exchanging oxygen through their skin and gulping surface air into their air bladder, which functions as a lung. They can survive for weeks lying dormant in the mud of a dried-up pond. Brown bullheads are also tolerant of high water turbidity, stagnation, and pollution (Scarola 1987).

In The Primary Study Area: Brown bullheads were observed in the shallow, warm backwater and in Woods Pond. These areas typically contain mud bottoms with or without dense aquatic vegetation. Table 2 contains a summary of the literature review and observational data on the use by brown bullheads of the natural community types found within the primary study area.

HIBERNATION

Brown bullheads bury themselves in the soft mud bottom of lakes, ponds, and streams and remain inactive over the winter (Scarola 1987). This behavior typically occurs when water temperatures are between 0 – 18°C and is more common where lower temperatures are found (Loeb 1964, as cited in Carlander 1969).

HOME RANGE AND TERRITORIALITY

Brown bullheads are not territorial except during the breeding season, when the males defend the female and the nest (Adams and Hankinson 1926). Little is known about the home range of brown bullheads.

BREEDING

Brown bullheads spawn in the late spring when water temperatures reach 21°C. A shallow nest is excavated by one or both parents in mud or sandy substrate near the cover of logs, rocks, or vegetation, in water less than 2 ft deep. Bullheads lay 2,000 – 10,000 small (about 3.0 mm), cream-colored eggs in an adhesive cluster in the nest site. Both parents guard the eggs and aerate them by fanning, physically stirring them up, and taking them into the mouth and spitting them back out (Scarola 1987).

Table 2. Habitat use by brown bullhead in the primary study area

Habitat Codes and Natural Community Classifications																				
Wetland Habitats													Terrestrial Habitats							
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
	Y																			

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

In The Primary Study Area: Numerous pairs of brown bullheads were observed spawning in Woods Pond and the backwaters north of Woods Pond during the late spring, in areas typically 1 – 2 feet deep and well-vegetated with aquatic plants.

GROWTH AND DEVELOPMENT

Eggs hatch in five days at 25°C, with incubation time increasing in colder waters. Larvae are 8.0 mm at the time of hatching. They have a large yoke sack, which is absorbed over the next five days. Larvae stay within the nest under the protection of the parents for their first week. After leaving the nest, larvae remain in dense schools until they reach approximately 50 mm. At that point schools break down and juveniles disperse. Table 3 illustrates growth rates for young of the year bullheads in Cayuga Lake, New York (Raney and Webster 1940).

Table 3. Growth of young-of-the-year brown bullheads from New York (Raney and Webster 1940)

Date Collected (1938)	*n* =	Total length (mm)	
		Range	Mean
21-June	100	13–16	15.2
30-June	97	16–25	20.9
8-July	100	20–31	26.8
15-July	65	23–38	31.6
16-July	100	28–44	36.9
5-August	63	35–48	42.0
30-September	27	45–79	57.5
10-October	53	41–93	68.0

FOOD HABITS AND DIET

Brown bullheads are opportunistic bottom feeders, consuming a variety of plant, animal, and detrital foods. They feed primarily at night and locate food by brushing their barbells, which are equipped with taste buds, along the bottom (Scarola 1987). Klarberg and Benson (1975) found that brown bullheads in a small impoundment of the Tygart River in West Virginia consumed 54.2% plant material, 22.7% invertebrates, 21.9% detritus, and 1.1% fish. The same study found that brown bullheads in the Monongahela River consumed 36.1% sewage, 33.4% detritus, 18.8% invertebrates, 6.1% plants, and 5.6% fish. Common invertebrates consumed included midges, worms, copepods, beetles, caddisflies, and crayfish. Fish collected near sewage outfalls consumed large amounts of sewage and invertebrates associated with sewage.

Leeches, mollusks, fish eggs, and frogs are also common foods of adults. Juveniles (30 – 60 mm) are primarily carnivorous, and feed mostly on cladocerans, ostracods, amphipods, bugs, and mayflies, as well as eggs and larvae of other fish (FishBase 2001).

Brown bullheads prefer midge larvae (Chironomid) and scuds (*Hyalella* sp.) (Klarberg and Benson 1975, Kline and Wood 1996). Chironomid larvae made up only 2.9% of bottom-dwelling invertebrates in a West Virginia river, but made up 10.1% of the invertebrates eaten by brown bullheads (Klarberg and Benson 1975). Young-of-the-year (YOY) consume more Chironomid larvae (71%) than do adults (38%), while adults consume more scuds (44%) than do YOY (4%) (Kline and Wood 1996). Raney and Webster (1940) reported that young of the year consume mostly Cladocera (25.0%), Diptera (24.3%), and Ostracoda (20.5%).

Brown bullheads are able to digest and utilize filamentous algae and consume large amounts (as much as 60% of their diet) of this food source (Gunn *et al.* 1977). Table 4 shows the food volume and composition found in brown bullhead stomachs by size class as reported by Klarberg and Benson (1975).

ENERGETICS AND METABOLISM

Brown bullheads are reported to consume 12.7 times their body weight in food per year (FishBase 2001). The metabolic rate of fish is usually measured by their rate of respiration

(i.e., their rate of oxygen consumption). Figure 2 shows the oxygen consumption of brown bullheads at 20° C (FishBase 2001). More detailed information and additional sources can be obtained from the FishBase website.

Table 4. Average food volumes in brown bullhead stomachs (ml/100 fish) from polluted waters in Virginia, by fish size class (from Klarberg and Benson 1975).

Food Type	River			
	I (n=22)	II (n=21)	III (n=29)	IV (n=11)
Invertebrates	35	27	12	67
Fish	0	0	0	70
Plants	0	tr	tr	77
Detritus	30	33	38	164
Sewage	0	1	1	0
Food Type	**Impoundment**			
	I (n=2)	II (n=2)	III (n=4)	IV (n=34)
Invertebrates	6	336	2	18
Fish	30	0	0	0
Plants	0	tr	86	81
Detritus	2	0	14	35
Sewage	0	0	0	0

Size classes (mm): I = 101–150, II = 151–200, III = 201–250, IV = 251+

POPULATIONS AND DEMOGRAPHY

Survivorship: Survivorship likely varies widely by water body and region. Mean annual survival was estimated at 76% and rate of exploitation at 7% for a population of brown bullheads in Clear Lake, California, with 52% and 14%, respectively, in Folsom Lake, California (McCammon and LaFlaunce 1961, Rawstrom 1967, both as cited in Carlander 1969).

Age at Maturity and Life Span: Brown bullheads reach sexual maturity their third year and live up to 8 years (Scarola 1987).

Mortality: Predation, competition, food availability, parasites, and diseases all play a part in brown bullhead mortality. Because they are taken by anglers, the mortality rate of the adult fish would also be dependent on the extent of local or regional fishing pressure.

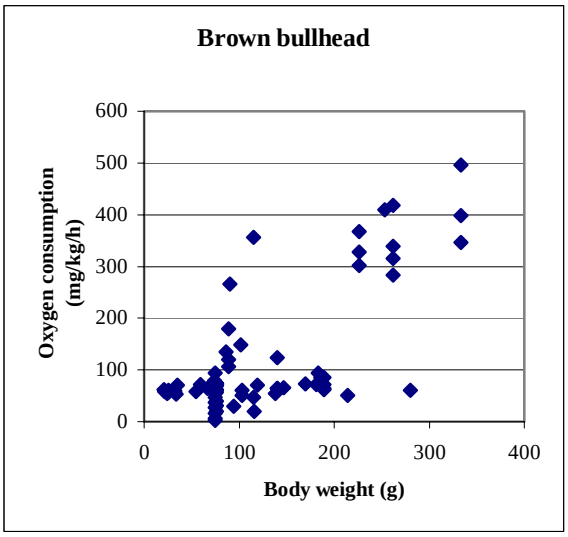


Figure 2. Metabolic rates of the brown bullhead as a function of oxygen consumption per body weight.

Enemies: Large game fish (i.e., bass, pike, pickerel, and perch), snapping turtles, water snakes, and wading birds are known to prey upon brown bullheads. Though anglers take these fish, populations are generally unexploited because of their nocturnal feeding habits. Parasitic trematodes, cestodes, copepods, and nematodes have been found in brown bullheads, though it is not clear to what extent the affect bullhead survival. The glochidia of mussels can be found in the gills, and leeches are common parasites (Adams and Hankinson 1926).

STATUS

General: The brown bullhead is common in northeast as well as on the Atlantic and Gulf slopes and is often abundant in suitable habitat (Page and Burr 1991). It has the potential to become overcrowded in certain water bodies, resulting in competition for space and food as well as undersized individuals. The overcrowding of bullheads can also negatively impact other fish species in the water body (Scarola 1987).

In The Study Area: Brown bullheads were observed and captured primarily in the lower portions of the study area from reach 5C south to Woods Pond. They breed in Woods Pond and the shallow backwaters north of Woods Pond. Figure 3 illustrates these locations.

REFERENCES

Adams, C.C., and T.L. Hankinson. 1926. The ecology and economics of Oneida Lake fish. Roosevelt Wild Life Annals, Vol. 1, No. 1-2, Syracuse University Bulletin 24(26):372-382.

Carlander, K.D. 1969. Handbook of Freshwater Fishery Biology. Vol. 1. Iowa State University Press, Ames, IA, USA.

FishBase. 2001. Key Facts on Brown Bullhead. URL http://www.fishbase.org.

Gunn, J.M., S.U. Qadri, and D.C. Mortimer. 1997. Filamentous algae as a food source for the brown bullhead. Journal of the Fisheries Research Board of Canada 34:396-401.

Klarberg, D.P., and A. Benson. 1975. Food habits of *Ictalurus nebulosus* in acid polluted water of northwest Virginia. Transactions of the American Fisheries Society 1975(3):541-547.

Kline, J.L., and B.M. Wood. 1996. Food habits and diet selectivity of the brown bullhead. Journal of Freshwater Ecology 11(2):145-151.

Loeb, H.A. 1964. Submergence of brown bullheads in bottom sediment. New York Fish and Game Journal 11(2):119-124.

McCammon, G.W., and C.M. Seely. 1961. Survival, mortality, and movement of white catfish and brown bullheads in Clear Lake, California. California Fish and Game Journal 47(3):237-255.

McClane, A.J. 1978. Freshwater Fishes of North America. Holt, Rinehart, and Winston, New York, NY, USA.

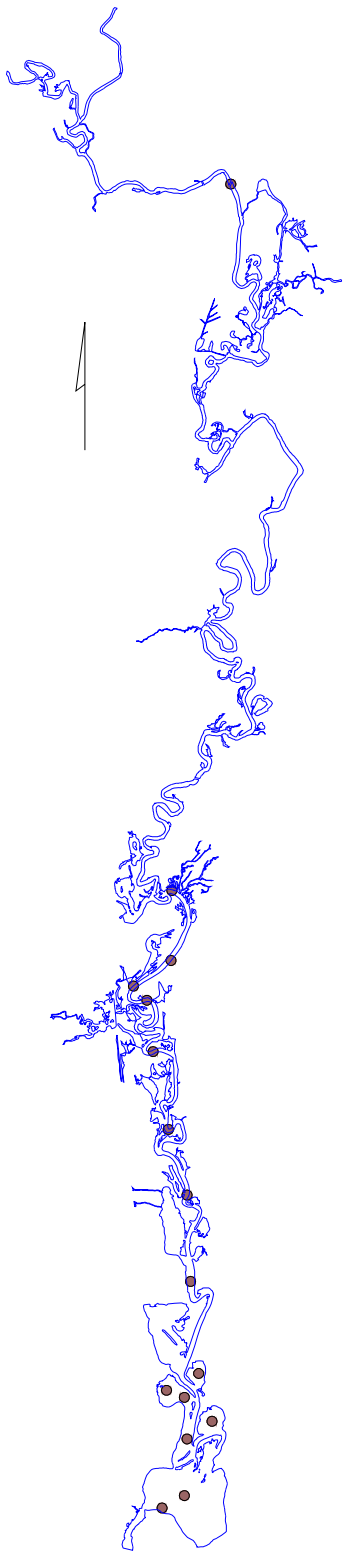


Figure 3. Brown bullhead sightings in the primary study area

Mugford, P.S. 1969. Illustrated Manual of Massachusetts Freshwater Fish. Massachusetts Division of Fisheries and Wildlife, Westborough, MA, USA.

Page, L.M., and B.M. Burr. 1991. A Field Guide to Freshwater Fishes. Houghton Mifflin Company, Boston, MA, USA.

Raney, E.C., and D.A. Webster. 1940. Food and growth of the young of the common bullhead in Cayuga Lake, New York. Transactions of the American Fisheries Society 69:205-209.

Rawstrom, R.R. 1967. Harvest, mortality, and movement of selected warmwater fishes in Folsom Lake, California. California Fish and Game Journal 53(1):40-48.

Scarola, J.F. 1987. Freshwater Fishes of New Hampshire. New Hampshire Fish and Game Department, Concord, NH, USA.

Common Moorhen

Gallinula chloropus

DESCRIPTION

The common moorhen is a secretive, duck-like bird inhabiting shallow, freshwater marshes. Its head and neck are black, the back is brownish, and the underparts are a slate gray. During the breeding season, the common moorhen can be identified by its yellow tipped red bill and a red frontal shield (National Geographic 1999). Outside of the breeding season the bill and facial shield are brownish in color. White streaking on its flank distinguishes the moorhen from the similar American coot (*Fulica americana*).

BODY SIZE

The average body length for the common moorhen ranges from 12 – 14 inches with males larger than females (Forbush 1925, National Geographic 1999, Massachusetts Division of Fisheries and Wildlife 2000, Connecticut Department of Environmental Protection 2000). Body weight is approximately 14 oz (Forbush 1925).

In The Primary Study Area: No common moorhens were captured or collected in the Housatonic study area, and no site-specific or regional body size data were found.

DISTRIBUTION

The common moorhen breeds from New England south along the Atlantic seaboard and Gulf of Mexico north to the Great Lakes (Figure 1). During the winter, moorhens occur along the Atlantic coast from South Carolina west along the Gulf Coast and south into Mexico (DeGraaf and Yamasaki 2001). Common moorhens that breed in the northeast typically winter along the Gulf Coast (American Ornithologists' Union 1983, as cited in Kibbe 1985).

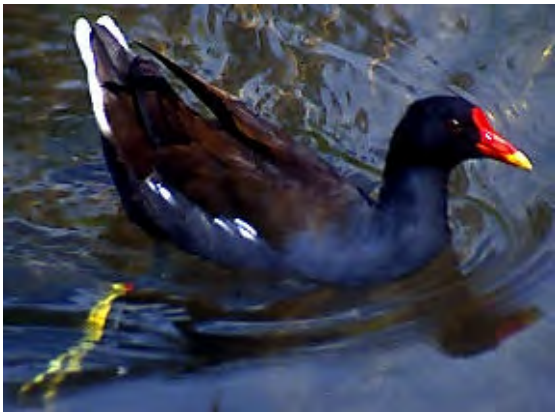


Figure 1. Range of common moorhen in North America

MIGRATION

Southern migration of the common moorhen from New England occurs during September and October, and northern breeding migration occurs during April and May (Forbush 1925, Bent 1926, Kibbe 1985, Connecticut Department of Environmental Protection 2000).

HABITAT

The common moorhen inhabits shallow, freshwater and brackish marshes that support dense emergent vegetation interspersed with areas of open water. Breeding success in this

species is closely tied to emergent cover, with the greatest success occurring in marshes with at least 50 percent cover of emergent vegetation (Post and Seals 2000). Habitats utilized by the moorhen include the margins of lakes, ponds, slow-flowing rivers and streams, and sewage treatment lagoons (DeGraaf and Yamasaki 2001). In New England, the common moorhen preferentially uses shallow, freshwater marshes, but it will also use deep marshes, ponds, lakes, and estuary/salt marshes (DeGraaf and Yamasaki 2001).

Habitats utilized by the common moorhen typically support emergent vegetation such as cattails (*Typha* spp.), bulrushes, sedges (Cyperaceae), reeds (*Phragmites* sp.), and bur-reeds (*Sparganium* spp.) growing in water at least 12 inches deep and interspersed with areas of open water (Strohmeyer 1977, as cited in DeGraaf and Yamasaki 2001). In New England where the common moorhen is at the northern extreme of its breeding range and populations are relatively small, suitable habitat may not be occupied. For example, in Vermont the common moorhen is found almost exclusively within wetlands bordering Lake Champlain, even though nesting habitat is available in other locations (Kibbe 1985).

Nests are typically built close to (i.e., within 1.5 ft) or over water that is 1 – 3 ft deep (Bent 1926, Connecticut Department of Environmental Protection 2000, DeGraaf and Yamasaki 2001). The nest is a cup constructed of dead plants and placed on a hummock or dead emergent vegetation such as cattails or pickerelweed (*Pontederia cordata*), with a ramp leading to the water (Bent 1926, Forbush 1925, Kibbe 1985, Ehrlich *et al.* 1988, Post and Seals 2000). Occasionally, moorhens will construct their nests in shrubs such as willow (*Salix* spp.) or alders (*Alnus* spp.) growing adjacent to the water (Bent 1926, DeGraaf and Yamasaki 2001). They also will construct several other nests within their territory where the adults brood the young following hatching (Forbush 1925).

In The Primary Study Area: Table 1 contains a summary of the literature review and observational data on the use by common moorhens of the natural community types found within the primary study area. Common Moorhens were repeatedly observed in the primary study area in 1998 and 1999. Some individuals responded to playback surveys in June and July 1998 while others

Table 1. Habitat use by common moorhens in the primary study area

Habitat Codes and Natural Community Classifications																						
Wetland Habitats													Terrestrial Habitats									
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES		
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development		
B	B							B	B	B												

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

were observed during the course of concurrent investigations. The responses elicited by moorhens during the playback survey indicate that moorhens were territorial and likely nesting within the study area. However, no moorhen broods were observed in either year.

HOME RANGE AND TERRITORIALITY

Very little information is available on the home range and territoriality of this species. The literature indicates that both the male and female, and later the young, participate in territorial defense, but specific reference to territory size was not reported (Kibbe 1985, Ehrlich *et al.* 1988). Other sources also indicate that common moorhen will sometimes nest in small colonies (Connecticut Department of Environmental Protection 2000).

BREEDING

The common moorhen returns to New England to breed during April and May. Pairing and courtship in this species begin during migration prior to arrival on the breeding grounds (Kibbe 1985). Once a breeding territory is established, both the male and female participate in territorial defense and nest construction (Kibbe 1985, Connecticut Department of Environmental Protection 2000). Nesting begins in May and continues through June in both Massachusetts and Vermont (Kibbe 1985, Massachusetts Division of Fisheries and Wildlife 2000). Egg dates in Massachusetts range from 22 May to 17 July and in New York from 9 May to 5 July (Bent 1926, Viet and Petersen 1993). Females lay between 6 – 17 eggs per clutch, with younger birds nesting later and laying smaller clutches (Forbush 1925, Bent 1926, Ehrlich *et al.* 1988, Massachusetts Division of Fisheries and Wildlife 2000). Reported average clutch size is highly variable and ranges from 7 – 12 (Bent 1926, Ehrlich *et al.* 1988, Post and Seals 2000, DeGraaf and Yamasaki 2001). Large clutches may be the result of intra-specific brood parasitism, which occurred in approximately 18 percent of the nests in one study in South Carolina (Post and Seals 2000).

Eggs are laid over several days with one or two days between the laying of each egg (Bent 1926). Both the male and female incubate the eggs, and incubation begins about the time the fifth egg is laid (Bent 1926, Kibbe 1985, Ehrlich *et al.* 1988, Massachusetts Division of Fisheries and Wildlife 2000). The incubation period lasts from 18 – 22 days with an average length of 21 days (Bent 1926, Kibbe 1985, Massachusetts Division of Fisheries and Wildlife 2000, DeGraaf and Yamasaki 2001). The eggs hatch asynchronously and the female continues to incubate the remaining eggs, while the male cares for the chicks until incubation is completed (Massachusetts Division of Fisheries and Wildlife 2000). Common moorhens, particularly in the southern part of their breeding range, may raise two or more broods per breeding seasons, with young of the first brood helping to care for subsequent broods (Ehrlich *et al.* 1988, Bannor 1998 as cited in Post and Seals 2000, DeGraaf and Yamasaki 2001).

GROWTH AND DEVELOPMENT

Young common moorhen are precocial and are able to leave the nest almost immediately after hatching. Both adults continue to brood the young after the chicks leave the nest (Forbush 1925, Kibbe 1985). The young are able to feed independently by three weeks of age and are able to fly at 6 – 7 weeks, but remain dependent upon the parents for several more weeks (Massachusetts Division of Fisheries and Wildlife 2000). Full growth is reached at about 10 weeks of age (Strohmeyer 1977 as cited in Kibbe 1985).

MOLTING

Young birds maintain their juvenile plumage through the fall and undergo gradual changes toward adult plumage. By December, the juveniles closely resemble the adults, but the first postnuptial molt does not occur until the summer following hatching when birds are at least a year old (Bent 1926). As adults,

common moorhens undergo a complete postnuptial molt in the late summer and a very limited prenuptial molt in the spring (Bent 1926).

FOOD HABITS AND DIET

The common moorhen eats a variety plant material and animal prey including the leaves, roots, and stems of underwater plants, duckweed (*Lemna* spp.), the leaves of terrestrial grasses and forbs, seeds, berries, fruit, mollusks (e.g., snails), insects (e.g., grasshoppers, locusts), and worms (Bent 1926, Forbush 1925, Ehrlich *et al.* 1988, DeGraaf and Yamasaki 2001). In a study conducted in Porto Rico, over 90% of the moorhen's diet consisted of grass and rootlets, 6% seeds of terrestrial grasses and weeds, and about 3% insects and mollusks (Wetmore 1916, as cited in Bent 1926).

ENERGETICS AND METABOLISM

No information on energetics or metabolism was found during a search of the literature.

POPULATIONS AND DEMOGRAPHY

Survivorship: Common moorhens have been reported to have high nesting, hatching, and fledging success (Byrd and Zeillemaker 1981, as cited in Kibbe 1985). In one study conducted in an impounded freshwater marsh in South Carolina, an average of 68% of the common moorhen nests fledged at least one chick (range = 28 – 91%) (Post and Seals 2000). However, it is suspected that nesting success is lower in Vermont (Kibbe 1985). No information on recruitment to the breeding population was located during a search of the literature.

Age at Maturity and Life Span: Information on the age of this species at sexual maturity was not found in the existing literature, but is assumed to be 1 – 2 given that adult plumage is attained the summer after hatching. Based on banding data, the life span of the common moorhen is approximately 5 – 6 years of age (Connecticut Department of Environmental Protection 2000).

Mortality: In some parts of its range, the common moorhen is legally hunted, but in other areas, including much of New England, hunting seasons have been closed because local populations of this species are considered too small to withstand hunting pressures (Kibbe 1985, Connecticut Department of Environmental Protection 2000). In Massachusetts, the hunting season on the common moorhen was closed in 1985, even though historical hunting pressure was light (Massachusetts Division of Fisheries and Wildlife 2000).

Enemies: Common moorhens are most likely susceptible to a variety of predators including mammals, particularly mink (*Mustela vison*), raccoons (*Procyon lotor)*, raptors, and reptiles, particularly during the nesting season. The available literature, however, documented only losses to snakes (e.g., yellow rat snake (*Elaphe obsoleta*) (Post and Seals 2000).

STATUS

General: The common moorhen is an uncommon to local breeder and migrant in New England and is rare during the winter (DeGraaf and Yamasaki 2001). Scattered, localized breeding has been confirmed throughout Massachusetts, with the current breeding population estimated between 11 – 20 pairs (Veit and Petersen 1993, Massachusetts Division of Fisheries and Wildlife 2000, Gulo 2001).

In Maine and Massachusetts, the moorhen is listed as a Species of Special Concern, and in Connecticut, it is listed as Endangered (Connecticut Department of Environmental Protection 2000, Massachusetts Division of Fisheries and Wildlife 2000, DeGraaf and Yamasaki 2001). In the remainder of New England, the moorhen is not formally listed, but its populations are tracked by state agencies and heritage programs (DeGraaf and Yamasaki 2001).

In New England, the common moorhen is at the northern limit of its breeding range and the limit of its climatic tolerance (Kibbe 1985). In Vermont, this species has been considered rare and local since the 1800s, whereas in Connecticut it was considered a common summer resident during the late 1800s and early 1900s, but is now only a rare summer visitor (Allen 1909, as cited in Kibbe 1985, Connecticut Department of Environmental Protection 2000). Declines in Massachusetts, Connecticut, and other parts of its range have been attributed to loss or degradation of emergent wetland habitats (Connecticut Department of Environmental Protection 2000, Massachusetts Division of Fisheries and Wildlife 2000, DeGraaf and Yamasaki 2001).

In The Primary Study Area: Breeding pairs of common moorhens have been confirmed in the Pittsfield area (Gulo 2001). Moorhen sightings during the field surveys of 1998 – 2000 were generally limited to the lower mile of the study area, typically at the north end of Woods Pond and the adjacent upstream backwaters (Figure 2).

REFERENCES

Allen, F.H. 1909. Fauna of New England: Aves. Vol. 7 of Occasional Papers of the Boston Society of Natural History. Boston Society of Natural History, Boston, MA, USA.

American Ornithologists' Union. 1983. Checklist of North American Birds. Sixth ed. Allen Press, Lawrence, KS, USA.

Bannor, B.K. 1998. Common moorhens in Dade County, Florida, raise five broods in one year. Florida Field Naturalist 26:24.

Bent, A.C. 1926. Life Histories of North American Marsh Birds. Dover Publications, Inc., New York, NY, USA.

Byrd, G.V., and C.F. Zeillemaker. 1981. Ecology of nesting Hawaiian common gallinules at Hanaki, Hawaii. Western Birds 12(3):105-116.

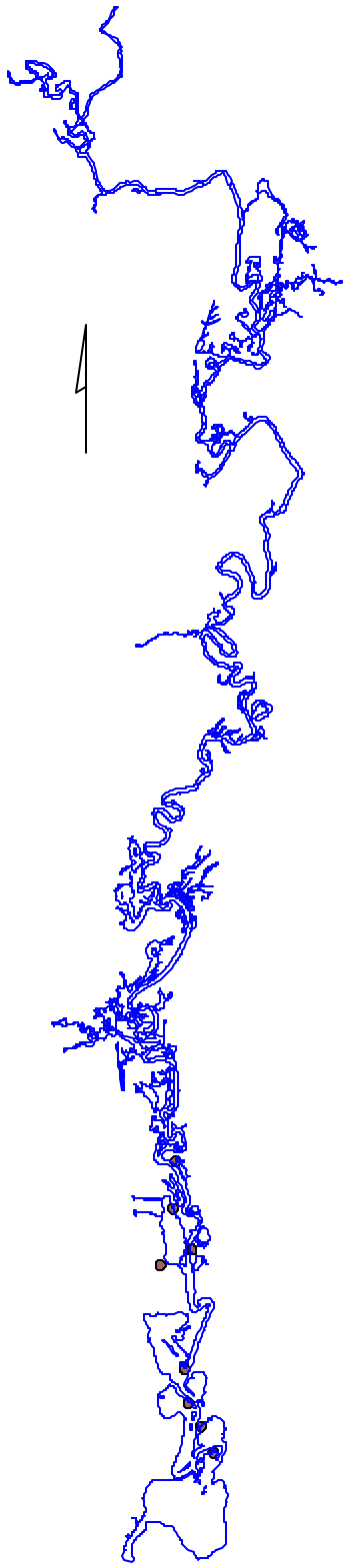


Figure 2. Common moorhen sightings in the primary study area

Connecticut Department of Environmental Protection. 2000. Wildlife in Connecticut: Endangered and Threatened Species Series, Common Moorhen (*Gallinula chloropus*). URL http://dep.state.ct.us/burnatr/wildlife/factshts/cmoorhen.htm.

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH, USA.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon and Schuster, New York, NY, USA.

Forbush, E.H. 1925. Birds of Massachusetts and Other New England States. Vol. 1. Massachusetts Department of Agriculture, Commonwealth of Massachusetts, MA, USA.

Gulo, T. 2001. Massachusetts Division of Fisheries and Wildlife. Personal Communication to Woodlot Alternatives, Inc.

Kibbe, D.P. 1985. Common Moorhen (*Gallinula chloropus*). p. 100-101. *In* S.B. Laughlin and D.P. Kibbe (ed.) The Atlas of Breeding Birds of Vermont. University Press of New England, Hanover, USA.

Massachusetts Division of Fisheries and Wildlife. 2000. Natural Heritage and Endangered Species Program. Westborough, MA. URL http:/www.state.ma.us/dfwele/dfw/nhesp/.

National Geographic Society. 1999. Field Guide to the Birds of North America. 3rd ed. National Geographic Society, Washington, DC, USA.

Post, W., and C.A. Seals. 2000. Breeding biology of the common moorhen in an impounded cattail marsh. Journal of Field Ornithology 71(3):437-442.

Strohmeyer, D.L. 1977. Common gallinule (*Gallinula chloropus*). In G.C. Sanderson (ed.) Management of Migratory and Upland Game Birds in North America. International Association of Fish and Wildlife Agencies, Washington, D.C. 358pp.

Veit, R.R., and W.R. Peterson. 1993. Birds of Massachusetts. Massachusetts Audubon Society, Lincoln, MA, USA.

Wetmore, A. 1916. Birds of Porto Rico. US Department of Agriculture, Bulletin No. 326.

Great Blue Heron

Ardea herodias

DESCRIPTION

The great blue heron is one of the largest and most widespread wading bird in North America. It is one of two subspecies recognized on the continent, the second one being the great white heron (*Ardea occidentalis*) of Florida. The white herons freely interbreed with blue herons, producing an intermediate form called Würdemann's heron of the Florida Keys (Butler 1992). This account will focus on *A. herodias*, the only subspecies that occurs in the Housatonic study area.

BODY SIZE

The adult great blue heron is a large bird, standing up to 60 cm tall or more and measuring 97 to 137 cm long. Adults weigh between 2.1 and 2.5 kg. The wings are long and broad, and the tail short. In flight, the long neck is doubled back in an S-shape and the head rests against the shoulders. The legs and bill are also long (Tufts 1986, Butler 1992).

In The Primary Study Area: No great blue herons were captured or collected in the Housatonic study area, and no site-specific or regional body size data were found.

DISTRIBUTION

The breeding range of the great blue heron is extensive, ranging from the southern Canadian provinces to southern Mexico (Figure 1). Wintering and permanent range includes southeastern Massachusetts south along the coastal states and west across the south half of the U.S. into Mexico and northern South America. Depending on weather severity, a small number may spend the winter (or a portion of it) near unfrozen rivers and tidal wetlands of New England. In Massachusetts, wintering great blue herons are largely limited to outer Cape Cod and Nantucket (Laughlin and Kibbe 1985, Butler 1992, DeGraaf and Yamasaki 2001).

Photo by: Scott Robinson

Figure 1. Range of the great blue heron in North America

MIGRATION

Most great blue herons breeding in the northern regions of the range, including the Housatonic study area, migrate southward in winter and northward in summer. Southward migration from northern portions of the breeding range begins in September and October, though some birds are recorded annually in Canada in December. Herons begin returning to the New England region in mid-

March. Overall, migration chronology is not well understood, and little information is available on migration routes or migratory behavior. They most likely winter along ice-free rivers and coastal areas, though banding studies suggest many may winter in the Caribbean. Great blue herons usually migrate alone or in small groups, but also occasionally in larger flocks of up to 100 (Palmer 1962, Butler 1992, DeGraaf and Yamasaki 2001).

HABITAT

In the breeding season, great blue herons inhabit many different wetland community types. They feed primarily in shoreline areas associated with lakes, ponds, beaver flowages, slow-moving freshwater streams, and estuaries, though they are occasionally found in shallow coastal marine habitats and fields. Great blue herons typically nest in tall trees near water, but may also build nests on the ground, on rock ledges and sea cliffs, or in shrubs when trees are not available. They are typically colonial nesters but may also be solitary. The nest sites are often located on islands or in swamps, presumably to avoid land predators. Some nest sites are located far from food sources.

In New England, great blue herons prefer nesting near inland freshwater habitats rather than salt water (Butler 1992, DeGraaf and Yamasaki 2001).

In The Primary Study Area: Table 1 contains a summary of the literature review and observational data on the use by great blue herons of the natural community types found within the primary study area.

Little information is available on the habitat use of great blue herons on the winter range. Along the east coast, they prefer salt marshes and other coastal marine habitats. In Okalahoma, they appear to prefer natural wetlands and riverbanks over farm ponds. In the coastal northwest (British Columbia), the females and juveniles feed in estuaries and nearby grasslands, while the males set up territories along riverbanks. Habitat use by great blue herons during spring and fall migrations is probably similar to that of the breeding season (Butler 1992).

HOME RANGE AND TERRITORIALITY

Results of studies from the midwestern and western states show that mean distances from nesting

Table 1. Habitat use by great blue herons in the Housatonic study area

Habitat Codes and Natural Community Classifications																			
Wetland Habitats												Terrestrial Habitats							
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
	B	B	B	B	B	B	B	B	B	B	B	B								

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

colonies to principal foraging grounds ranged from 2.3 to 6.5 km. Some breeding adults range as much as 30 km from the colony, but most stay much closer. Little is known about home range sizes outside the breeding season (Butler 1992).

Great blue herons can be territorial or nonterritorial, depending on age, sex, or time of year. Defense is by threats, displays, or chasing. Adult females and juveniles are not territorial at feeding areas during winter. Adult males defend feeding territories year round, females mostly during nesting season. Breeding pairs defend the immediate vicinity of their nest (i.e., where they can reach with their bills without leaving the nest). Feeding territory sizes are variable, probably dependent on the quality of the habitat in regard to forage type and availability. Shoreline territories in feeding areas in an Oregon estuary (n = 32) had a mean shoreline length of 355 m (SD = 168) and a mean area of 8.4 ha (SD = 5.4). Territories in a freshwater marsh (n = 7) had a mean shoreline length of 129 m (SD = 28) and a mean area of 0.6 ha (SD = 0.1). Nonterritorial herons from neighboring colonies have overlapping foraging grounds. Great blue herons forage and roost alone or in loose flocks (Butler 1992).

BREEDING

Great blue herons are primarily colonial nesters. The communal nest sites are often called rookeries. Great blue heron colonies sometimes share nest sites with other colonial species such as the black-crowned night heron (*Nycticorax nycticorax*) and the double-crested cormorant (*Phalacrocorax auritis*), in which case the great blue herons take possession of the tops of trees (Canadian Wildlife Service 1990).

Great blue herons are mostly monogamous, but choose new mates each year. Males arrive at the nests first, and pair formation follows elaborate courtship displays. Nests are usually located in the upper portions of tall trees (up to 130 feet), and are constructed of branches and lined with vegetation (i.e., pine needles, grass, moss, leaves). Both coniferous and deciduous trees are utilized for nest sites. Site selection for the nest colony is most likely based on distribution of foraging habitats, but may also be influenced by protection from mammalian predators. Individual nests can be closely spaced within the colony, often several in the same tree. Old nests may be repaired for use each season, though nest-site fidelity is weak year to year. Older nests are generally larger than new ones because they are continually added to. Some colonies are used for decades (Butler 1992). Colonies can contain up to 2000 birds, but more commonly contain dozens to a few hundred.

Clutch size varies from 3 to 7 eggs, but 4 is typical (DeGraaf and Yamasaki 2001). Great blue herons produce one clutch per year. Eggs are laid in intervals of about 2 days. Typical fresh weight of eggs is about 65 – 75 g. Both males and females take part in incubation. The incubation period is about 27 days. Adults throw eggshells out of nest soon after hatching.

GROWTH AND DEVELOPMENT

Newly-hatched great blue herons in two Nova Scotia colonies had mean weights of 49.3 g (SD = 3.2, n = 5) and 51.8 g (SD = 7.1, n = 39) (Quinney and Smith 1979, as cited in Butler 1992). Quinney (1982, as cited in Butler 1992) reported that the first chicks to hatch in a clutch grow faster than the last to hatch. Mass increase is nearly linear for first 30 days, and by day 45 chicks can weigh about 86% of the adult weight. Growth over the entire nestling period is best explained by logistic growth curve. Brood reduction is common in the nests, caused by aggression and competition for food among nestlings. The age of the fledglings' first flights ranges from about 50 to 60 days. Fledglings leave the nest between 60 and 91 days after hatching, depending on the hatching order and the date nesting began (i.e., chicks from late nesters leave in a shorter number of days) (Butler 1992, DeGraaf and Yamasaki 2001).

FOOD HABITS AND DIET

The diet of the great blue heron consists primarily of fish, but also amphibians, reptiles, insects, crustaceans, and sometimes small mammals and birds. They hunt by wading through or waiting in shallow water. They also hunt rodents in upland fields, especially in winter. Great blue herons hunt

night and day, and are reported to have good night vision. Prey is located by sight, caught by a rapid forward thrust of the neck, and held in the bill before ingestion. Prey is usually swallowed whole. Some fish are taken ashore, speared with the bill and shaken before being swallowed. Information on fish prey size is limited, though a range of 5 – 30 cm and occasionally larger has been reported. Some herons choke to death on large food items (Butler 1992, DeGraaf and Yamasaki 2001).

Butler (1991, as cited in Butler 1992) listed estimated mean (± SE) intake of metabolized energy per day by individual herons feeding on small fish: egg laying stage = 1,163 kJ (± 555); incubation = 1,197 kJ (± 194); small chicks = 4,264 kJ (± 764); and large chicks = 1,598 kJ (± 151).

POPULATIONS AND DEMOGRAPHY

Survivorship and Mortality: Survivorship varies regionally. Estimates from band recovery data indicate mortality is about 69% the first year, 36% the second year, and 22% in subsequent years. Documented factors contributing to great blue heron mortality include disease, predation (mostly of the young), winter kill, illegal shooting, choking, and possibly high levels of chemical contamination. The young are vulnerable to predation, disease, inclement weather, starvation, and falls from the nest (both accidental and sibling-caused). The effects of egg shell thinning caused by pesticides and other chemicals has been a suspected cause of reproductive failure, though there is no clear evidence of its adverse effects (Butler 1992).

Age at Maturity and Life Span: The age at first breeding is apparently 22 months (i.e., the second spring). The oldest banded great blue heron was 23 years old, though the average life span is not well known (Butler 1992). One account indicates they live as long as 17 years in the wild (Canadian Wildlife Service 1990).

Enemies: Adult great blue herons have few natural enemies. They are occasionally preyed upon or attacked by hawks and owls, but predation is not a limiting factor on their populations (Canadian Wildlife Service 1990). The eggs and young can be heavily preyed upon in the nest by crows, ravens, hawks, owls, gulls, and raccoons. Great blue herons are known to carry the parasitic nemetode *Eustrongylides ignotus*, which can kill herons. *Giardia* has been documented in a great blue heron from New York. (Butler 1992)

STATUS

General: The great blue heron is considered to be a relatively common and increasing breeder in New England (Laughlin and Kibbe 1985, DeGraaf and Yamasaki 2001). Suitable nesting sites and an abundant food supply (related to the area of suitable, nearby wetlands) may be limiting factors in the local or regional population size.

Historically, populations have been adversely affected by shooting and egg collecting, as well as the extensive loss of wetland habitat in the U.S. within the last century (Bent 1926, Laughlin and Kibbe 1985, Butler 1992, DeGraaf and Yamasaki 2001). Changing attitudes and the regulation of wetland losses of recent years has allowed great blue heron populations to recover and stabilize throughout much of its range, though the potential for human-caused declines still exists. The great blue heron is currently not a listed species in Massachusetts or other New England States.

Great blue herons are particularly susceptible to disturbance while nesting. Though response varies among sites and relative to the stage of nesting, nest site and colony abandonment can occur as a result of human activities (e.g., logging, development) within 0.5 km. Some colonies or members of a colony can be easily disturbed early in the nesting season, and may even move or abandon the nest when people approach on foot to within a few hundred meters (Butler 1992).

In The Primary Study Area: Great blue herons were commonly seen during the 1998 – 2000 field surveys in the primary study area, stalking prey along the river edge or in backwater areas (Figure 2). As of 2000, there was an active rookery in a large freshwater marsh located approximately 1.5 miles west of the primary study area, adjacent to

the Pittsfield Municipal Airport. There were at least 10 – 12 active nests in snags over open water. It is not known if the herons seen in the study area are residents of this breeding colony.

REFERENCES

Bent, A.C. 1926. Life Histories of North American Marsh Birds. Dover Publications, Inc., New York, NY, USA.

Butler, R.W. 1991. Habitat selection and time of breeding in the great blue heron (*Ardea herodias*). Ph.D. Dissertation. University of British Columbia, Vancouver, Canada.

Butler, R.W. 1992. Great Blue Heron (*Ardea herodias*). p. 1-19. *In* A. Poole, P. Stettenheim and F. Gill (ed.) The Birds of North America, No. 25. The Birds of North America, Inc., Philadelphia, PA, USA.

Canadian Wildlife Service. 1990. Hinterland Who's Who: Great Blue Heron. URL http://www.cws-scf.ec.gc.ca/hww-fap/heron/heron.html.

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH.

Laughlin, S.B., and D.P. Kibbe. 1985. The Atlas of Breeding Birds of Vermont. University Press of New England, Hanover, NH, USA.

Palmer, R.S. 1962. Handbook of North American Birds. Vol. 1. Yale University Press, New Haven, CT, USA.

Quinney, T.E. 1982. Growth, diet, and mortality of nestling great blue herons. Wilson Bulletin 94:571-577.

Quinney, T.E., and P.C. Smith. 1979. Reproductive success, growth of nestlings and foraging behaviour of the great blue heron (*Ardea herodias herodias* L.). Canadian Wildlife Service Contract Report No. KL229-5-7077, Ottawa, Canada.

Tufts, R.W. 1986. Birds of Nova Scotia. 3rd ed. Nimbus Publishing Limited and The Nova Scotia Museum, Halifax, Nova Scotia, Canada.

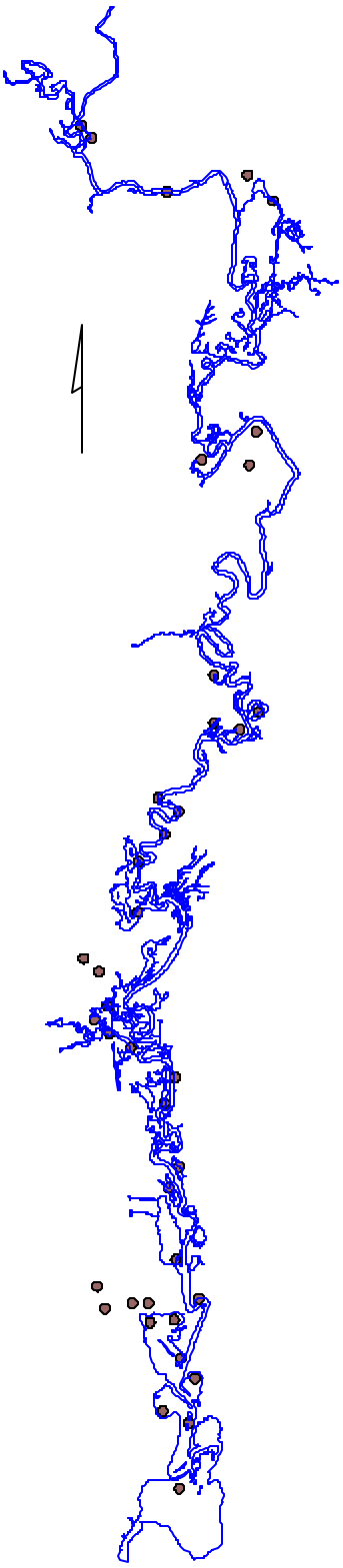


Figure 2. Great blue heron sightings in the primary study area, from 1998 – 2000 field studies

Belted Kingfisher

Ceryle alcyon (formerly *Megaceryle alcyon*)

DESCRIPTION

The belted kingfisher is a pigeon-sized member of the Alcedinidae family found throughout much of the United States and Canada. This piscivorous bird has a stocky body, heavy bill, and a large head with a double-pointed crest. Both the male and female are blue-gray on the back and head with a white collar around the neck and white underparts. Males have a single blue-gray band across the chest and females have a blue-gray pectoral band with a rufous band across the lower breast and rufous sides (Hamas 1994).

BODY SIZE

Belted kingfishers display little if any sexual dimorphism in size. Some researchers report that females tend to be slightly larger than males; however, other sources state that either member of a breeding pair may be larger than its mate (Salyer and Lagler 1946, Hamas 1994). Body length, as measured from the tip of the bill to the tip of the tail, is approximately 33 cm (National Geographic Society 1999). Average body weights of male and female kingfisher during the spring in Minnesota were 143.6 g (n = 8, range 138 – 150 g) for males and 151.6 g (n = 6, range 138 – 169 g) for females (Hamas 1994). During fall migration, body weights have been reported to range from 125 to 215 g (Muray and Jehl 1964, and Dunning 1993 as cited in Hamas 1994).

DISTRIBUTION

During the breeding season, belted kingfisher occur throughout much of the United States and Canada (Figure 1) excluding high elevation areas (>9,000 feet) of the Rocky Mountains and the northern most regions of Alaska and Canada (Hamas 1994, DeGraaf and Yamasaki 2001). Kingfishers do occur in xeric regions such as the central grasslands during the breeding season, but populations are limited and breeding is localized (Hamas 1994).

Figure 1. Range of belted kingfisher in North America

The southern limit of the belted kingfisher's range closely coincides with the northern limit of the ringed kingfisher's range (*Ceryle torquata*) (Hamas 1994).

MIGRATION

Belted kingfishers overwinter throughout much of their breeding range, although they do migrate from most of Canada and the northern tier of the United States. Migration from northern regions is dependent upon the severity of the winter and individuals may remain in these areas provided ice-free conditions persist. Migrating belted kingfisher may travel as far south as northern South America (Hamas 1994). Southern migration of the belted

kingfisher from Canada and the northern United States begins by mid-September and continues throughout November (Hamas 1994). Belted kingfishers migrate from these northern regions where ice accumulation limits food availability. However, some individuals remain near open water areas throughout much of New England including Connecticut, Rhode Island, Massachusetts, coastal New Hampshire, and Vermont (Ellison 1985, Veit and Petersen 1993, and DeGraaf and Yamasaki 2001). In Vermont, for example, a few males remain behind in ice-free areas to maintain previously established territories (Ellison 1985). The northern breeding migration occurs during late March and early April for much of northern New England, including New Hampshire, Massachusetts, and Vermont (Hamas 1994).

HABITAT

Habitat use by belted kingfisher during both the breeding and non-breeding season is dependent upon the availability of clear water bodies for foraging (Hamas 1994). Belted kingfisher will use a variety of freshwater and coastal habitats, provided prey is available, including ponds, lakes, rivers, streams, reservoirs, large vernal pools, estuaries, and harbors (DeGraaf and Yamasaki 2001). Despite their apparent indiscriminate use of aquatic habitats, kingfisher prefer calm, clear waters that are free of dense mats of aquatic plants or floating debris. Aquatic plants, floating debris, or silt stirred up by heavy rains or wave action can hamper foraging by obscuring visibility. When foraging on large lakes or coastal waters, belted kingfisher select sheltered locations where wave action is limited (Hamas 1994). Salyer and Lagler (1946) found that kingfisher preferentially selected smaller lakes over larger water bodies where turbidity affected visibility. When foraging in stream habitats, belted kingfisher appear to select territories where there is a greater concentration of riffles as opposed to pools (Davis 1982). Researchers found that riffle habitats contained a greater number fish, the principal prey of the belted kingfisher, and that the kingfisher appeared to use the presence of riffles as a guide to habitat quality.

Kingfishers also require foraging perches along these water bodies from which they can hunt. Foraging perches include bare, projecting branches, telephone wires, or pier pilings (Hamas 1994). In New England during both the breeding and non-breeding seasons, belted kingfisher will forage at pond, lake, stream, river, riparian, estuary/salt marsh, and coastal beach habitats (DeGraaf and Yamasaki 2001).

During the breeding season, the availability of nesting locations, principally earthen banks, will limit belted kingfisher populations (Ellison 1985). For example, Davis (1982) found that of 24 available nesting banks within his study area, 13 banks were utilized by breeding pairs of belted kingfisher, six banks were unsuitable because of substrate composition or human activity, and the remaining five were unused because of competitive exclusion by other nesting pairs. Kingfisher preferentially select nesting sites located near their foraging territory, but nest sites can be up to a mile from the feeding territory (DeGraaf and Yamasaki 2001). Along streams, nest site selection may be the overriding factor that determines territory location (Brooks and Davis 1987 as cited in Hamas 1994).

Kingfisher nests are typically excavated burrows located in earthen banks. Earthen banks chosen for nest sites often lack vegetative cover, particularly woody vegetation, because roots interfere with excavation (Brooks and Davis 1987, as cited in Hamas 1994). Suitable bank substrates include sandy clay soil and soils with high sand (>75 percent) and low clay (<7%) content (Cornwell 1963 as cited in Hamas 1994, Brooks and Davis 1987 as cited in DeGraaf and Yamasaki 2001). Banks with a high content of clay, gravel, or rock often are unsuitable for nest construction because birds are unable to excavate burrows in these substrates. Burrows may be located in a streambank or riverbank or along a ditch, road cut, landfill, or sand/gravel pit (Hamas 1994). Other less typical sites include sand dunes, sawdust piles, dredge spoils, mud slides created by beaver activity, furrows in a plowed field, and holes in dead trees or tree stumps.

Little is known about the roosting requirements of this species. Published information indicates that

belted kingfisher will roost in both coniferous and deciduous trees (Hoyte 1961 as cited in Hamas 1994). More specifically birds may selectively roost at the tip of small branches that would not support the weight of potential predators (Brewster 1937, as cited in Hamas 1994).

In The Primary Study Area: Table 1 contains a summary of the literature review and observational data on the use by belted kingfishers of the natural community types found within the primary study area.

HOME RANGE AND TERRITORIALITY

Belted kingfishers are solitary except during the breeding season when pairs form monogamous bonds (Hamas 1994). Males first establish breeding territories as a means of attracting a mate. Once a pair bond is formed, both the male and female aggressively defend their territory. During the breeding season, nest site protection seems to be the primary reason for territoriality with the security of the foraging site secondary.

Researchers have found that the size of the breeding territory and fledging success (i.e., fledgling/nest) appear to be related to the concentration of prey (g/m) and that the smallest territories typically include the richest sources of food (Davis 1982). The size of breeding territories expressed as miles of shoreline ranges from 0.5 – 1.36 miles (Salyer and Lagler 1946, Brooks and Davis 1987 as cited in USEPA 1993). At Lake Itasca in Minnesota, home range for a breeding pair ranged from 0.5 – 5.0 linear miles from the nest site (Cornwell 1963 as cited in Hamas 1994).

Individual belted kingfishers including young of the year, also maintain a feeding territory outside of the breeding season. Davis (1980) found that non-breeding territories are less than half as large as breeding territories. In addition, the size of non-breeding territories is inversely related to food density (Davis 1982). The size of non-breeding territories, expressed as miles of shoreline. ranges from 0.24 – 0.64 miles (Salyer and Lagler 1946, Brooks and Davis 1987 as cited in USEPA 1993).

Table 1. Habitat use by belted kingfishers in the primary study area

Habitat Codes and Natural Community Classifications																			
Wetland Habitats													Terrestrial Habitats						
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
B	B	B	B					B	B	B		B								

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

BREEDING

Belted kingfishers are seasonally monogamous, and following the formation of a pair bond both the male and female excavate a nesting burrow within their territory. Nesting burrows are occasionally reused, but kingfishers do not show a high degree of nest site fidelity (Hamas 1994). In Vermont, nest construction occurs in April and nesting begins in early May (Ellison 1985). Eggs are laid from early April to early July, but the timing of egg laying varies with geographic location (Hamas 1994). In Massachusetts, egg dates range from 14 May to 6 June (Veit and Petersen 1993). In the northern part of their range, belted kingfisher only produce one brood per year, although individuals may re-nest if their first clutch is destroyed or abandoned before mid-June (Hamas 1994). Sharpe (1868, as cited in Hamas 1994) reported that birds in the southern United States may produce two broods per year.

The first egg of a clutch is laid within a week following the completion of the nest (Hamas 1994). Successive eggs are laid over several days and incubation does not begin until the clutch is completed. Clutch size ranges from 5 – 8 with an average clutch containing 6 – 7 eggs (DeGraaf and Yamasaki 2001). Egg production is energetically costly for the female with a clutch of five to seven eggs representing from 37 – 57 percent of the female's body weight (Hamas 1994). During the 22- to 24-day incubation period, both the male and female spend time on the nest (Bent 1940 as cited in DeGraaf and Yamasaki 2001, Hamas 1994). Typically, all of the eggs within a clutch hatch within a 12 – 18 hour period (Hamas 1994). The female and occasionally the male brood the young continuously for 3 – 4 days following hatching (Hamas 1975 as cited in Hamas 1994). Brooding ceases by the time the young are 6 days old.

GROWTH AND DEVELOPMENT

At the time of hatching, the young weigh from 9 – 13 g, their eyes are closed, and they lack natal down (Hamas 1994). The chicks grow rapidly during their first 10 days (5 – 6 g/day) and reach adult weight by the time they are 16 days old, but lose some weight before fledging (Brooks and Davis 1987 as cited in USEPA 1993, Hamas 1994). For the first 3 – 4 days the adults feed the young an oily bolus of regurgitated fish, but after 5 days they young are able to consume whole fish brought to the nest by the adults. The fledglings leave the nest at about 27 – 29 days of age following complete development of their juvenal plumage. Young are able to capture live prey about a week after fledging, but are also fed sporadically by the adults for approximately 3 weeks. Fledglings may remain in their natal territory or disperse when they are capable of foraging for themselves (Hamas 1994). The literature presents conflicting information on dispersal, with one source reporting that adults drive young from the natal territory and another reporting that the adults disperse (Ehrlich *et al.* 1988, Hamas 1994).

MOLT

Young birds retain their juvenile plumage through October or November. The pre-basic molt begins in December or January and is completed by April or May (Hamas 1994). The degree to which birds undergo the pre-basic molt is variable and appears to be related to whether birds are residents or migrants. The definitive plumage molt for the belted kingfisher begins in late June or July (Hamas 1994). For residents, this molt is completed by late October or early November. For migrants, the molt is suspended in mid-September and is completed by November or December on their wintering grounds (Hamas 1994).

FOOD HABITS AND DIET

Belted kingfishers feed primarily on fish, but they also take mollusks, crustaceans, insects, amphibians, reptiles, young birds, small mammals, and some berries (Hamas 1994). The kingfisher will feed on the most readily available prey, which is dependent upon the habitat in which they are foraging. Analysis of regurgitated pellets indicates that belted kingfishers preferentially feed on those species of fish that are most abundant within shallow water (Hamas 1994). Most fish caught by kingfishers are found within 60 cm of the surface, which means they are taking fish that either swim near the surface or are located in shallow water (Hamas 1994).

Specific prey taken by belted kingfishers includes three-spined sticklebacks (*Gasterosteus aculeatus*), trout (Salmonidae), mummichogs (*Fundulus heteroclitus*), crayfish (*Cambarus* spp.), and stonerollers (*Campostoma anomalum*) (Hamas 1994). In one study conducted in Ohio, prey brought to nestlings included 37.6% stonerollers, 26.1% unidentified cyprinids, 12.7% minnows, 10.2% non-minnows, and 13.3% crayfish (Davis 1982). Fish taken by belted kingfishers typically are less than 10.2 cm long (Imhof 1962, as cited in Hamas 1994). Fish greater than 12.7 cm in length are considered too long for the kingfisher to eat (Salyer and Lagler 1946).

ENERGETICS AND METABOLISM

In captivity, a post-absorptive adult kingfisher weighing 130 g requires an average of 55 – 61 kcal per day regardless of the season (Vessel 1978, as cited in Hamas 1994). The average ingestion rate for adults is 0.50 g/g-day and the ingestion rate for nestlings has been reported to range from 1.0 – 1.75 g/g-day (White 1936, Alexander 1977, both as cited in USEPA 1993). Davis (1982) estimated that at maximum growth rate, nestling belted kingfishers could consume approximately 11.2 fish/day. A water ingestion rate for adult birds has been estimated to be 0.11 g/g-day (USEPA 1993).

POPULATIONS AND DEMOGRAPHY

Population Densities: Population densities have been reported as 1 pair per 1.8 sq. mi. in Minnesota (Cornwell 1963, as cited in DeGraaf and Yamasaki 2001). In New Brunswick, population densities of belted kingfisher were estimated to be 10 birds for every 5,250 ft of stream, and for a river in Ohio populations were estimated to be 5 pairs for every 32,810 ft of shoreline (White 1953, Brooks and Davis 1987, both as cited in Hamas 1994).

Age at Maturity and Life Span: Both male and female belted kingfishers reach sexual maturity at one year and breed the spring following hatching (Hamas 1994). No information was found in the literature on life expectancy for this species.

Mortality: Unlike other higher-level consumers, the belted kingfisher does not appear to be highly susceptible to environmental contaminants such as DDT, most likely because the small prey kingfishers eat do not accumulate high level of toxins (Hamas 1994). Neither DDT nor polychlorinated biphenyls (PCBs) appear to significantly impair the reproductive success of the belted kingfisher (Fox 1974, Heinz *et al.* 1984, both as cited in Hamas 1994). However, this species will withdraw from badly polluted waterways (Hall 1983, as cited in Ellison 1985).

Nestling mortality for belted kingfisher is generally low and chicks that die are generally lost during the first few days following hatching. In Minnesota, hatching success was approximately 87 percent and fledging success was 97 percent (Hamas 1975, as cited in Hamas 1994). Nematodes, tremetodes, and helminthes are known internal parasites (Hamas 1994). Shooting at fish hatcheries has been documented as a cause of adult mortality.

Enemies: Nest predators of the belted kingfisher include skunks (*Mephitis mephitis*), mink (*Mustela vison*), raccoons (*Procyon lotor*), and snakes. Cooper's hawk (*Accipiter cooperii*), northern harrier (*Circus cyaneus*), and other raptors are the chief predators of adults and juveniles (Hamas 1994).

STATUS

General: In New England during the breeding season, the belted kingfisher is uncommon, but widespread (DeGraaf and Yamasaki 2001). During the winter, the belted kingfisher is uncommon and its occurrence is dependent upon the severity of the winter. Based on Breeding Bird Surveys conducted between 1982 and 1992, the continental population of belted kingfishers is showing a decline of 1.1% per year, whereas prior surveys (1965 – 1979) indicated no significant long-term population trends (Hamas 1994).

In The Primary Study Area: Belted kingfishers were commonly seen in the primary study area in suitable habitats during the 1998 – 2000 field surveys. Three nests were found in the primary study area along the main stem in 1998 (Figure 2).

REFERENCES

Alexander, G.R. 1977. Food and vertebrate predators on trout waters in north central lower Michigan. Michigan Academician 10:181-195.

Bent, A.C. 1940. Life Histories of North American cuckoos, goatsuckers, hummingbirds, and their allies. United States National Museum Bulletin No. 176. Washington, DC, USA.

Brewster, W. 1937. The birds of the Lake Umbagog region of Maine, Part 3. Bulletin of the Museum of Comparative Zoology. 66:409-415.

Brooks, R.P., and W.J. Davis. 1987. Habitat selection by breeding belted kingfishers. American Midland Naturalist 117:63-70.

Cornwell, G.W. 1963. Observations on the breeding biology and behavior of a nesting population of belted kingfishers. Condor 65:426-431.

Davis, W.J. 1980. The Belted Kingfisher, *Megaceryle alcyon*: Its Ecology and Territoriality. MS Thesis. University of Cincinnati, Cincinnati, OH, USA.

Davis, W.J. 1982. Territory size in *Megaceryle alcyon* along a stream habitat. Auk 99(2):353-362.

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH, USA.

Dunning, J.C., Jr. 1993. CRC Handbook of Avian Body Masses. CRC Press, Boca Raton, FL, USA.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon and Schuster, New York, NY, USA.

Ellison, W.G. 1985. Belted Kingfisher, *Ceryle alcyon*. p. 152-153. *In* S.B. Laughlin and D.P. Kible (ed.) The Atlas of Breeding Birds of Vermont. University Press of New England, Hanover.

Fox, G.A. 1974. Changes in eggshell quality of belted kingfishers nesting in Ontario. Canadian Field Naturalist 88:358-359.

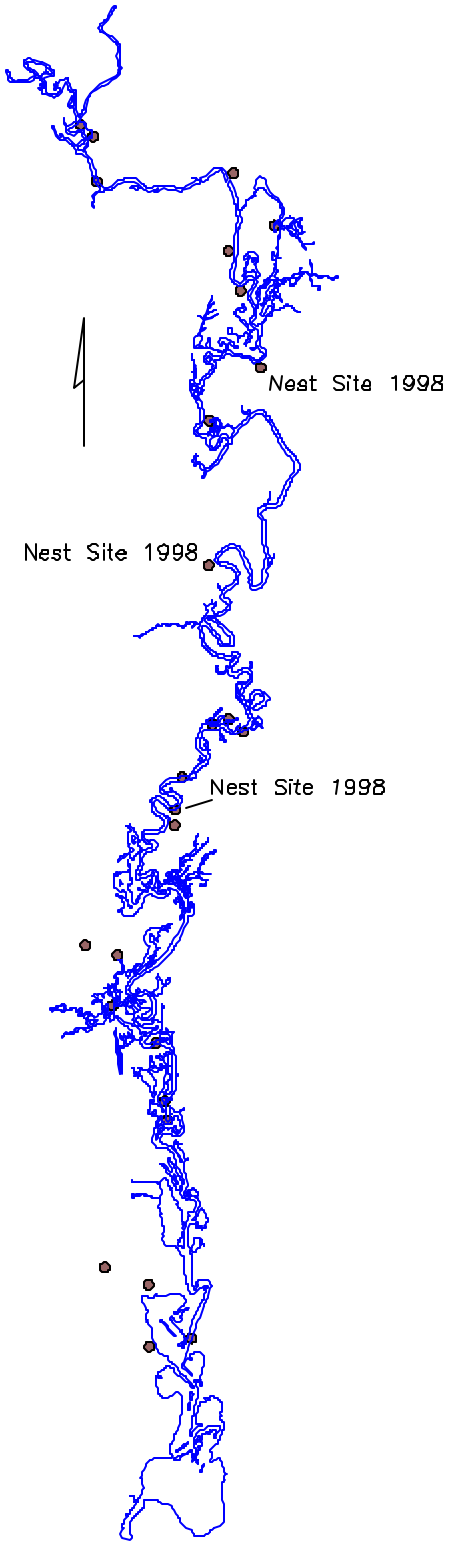


Figure 2. Belted kingfisher sightings in the primary study area

Hall, G.A. 1983. West Virginia Birds: Distribution and Ecology. Carnegie Museum of Natural History Special Publication No. 7.

Hamas, M.J. 1975. Ecological and Physiological Adaptations for Breeding in the Belted Kingfisher (*Megaceryle alcyon*). Ph.D. Dissertation. University of Minnesota, Minneapolis, MN, USA.

Hamas, M.J. 1994. Belted Kingfisher (*Ceryle alcyon*). p. 1-16. *In* A. Poole and G. Gill (ed.) The Birds of North America, No.84. The Birds of North America Inc., Philadelphia, PA, USA.

Hoyte, S.F. 1961. Are kingfishers worth saving? Conservationist 15:8-9.

Imhof, T.A. 1962. Alabama Birds. University of Alabama Press, Birmingham, AL, USA.

Murray, B.G., and J.R. Jehl. 1964. Weight of autumn migrants from coastal New Jersey. Bird Banding 35:253-263.

National Geographic Society. 1999. Field Guide to the Birds of North America. 3rd ed. National Geographic Society, Washington, DC, USA.

Salyer, J.C., and K.F. Lagler. 1946. The eastern belted kingfisher, *Megaceryle alcyon alcyon* (Linneaus), in relation to fish management. Transactions of the American Fisheries Society 76:97-117.

Sharpe, R.B. 1868-1871. A Monograph of the Alcedinidae. R. B. Sharpe, London, England.

USEPA. 1993. Wildlife Exposure Factors Handbook. Volume 1 of 2. EPA/600/R-93/187a. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC, USA.

Veit, R.R., and W.R. Peterson. 1993. Birds of Massachusetts. Massachusetts Audubon Society, Lincoln, MA, USA.

Vessel, R.D. 1978. Energetics of the Belted Kingfisher (*Megaceryle alcyon*). Ph.D. Dissertation. Oregon State University, Corvallis, OR, USA.

White, H.C. 1936. The food of kingfishers and mergansers on the Margaree River, Nova Scotia. Journal of the Biological Board of Canada 2:299-309.

White, H.C. 1953. The eastern belted kingfisher in the Maritime Provinces. Bulletin of the Fisheries Research Board of Canada 97:1-44.

Largemouth Bass

Micropterus salmoides

DESCRIPTION

The largemouth bass is one of the most important freshwater game fishes in the United States. It is considered a warm water fish and is the largest member of the sunfish family (Centrarchidae). The largemouth is able to thrive in a wide range of freshwater habitats, however, it thrives best in shallow, weedy lakes, sluggish rivers or backwaters. Both the largemouth and smallmouth bass are similar in appearance. The largemouth can be distinguished by its longer upper jaw which, when the mouth is closed, extends well beyond the eye. The body is oblong and somewhat compressed. It is dark green above, shading to lighter silvery-green on the sides, and whitish below (Scarola 1987). A solid, dark horizontal stripe extending from the head to the tail further distinguishes it from the smallmouth bass.

BODY SIZE

Largemouth bass average 10 – 20 inches in length. A typical adult is 1 – 2 pounds, but 5 – 13 pounds is not uncommon (Cochran 1960). Mature females grow larger than males, growing up to 10 pounds; the males seldom exceed 5 pounds (Davis and Lock 1997).

In the Primary Study Area: During the 2000 fish biomass survey in the primary study area, 343 largemouth bass were captured from reaches 5A, 5B, 5C, Woods Pond, and its associated backwaters. Table 1 shows the captures for each reach by size class. The length of largemouth bass captured ranged from 36 to 476 mm with a mean of 234.9 mm (SD = 126.7). The weights ranged from 1.0 to 1245 g with a mean of 376.2 g (SD = 361.8).

DISTRIBUTION

The largemouth bass is indigenous to southeastern Canada and much of the eastern United States (Figure 1). This species was introduced west of the Rockies and into New England in the mid 1800s (McClane 1978). Largemouth bass were first introduced into Massachusetts prior to 1862 (Hartel *et al*. 1996). As a widely introduced fish that adapts well to warm waters, it has become a highly valued game fish now found throughout the United States.

Figure 1. Indigenous range of largemouth bass in North America

Table 1. Largemouth bass captures from the primary study area in 2000

Reach	Size Class					Total
	YOY	I	II	III	IV	
5A	0	4	14	23	11	52
5B	0	17	12	16	26	71
5C	3	27	15	31	34	110
Backwaters	1	20	1	5	8	35
Woods Pond	5	40	7	13	10	75
Total	9	108	49	88	89	343

Size classes (mm): YOY (Young of the Year)=<50, I =50-150, II = 150-250, III = 250-350, IV = 350+

MIGRATION

Largemouth bass do not migrate seasonally or to breed. Studies have found that largemouth bass tend to move toward warmer water in the colder months, although this may be affected by prey availability (Davis and Lock 1997).

HABITAT

Largemouth bass are found in ponds, lakes, and slow, sluggish streams. Lakes are the preferred habitat. Optimal conditions include extensive shallow areas (<6 m depth) that support submergent vegetation as well as areas deep enough (3 – 15 m mean depth) to successfully overwinter bass (Robbins and MacCrimmon 1974, Carlander 1977, Winter 1977 as cited in Stuber *et al*. 1982). They tend to move less frequently when the water temperatures drop below 10ºC or rises above 27ºC.

Largemouth bass are most commonly found around submerged logs and rocks concealed from their prey. Typically the species does not do well in muddy areas because they often feed by sight, and require water clarity of at least 15 inches, preferably 24 inches (Davis and Lock 1997). In riverine habitats largemouth bass prefer low gradient (1 m/km) streams, large, slow moving rivers or pools of streams with soft bottoms, some aquatic vegetation, and clear water (Finnell *et al*. 1956, Trautman 1957, Larimore and Smith 1963, Scott and Crossman 1973, Moyle and Nichols 1973 as cited in Stuber *et al*. 1982). Largemouth bass are considered intolerant of suspended solids (turbidity) and sediment (Muncy *et al*. 1979 as cited in Stuber *et al*. 1982). Optimum suspended solid levels are assumed to be 5 – 25 ppm, and levels <5 ppm indicate low productivity (Buck 1956a, 1956b as cited in Stuber *et al*. 1982). Largemouth bass require a pH between 5 and 10 for successful reproduction (Swingle 1956, Buck and Thoits 1970 as cited in Stuber *et al*. 1982).

In the Study Area: Largemouth bass were primarily observed in the warm shallow submerged aquatic habitat and deep-water habitat of Woods Pond. Largemouth were observed in the slow gradient portions of the mainstem (Table 2).

Table 2. Habitat use by largemouth bass in the primary study area

Habitat Codes and Natural Community Classifications																						
Wetland Habitats													Terrestrial Habitats									
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES		
Medium-gradient stream	Low-gradient stream	Riverin pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development		
	Y																					

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

HIBERNATION

Largemouth bass do not hibernate, but they tend to enter periods of inactivity when the water temperatures drop below 10ºC. They will seek deeper water during the winter and take shelter at the bottom. The largemouth bass will remain more active than the smallmouth bass and is sometimes taken through the ice (Scarola 1973).

HOME RANGE AND TERRITORIALITY

Largemouth bass appear to maintain a foraging territory (Snow 1961 as cited in Carlander 1977). They are aggressively territorial during breeding season when the male will guard the nest until the eggs hatch and the fry disperse (approximately a two-week period depending on temperatures).

BREEDING

Largemouth bass typically first spawn when they are one year old and approximately 10 inches long. Spawning takes place in the late spring at water temperatures of 18° – 23° C in depths of 1 – 4 ft, anywhere from 1 – 8 ft off shore. Nests have been observed at depths of 20 ft in clear water (Davis and Lock, 1997).

Males build nests by fanning areas on substrates such as sand, gravel, roots, or aquatic vegetation close to the cover of logs, rocks or vegetation (Kramer and Smith 1962, Emig 1966, Breder 1936 as cited in Carlander 1977). Largemouth will not nest on silt bottoms (Robinson 1961 as cited in Carlander 1977). The female will generally lay only a few hundred eggs at a time. The eggs are adhesive and fasten to the bottom of the nest. During the spawning period, a female may mate with several males in different nests, and thus several batches of eggs are deposited into the nests at short intervals (Reighard 1906, Breder and Rosen 1966). Female largemouth bass may contain 2,000 – 94,000 or more eggs (Moyle 1976). The fecundity appears to increase with age, weight, and length of the female fish (Latta 1975). The male will guard the nest and fan the silt away from the eggs. He will stand guard until the fry disperse, which may be a period of two weeks or more, depending on temperatures. If the temperature drops below 15°C the male will abandon the nest (Davis and Locke 1997).

In the Study Area: Although no pairs of largemouth bass were observed spawning in the primary study area, the capture data for the Young of the Year (Table 1) suggests that the primary juvenile habitat is located in the warm, shallow waters that contain submerged aquatics.

GROWTH AND DEVELOPMENT

Eggs are spherical and between 1.5 – 1.7 mm in diameter (Kelley 1962). Eggs hatch between 2 – 10 days on average, depending on temperatures. Hatching was reported as requiring 16 – 21 days in one Wisconsin study (Mraz 1957 as cited in Carlander 1977). Larvae are 3.6 – 4.1 mm at the time of hatching (Wang and Kernehan 1979). Newly hatched larvae have no pigmentation and remain on the nest until the yolk sac has been absorbed, after which they school, frequenting the shallow water (Carr 1942). They remain in schools until over 250 mm in length, a characteristic that distinguishes them from the smallmouth species, which scatters at only 125 mm in length (McClane 1978).

Fry develop mouthparts in 190 hours if the temperature is conducive (i.e., 20°C) and begin feeding on zooplankton at about 8 days old. They add insect larvae and fish to their diet when they reach approximately 50 mm (McClane 1978, Davis and Lock 1997). At this stage the largemouth fry are a yellowish, transparent color with a very pronounced black stripe down the body. Table 3 illustrates the mean total length for experimental groups of young-of-the-year (YOY) largemouth bass in Minnesota (Kramer, R.H. and L.L. Smith, Jr., 1960 as site in Carlander 1977). Optimal temperature for growth of adult bass ranges from 24 – 30°C (Mohler 1966, Coutant 1975, Brungs and Jones 1977, Carlander 1977 as cited in Stuber *et al*. 1982). Very little growth occurs below 15°C (Mohler 1966, as cited in Stuber *et al*. 1982) or above 36°C (Carlander 1977 as cited in Stuber *et al*. 1982). Salinity levels above 4 ppt cause sharp declines in abundance (Tebo and McCoy 1964 as cited in Stuber *et al*. 1982).

Table 3. The mean TL (Total Length) of various experimental groups

2 weeks	8-17 mm	10 weeks	43-60 mm
4 weeks	16-36 mm	12 weeks	51-68 mm
6 weeks	26-45 mm	14 weeks	54-75 mm
8 weeks	34-54 mm	16 weeks	55-81 mm

In general, growth is slower in the north and more rapid in the south, which is believed to be related to the length of the growing season. Largemouth bass are also longer-lived in the north than in the south (Bennett 1937).

FOOD HABITS AND DIET

The largemouth bass is a true predator, beginning to feed on their life long diet of reptiles, amphibians, and fish at just 51 mm long. Largemouth bass fry feed mainly on microcrustaceans and small insects, juveniles consume mostly insects and small fish, and adults feed primarily on fish and crayfish (Emig 1966, Zweiacker and Summerfelt 1974, Carlander 1977 as cited in Stuber *et al.*, 1982).

Largemouth bass swallow live fish and other aquatic life whole rather than biting off chunks, which limits the size of what they can eat. One of the reasons that bass feed is to satisfy hunger; the other is an apparent reflex action to sound or vibrations in the water. Normally, fry feed about every three hours, as this is the length of time necessary for food to pass through the gut. Adult largemouth bass are often observed to feed every 14 – 24 hours depending on the size of the prey devoured (Davis and Lock 1997). Largemouth bass feeding intensity is bimodal, with peaks in the early morning and late evening (Snow 1971, Olmstead 1974 as cited in Stuber 1982).

Cessation of feeding in the spring appears to be associated with a stage in sexual development (Lewis *et al.* 1961). Dieoff of the heavy growth of submerged aquatic plants in August in a small Illinois lake was followed by rapid growth of the largemouth bass, which could then readily feed on the smaller fish that had hidden in the plant growth (Bennett 1971 as cited in Carlander 1978). A study conducted at Michigan State University demonstrated that prey encounter rates and handling times and swimming velocities of the largemouth bass while searching for and handling prey were significantly influenced by changes in vegetation (Anderson 1984 as cited in Carlander 1978). Average growth of bass is often related to the abundance of vulnerable prey (Lewis 1967 as cited in Carlander 1978).

ENERGETICS AND METABOLISM

Largemouth bass consumes 10 times their body weight per year (FishBase 2001). Growth of largemouth bass is reduced at dissolved oxygen levels <8 mg/l, and a substantial reduction occurs below 4 mg/l (Stewart *et al.* 1967 as cited in Stuber *et al.* 1982). Levels below 1.0 mg/l are considered lethal (Moss and Scott 1961, Mohler 1966, Petit 1973 as cited in Stuber *et al.* 1982). In one study, the minimal oxygen concentrations that bass can tolerate in a sudden change were 0.92, 1.19 and 1.40 ppm at 25°, 30°, and 35°C; however, when acclimated, these values were 0.78 – 0.87, 0.79 – 0.87 and 1.20 – 1.32 ppm (Moss and Scott 1961 as cited in Carlander 1977).

POPULATIONS AND DEMOGRAPHY

Survivorship: Largemouth bass survivorship is variable, depending on fishing pressure, temperature, and prey and predator densities. Survivorship can be as high as 62% per year (FishBase 2001).

Age at Maturity and Life Span: Largemouth bass reach sexual maturity as early as age 1 near the southern limit of their range (Morgan 1958, Clugston 1964, La Faunce *et al.* 1964, Smitherman 1975 as cited in Stuber *et al.* 1982). Maturity is delayed among more northern populations (Eipper and Regier 1962, Bennett 1971, Carander 1977 as cited in Stuber *et al.* 1982). In Canada, maturity is reached in 3 – 4 years for males and 4 – 5 years for females (Scott and Crossman 1973 as cited in Stuber *et al.* 1982). The average life span appears to be 11 years (Scott and Crossman 1973).

Mortality: Predation, competition, food availability, parasites and disease all play a part in largemouth bass mortality. Mortality is typically high for YOY

and is dependent upon spawning time, density of adult and juvenile bass population, availability of prey, temperature, and overwinter dieoff (Post *et al*. 1998).

Enemies: Snapping turtles, water snakes, belted kingfishers, great blue herons, and bitterns are known to prey upon largemouth bass (Scott and Crossman 1973). The largemouth bass is one of the most popular gamefishes in the Untied States, and they are actively sought by anglers.

STATUS

General: The largemouth bass has been introduced widely as a gamefish and is now cosmopolitan. Provided that conditions are suitable, local populations can be abundant. Several countries have reported ecological impact after introduction. Largemouth bass introduced into Lake Atitlan, Guatemala, are believed to be responsible for elimination of several native species of fish, reduction in total biomass of fish, predation on young flightless giant grebes, and competition for the insects and crustaceans eaten by the grebes (LaBastille 1974 as cited by Carlander 1977).

In The Study Area: Based on biomass surveys in the primary study area, it is estimated that largemouth bass are common in suitable habitats. Figure 2 illustrates the locations where largemouth bass were observed during the 1998–2000 field surveys.

REFERENCES

Breder, C.M., Jr., and D.E. Rosen. 1966. Modes of Reproduction in Fishes. T.F.H. Publications, Neptune City, NY, USA.

Carlander, K.D. 1977. Handbook of Freshwater Fishery Biology. Vol. 2. Iowa State University Press, Ames, IA, USA.

Cochran, R. 1960. Ohio's Wildlife Resources. Ohio Department of Natural Resources, Columbus, OH, USA.

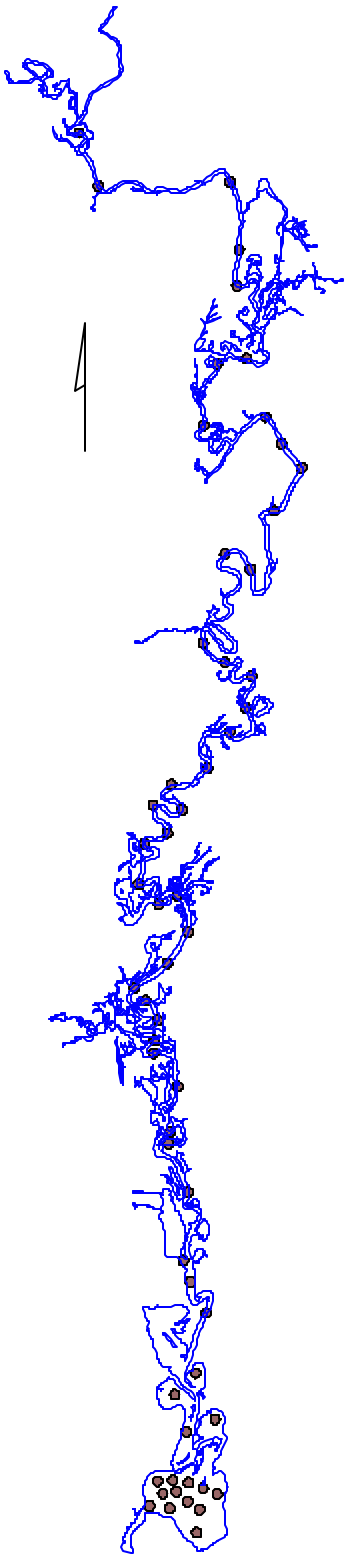


Figure 2. Largemouth bass observations in the primary study area from 1998 – 2000 field studies

Davis, J.T., and J.T. Lock. 1997. Largemouth Bass Biology and Life History. Southern Regional Aquaculture Center, US Department of Agriculture, Cooperative States Research, Education, and Extension Service. SRAC Publication No. 200.

FishBase. 2001. Key Facts on Largemouth Bass. URL http://www.fishbase.org.

Hartel, K.E., D.B. Halliwell, and A.E. Launer. 1996. An Annotated Working List of the Inland Fishes of Massachusetts. Comparative Museum of Zoology, Harvard University, Cambridge, MA, USA.

Kelly, J.W. 1962. Sexual maturity and fecundity of the largemouth bass, *Micropteris salmoides* (Lacepede), in Maine. Transactions of the American Fisheries Society 91(1):23-28.

Latta, W.C. 1975. Dynamics of Bass in Large Natural Lakes. p. 175-182. *In* H. Clepper (ed.) Black Bass Biology and Managment. Sport Fishing Institute, Washington, DC, USA.

Lewis, W.M., G.E. Gunning, E. Lyles, and W.L. Bridges. 1961. Food choice of the largemouth bass as a function of availability and vulnerability of food items. Transactions of the American Fisheries Society 90(3):227-280.

McClane, A.J. 1978. Freshwater Fishes of North America. Holt, Rinehart, and Winston, New York, NY, USA.

Moyle, P.B. 1976. Inland Fishes of California. University of California Press, Berkley, CA, USA.

Post, D.M., J.F. Kitchell, and J.R. Hodgson. 1998. Interactions among adult demography, spawning date, growth rate, predation, overwinter mortality, and the recruitment of largemouth bass in a northern lake. Canadian Journal of Fisheries and Aquatic Sciences 55:2588-2600.

Reighard, J.E. 1906. The breeding habits, development and propagation of the black bass (*Micropterus dolomieu* Lacepede and *Micropterus salmoides* Lacepede). Michigan Fish Commission Bulletin, No. 7. 73pp.

Scarola, J.F. 1987. Freshwater Fishes of New Hampshire. New Hampshire Fish and Game Department, Concord, NH, USA.

Scott, W.B., and E.J. Crossman. 1973. Freshwater Fishes of Canada. Bulletin of the Fisheries Research Board of Canada, No. 184. 966pp.

Stuber, R.J., G. Gebhart, and O.E. Maughan. 1982. Habitat Suitability Index Models: Largemouth Bass. US Department of Interior, Washington, DC, USA.

Wang, J.C.S., and R.J. Kernehan. 1979. Fishes of the Delaware Estuaries: A Guide to the Early Life Histories. Ecological Analysts, Towsun, MD, USA.

Northern Leopard Frog

Rana pipiens

DESCRIPTION

The northern leopard frog is a slender, medium-sized ranid, sometimes referred to as the "meadow frog" because of its preference for grassy habitats (Hunter *et al*. 1999). It is one of about 20 sibling species making up the *Rana pipiens* complex that ranges over much of North and Central America. Members of the complex, including the northern leopard frog, are commercially collected and shipped worldwide for laboratory use.

The northern leopard frog is not considered an obligate vernal pool species in New England (Colburn 1995, Kenny 1995), primarily because it prefers lakes, ponds, and slow-moving streams for breeding (Hunter *et al*. 1999, Klemens 1993). Its life cycle includes an aquatic larval stage and semi-terrestrial juvenile and adult stages.

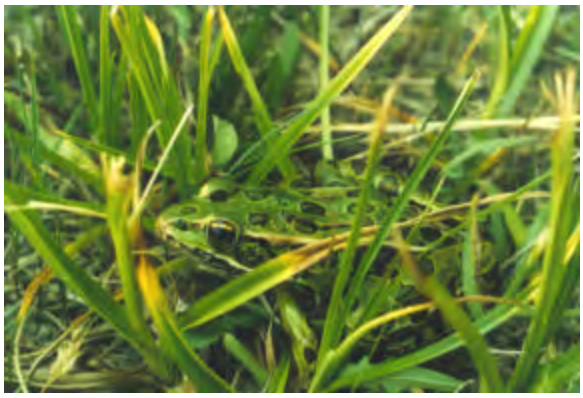
BODY SIZE

Klemens (1993) reported body lengths (snout-vent) of northern leopard frogs from a Connecticut sample (n=23) to be 51 – 65 mm for males (average 57.2 mm) and 53- 65 mm for females (average 57 mm). Hunter *et al*. (1999) reported slightly larger sizes (data possibly from a more northerly population), with male and female snout-vent lengths ranging from 52 – 82 mm and 54 – 95 mm, respectively.

In The Primary Study Area: Body size data from the Housatonic vernal pool surveys are presented in Table 1.

DISTRIBUTION

The northern leopard frog's range extends from the Canadian Maritimes and New England westward to the Rocky Mountains and beyond (Figure 1). The range of the northern leopard frog in southern New England overlaps somewhat with that of the southern leopard frog, (*Rana utricularia*), a sibling species that can be very similar in appearance (Klemens 1993).



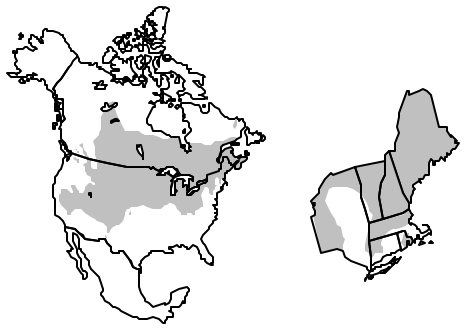


Figure 1. Range of the northern leopard frog

Table 1. Body size data for adult and yearling leopard frogs from 1999 live trapping surveys at vernal pools in the primary study area

Parameter	Males	Females
Weights (g)		
Mean	38.0	38.1
Range	16.5–76.3	3.9–79.4
Std. Dev.	13.3	21.7
n =	31	46
Lengths (mm)		
Mean	67.5	68.5
Range	52.8–79.2	41.7–87.7
Std. Dev.	5.9	14.4
n =	18	34

This overlap, however, does not appear to occur in the Housatonic River study area in Pittsfield, Massachusetts (Klemens *et al.* 1987). All leopard frogs observed there were assumed to be the northern species.

In Massachusetts, the range of the northern leopard frog is largely limited to northcentral and northeastern regions of the state, with localized populations also found in the Connecticut and Housatonic drainage basins. It is considered a relatively uncommon frog here, restricted to grassy riparian and floodplain habitats.

MIGRATION

Migration of northern leopard frogs is limited to movements between aquatic breeding and wintering habitats and nearby summer feeding areas. Summer movements of adult frogs include mostly short-distance (e.g., a few meters to 45 m) nocturnal travel on the home range. More extensive adult summer movements to areas outside the home area have been observed during nocturnal rains, in which travel distances exceeded 100 – 200 m (Dole 1965). Little is known about these large-scale movements. Fall migrations to the overwintering sites sometimes cover distances of up to 2 miles (Merrell 1970) as evidenced by adult captures far from any suitable waterbody.

HABITAT

Northern leopard frogs are considered semi-terrestrial amphibians. They breed and overwinter in water bodies, but the adults spend the entire post-breeding summer period (i.e., July, August, and early September) in grassy meadows, open shrub areas, or damp woods, often far from any water (Dole 1965, Hunter *et al*. 1999, Klemens *et al*. 1987, Merrell 1970). In southern New England, they appear to be restricted to floodplains along large streams and rivers, wetlands along lake margins, and meadows adjacent to freshwater and brackish tidal wetlands. They often inhabit cattle pastures and hay fields, but otherwise seem to avoid severely disturbed or polluted sites (Klemens 1993). In the spring, leopard frogs are attracted to vegetated shorelines by a greater abundance of food, moderated temperatures, and protective cover (Dole 1967a).

The preferred summer feeding habitat for adults is damp, grassy meadow with vegetation 6 inches to 1 foot high, though they have been shown to inhabit damp wooded areas as well (Hunter *et al*. 1999, Merrell 1970). In a Maine peatlands study, northern leopard frogs were found to be most abundant in streamside meadow habitats (Stockwell and Hunter 1989). Whitlock *et al*. (1994) indicate that the optimal summer habitat for northern leopard frogs includes pools of standing water surrounded by wet meadow with a broad transition to upland fields or pasture.

In fair weather, adults using grassy areas typically spend days sitting quietly in "forms," resting spots where the vegetation has been pushed aside so that the frog's underside is in contact with bare, moist soil. The soil moisture is absorbed through the frog's groin area, aiding hydration. Dew is also absorbed in this manner, and the frogs are known to move off the forms onto wet vegetation when sufficient soil moisture is not available (Dole 1967b).

During summer, northern leopard frogs do not use water to avoid predation as do other ranids (i.e., the green frog), but rather hop in a zig-zag fashion into thick vegetation (Klemens 1993). In fall and early spring, however, adult and juvenile leopard frogs more typically inhabit immediate shoreline areas and are known to take cover by diving into water and remaining temporarily submerged (Merrell 1970). Northern leopard frogs do not tolerate freezing conditions and must return to water to hibernate for the winter months (see Hibernation below).

The preferred breeding habitat of the northern leopard frog varies somewhat depending on geographic location (and possibly which species of the complex it belongs to). In New England, leopard frogs choose primarily shallow water bodies with emergent vegetation, including lake inlets and shallow, weedy shores, small ponds, slow-moving streams and backwaters (DeGraaf and Yamasaki 2001, Hunter 1999, Klemens 1993). In the Midwestern states, leopard frogs breed primarily in shallow ponds (with either temporary or permanent hydrology), though the juveniles leave the breeding ponds for the shores of larger waterbodies after metamorphosis (Merrel 1970).

In The Primary Study Area: Data on habitat use by northern leopard frogs from the Housatonic eco-characterization and vernal pool studies (1998 – 2000) are presented in Table 2.

HIBERNATION

Northern leopard frogs hibernate underwater from October or November to March or April (DeGraaf and Yamasaki 2001, Hunter *et al*. 1999). Emery *et al*. (1972) observed wintering leopard frogs on the bottom of an ice-covered pond in Ontario, Canada. These frogs were found hibernating in shallow excavated pits on the surface of the mud bottom at water depths of about 3 m. Though some frogs were covered with a thin layer of silt and others were completely uncovered, all maintained a clear space along their sides, presumably to facilitate sufficient respiration. Hibernating frogs exhibited some movement, albeit very slow. Cunjak (1986) observed a small number of leopard frogs overwintering in running water in a variety of stream types (e.g., riffles, pools, and runs) in southern Ontario. Both adult and juvenile frogs were found, typically in open crevices under rubble (rock diameter = 13 – 40 cm) in areas where there was only minimal silt deposition. Animals were found to be quite torpid but capable of swimming. Mean water depth in the hibernation areas was 85.5 cm, and mid-depth velocities averaged 22.5 cm/s. Cunjak (1986) speculates that the current provided aeration and prevented deoxygenation, which may be a cause of winter mortality in pond habitats. Northern leopard frogs also sometimes hibernate in caves (DeGraaf and Yamasaki 2001).

HOME RANGE AND TERRITORIALITY

Adult northern leopard frogs show marked fidelity to home areas, with individuals remaining in a relatively confined area for most of the summer and returning to that area after nighttime excursions and the following year after hibernation and breeding (Dole 1968). They are especially active during rainy nights, when they will often move to warm road surfaces. It is thought that temperature (air and water) may play a major role in the timing of leopard frog movements between wintering and breeding areas and between summering and

Table 2. Habitat use by northern leopard frogs in the Housatonic study area from 1998-2000 survey data

Habitat Codes and Natural Community Classifications																				
Wetland Habitats													Terrestrial Habitats							
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
Y	Y			B	B	B	B	B	Y	B	B	B			B	B	B	B	B	

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

wintering areas (Merrell 1970). In one study, leopard frogs showed excellent homing ability when displaced moderate distances (i.e., <1 km) from their home area (Dole 1968).

BREEDING

Northern leopard frogs in southern New England begin their migration from hibernation sites to the breeding sites in early spring (mid- to late March), slightly later than the wood frog (Klemens 1993, Degraaf and Yamasaki 2001, Whitlock *et al.* 1994). The breeding period lasts 7 – 28 days, and by late April to early May, the egg masses have been deposited (Hunter *et al.* 1999, Klemens 1993). Timing of migration from the underwater hibernation sites may be most related to temperature gradient. Merrell (1970) reports that adult northern leopard frogs (presumably populations in the Midwest) leave the hibernation waters when the air temperature is about 50°F, and that the sexually-immature frogs tend to remain in the larger waterbodies while the mature individuals begin their migration to the breeding sites. Water temperature plays a role in the selection of a breeding pond, with the frogs avoiding large ponds that do not warm rapidly and very shallow ponds that experience pronounced diurnal temperature fluctuations. The frogs also seem to choose the warmest spots of the ponds for breeding and egg-laying, often in open areas without a canopy.

Male leopard frogs are presumably not territorial (Hunter *et al.* 1999). They gather together in dense groups in shallow water and actively seek the females. Coupling is by pectoral amplexus, which lasts for about 24 hours or less. The individual egg clutches, which contain 2,000 to 6,500 eggs, are laid in shallow water either singularly or in communal masses of 25 to 40 clutches. The eggs become attached to submerged twigs or vegetation, or sometimes rest on the pond bottom. After the breeding and egg-laying period, the adults leave the breeding pond for their summer habitats and home areas (DeGraaf and Yamasaki 2001, Hunter *et al.* 1999, Wright and Wright 1949).

In The Primary Study Area: Documented leopard frogs breeding sites within the Housatonic study area included river edges and relatively deep backwaters adjacent to grassy meadow floodplain areas. Although leopard frogs were trapped going into and out of the vernal pools, no breeding activity was observed in any of the isolated pools surveyed, and no groups of adults were seen in the primary study area. In general, male and female adult leopard frogs (n = 44) were observed entering the vernal pools the first week of April, but they were caught leaving the pools within a day or two of entering.

GROWTH AND DEVELOPMENT

Like many frog species, embryonic development of the northern leopard frog is temperature-dependent, and can be delayed by periods of cold weather. The eggs hatch in 13 – 20 days, and the tadpoles metamorphose 60 – 80 days after hatching (DeGraaf and Yamasaki 2001, Hunter *et al.* 1999). Northern leopard frog tadpoles are relatively large, up to 84 mm in length (Wright and Wright 1949). In southern New England, metamorphosis would likely occur from mid-July through mid-August. Newly-metamorphosed juvenile leopard frogs are 20 – 30 mm in length (snout to vent). Their growth rate is highest in the summer, slowing considerably in September (Hunter *et al.* 1999). These juvenile frogs leave the natal pond area and disperse (often during rains) into nearby grassy areas or towards the shoreline of larger bodies of water. At first, the young frogs stay close to open water, which they use for escape cover and thermoregulation, but they tend to range further and further from water as they grow (Merrell 1970).

FOOD HABITS AND DIET

Foods of adult and juvenile northern leopard frogs include almost any kind of insect, as well as spiders, snails, and frogs. Linzey (1967) suggests that availability rather than preference determines food types, and reports that beetles (Coleoptera) are a staple in the diet of adults and juveniles probably because they are available throughout the active season. Moth and butterfly (Lepidoptera) larvae, grasshoppers and crickets (Orthoptera), bees, wasps and ants (Hymenoptera), and bugs (Hemiptera) are also particularly common (DeGraaf and Yamasaki

2001, Knowlton 1944, Linzey 1967). Linzey (1967) found that vegetable matter can also make up a significant volume (10 – 20%) of adult and juvenile food, and that the diet of adults was more diverse than that of juveniles in his study. Knowlton (1944) reported finding recently-shed frog skins and juvenile frogs in the stomachs of leopard frogs.

Leopard frog tadpoles are primarily herbivorous, consuming algae, plankton, and small plant materials (detritus) from the substrate and the undersides of aquatic vegetation within the natal pond (Hunter *et al*. 1999).

POPULATIONS AND DEMOGRAPHY

Survivorship: No specific information was found on the survivorship of the northern leopard frog. Based on data from other ranids like the wood frog, it is expected that survivorship at each of the various life stages would be variable and affected by factors such as weather, predation, environmental stresses, competition for limited resources (i.e., density-dependent factors), and geographic location. As with other amphibians, predation pressure on eggs and larvae is likely high, and juvenile mortality varies more than adult mortality (Duellman and Trueb 1986). The percent survival from egg stage to adult stage is probably very low, which is typical for amphibian species with similar reproductive strategies.

Age at Maturity and Life Span: Little information is available regarding the age at first breeding for the northern leopard frog in the Northeast. In Michigan, leopard frogs (presumably both males and females) were reported to mature sexually at 3 years of age (Force 1933, as cited in DeGraaf and Yamasaki 2001). Other sources (Hunter *et al*. 1999) say that age of first breeding may occur 1 year after transformation, but more typically 2 years from the egg stage. No specific information was found regarding the average life span of the northern leopard frog in the wild.

Mortality: Factors contributing to adult and juvenile leopard frog mortality are not well understood. Predation, road mortality, diseases and parasites, winter kill, and desiccation during periods of low rainfall all contribute to leopard frog mortality. Other factors, including environmental stresses and collection for commercial sale and human consumption have been identified (Hunter *et al*. 1999). The role of density-dependent factors in survivorship and overall population regulation is not well understood.

Enemies: Adult and juvenile northern leopard frogs have few defenses against predators, but they are often effective at avoiding capture by leaping into thick vegetative cover. In breeding habitats, adults fall prey to fish, water snakes, snapping turtles, herons, mink, raccoon, skunk, fox, and coyote. The eggs and juveniles are fed upon by leeches, caddisfly, mayfly, and dragonfly larvae, predaceous diving beetles, salamanders, adult frogs and toads, turtles, snakes (particularly eastern garter), herons, ducks, grebes, blackbirds, birds, and various carnivorous mammals (DeBenedictis 1974, Hunter *et al.* 1999, Whitlock *et al.* 1994).

STATUS

General: The northern leopard frog is considered to be an indicator of high quality, specialized wetlands. Though locally common in some floodplain areas, it is relatively rare in the Northeast region, and there is evidence that this species has been extirpated at many sites in southern New England as a result of flood control measures, impoundments, and other types of developments that have altered wetlands (Klemens 1993). Excessive collection for the scientific supply market has also contributed to the decline of northern leopard frog in Canada and the United States, and massive, continent-wide die-offs (not well understood) were reported in the 1970s and 1980s. Environmental stresses, including low pH and high concentrations of metals and chemicals from pesticides and fertilizers, have been shown to have detrimental effects on leopard frogs and tadpoles. Other possible factors contributing to declines include road mortality and increased ultraviolet-B radiation caused by the thinning ozone layer (Freda and McDonald 1990, Hunter 1999).

In The Primary Study Area: Leopard frogs were the second most common amphibian species observed

during the vernal pool surveys in 1999. Approximately 154 leopard frogs were caught in pitfall traps as they entered the four vernal pools in the study, as compared to 1,300 wood frogs, 87 green frogs, and 70 spotted salamanders.
Figure 2 illustrates the locations within the primary study area where leopard frogs were observed during the 1998, 1999, and 2000 field studies.

REFERENCES

Colburn, E.A. 1995. Certified: A Citizen's Step-By-Step Guide to Protecting Vernal Pools. March 1995. Sixth ed. Massachusetts Audubon Society, Lincoln, MA.

Cunjak, R.A. 1986. Winter habitat of northern leopard frogs, *Rana pipiens*, in a southern Ontario stream. Canadian Journal of Zoology 64:255-257.

DeBenedictis, P.A. 1974. Interspecific competition between tadpoles of *Rana pipiens* and *Rana sylvatica*: an experimental field study. Ecological Monographs 44:129-151.

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH.

Dole, J.W. 1965. Summer movements of adult leopard frogs, *Rana pipiens* Schreber, in northern Michigan. Ecology 46(3):236-255.

Dole, J.W. 1967a. The role of substrate moisture and dew in the water economy of leopard frogs, *Rana pipiens*. Copeia 1967(1):141-149.

Dole, J.W. 1967b. Spring movements of leopard frogs, *Rana pipiens*, in northern Michigan. American Midland Naturalist 78:167-181.

Dole, J.W. 1968. Homing in leopard frogs, *Rana pipiens*. Ecology 49(3):386-399.

Duellman, W.E., and L. Trueb. 1986. Biology of Amphibians. John Hopkins University Press, Baltimore.

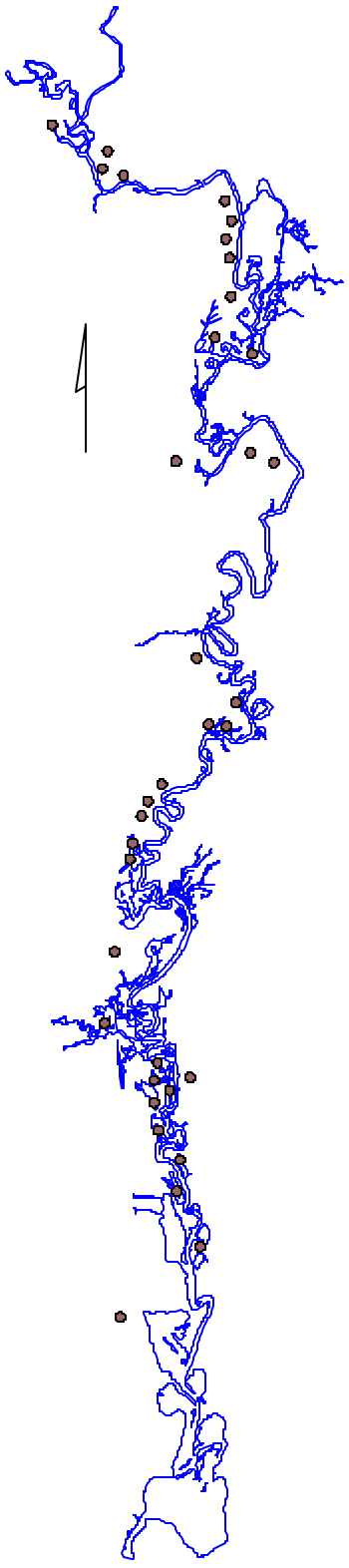


Figure 2. Northern leopard frog sightings in the primary study area in 1998, 1999, and 2000.

Emery, A.R., A.H. Berst, and K. Kodaira. 1972. Under-ice observations of wintering sites of leopard frogs. Copeia 1972:123-126.

Force, E.R. 1933. The age of attainment of sexual maturity of the leopard frog, *Rana pipiens*, in northern Michigan. Copeia 1933:128-131.

Freda, J., and D.G. McDonald. 1990. Effects of aluminum on the leopard frog, *Rana pipiens*: Life stage comparisons and aluminum uptake. Canadian Journal of Fisheries and Aquatic Science 47:210-216.

Hunter, M.L., A. Calhoun, and M. McCollough. 1999. Maine Amphibians and Reptiles. The University of Maine Press, Orono.

Kenny, L.P. 1995. Wicked Big Puddles: A Guide to the Study and Certification of Vernal Pools. 2nd ed. Reading Memorial Highschool and the Vernal Pool Association, Reading.

Klemens, M.W. 1993. The amphibians and reptiles of Connecticut and adjacent regions. State Geol. Nat. Hist. Surv. Conn. Bull. 112. 318pp.

Klemens, M.W., E. Kiviat, and R.E. Schmidt. 1987. Distribution of the northern leopard frog, *Rana pipiens*, in the lower Hudson and Housatonic river valleys. Northeastern Environmental Science 6(2):99-101.

Knowlton, G.F. 1944. Some insect foods of *Rana pipiens*. Copeia 2:119.

Linzey, D.W. 1967. Food of the leopard frog, *Rana pipiens*, in central New York. Herpetologica 23(1):11-17.

Merrell, D.J. 1970. Migration and gene dispersal in *Rana pipiens*. American Zoologist 10:47-52.

Stockwell, S.S., and M.L. Hunter Jr. 1989. Relative abundance of herpetofauna among eight types of Maine peatland vegetation. Journal of Herpetology 23(4):409-414.

Whitlock, A.L., N.M. Jarman, and J.S. Larson. 1994. WEThings. Wetland Habitat Indicators for NonGame Species (New England). Vol. II. The Environmental Institute, University of Massachusetts, Amherst, MA.

Wright, A.H., and A.A. Wright. 1949. Handbook of Frogs and Toads of the United States and Canada. 3rd ed. Cornell University Press, Ithica.

Mink

Mustela vison

DESCRIPTION

The mink is the largest member of the weasel family in the Eastern United States (Whitaker and Hamilton 1998). It is a semi-aquatic species, and like other mustelids has a long body, short legs, and long neck. The pelage color is a uniform dark brown to almost black, and the chin is characteristically white. White spots may also occur on the throat, chest and abdomen (Lariviere 1999). Unlike the three weasel species found in eastern North America, the mink does not develop a white coat during the winter.

The long body shape and short pelage of the mink enhance swimming efficiency and enable the mink to access the burrows of some its prey. However, this body shape makes it vulnerable to cold temperatures (Brown and Lasiewski 1972). In addition, the relatively small surface area of its feet, and a low oxygen storage capacity make the mink an inefficient swimmer when compared to more aquatic species of this family such as the river otter (Ben-David *et al.* 1995).

BODY SIZE

Mink display a slight sexual dimorphism in size, with males approximately 10% longer and 50% heavier than females (Lariviere 1999). Body lengths and weights also vary greatly depending on geographic location and habitat quality (USEPA 1993). Total lengths of animals from New York and Quebec (Canada) ranged from 491 – 590 mm (mean = 535) for males (n=11) and 481 – 597 mm (mean = 509) for females (n=5). Males generally weighed between 630 g and 1,000 g and females somewhat less (Whitaker and Hamilton 1998). Reported weights of adult males from Montana ranged from 1,040 – 1,233 g, while adult females ranged from 550 – 586 g. Juvenile males weighed about 25% less than adult males, while juvenile females were about the same weight as adult females (USEPA 1993).

DISTRIBUTION

The mink occurs throughout the United States and Canada excluding Arizona, and the more xeric parts of California, Nevada, Utah, New Mexico and Texas (Figure 1). The mink has proven itself to be well adapted to colonization, and has become established in portions of Europe and Asia where it was either purposely introduced or escaped from fur farms. The key factor affecting distribution of this species is the presence of persistent watercourses or wetlands capable of providing sufficient food and cover (Lariviere 1999).

Figure 1. Range of mink in North America

MIGRATION

The mink is non-migratory, although it often travels long distances between foraging locations or den sites (Whitaker and Hamilton 1998, Lariviere 1999). Nightly movements of up to 7.5 mi have been recorded for this species (Birks and Linn 1982, Arnold and Fritzell 1987 as cited in Lariviere 1999). Typically mink move between a few core areas within their home range that contain higher concentrations of prey (Birks and Linn 1982 as cited in Allen 1986). Mitchell (1961) found that the average distance traveled for adults and juveniles during his study ranged from 0.1 – 0.6

mi, although dispersing juveniles and adult males in search of mates will travel greater distances (Lariviere 1999).

HABITAT

The semi-aquatic mink is typically associated with riparian habitats, including small streams, tidal flats, cattail marshes, rivers, lakes, bogs, swamps, and bottomland woods (Gerell 1970 as cited in Allen 1986, Whitaker and Hamilton 1998). In New England, suitable mink habitat includes a variety of available palustrine and estuarine wetland systems, but preferred habitats appear to be shallow and deep marshes and ponds. This species will also use upland habitat provided there is sufficient cover and prey availability. In New England, mink may use a variety of forest cover types, with preferential use of red maple (*Acer rubrum*) stands (DeGraaf and Yamasaki 2001).

The presence of a waterbody appears to be a key factor in habitat selection by this species. In studies conducted throughout North America, mink activity seemed to be restricted to within 650 ft (200 m) of water (Allen 1986). However, wetlands and waterbodies that are at least semi-permanent provide the most suitable habitat for this species (Arnold and Fritzell 1990). During the course of the year, habitat use by this species shifts from wetlands with a relatively short hydrologic period to those that maintain permanent open water (Humphrey and Zinn 1982). Allen (1986) assumed that surface water must be present for at least nine months out of the year to provide optimal foraging habitat and prey availability for mink. In addition, other characteristics of a waterbody can affect habitat suitability. For example, eutrophic lakes, which tend to be shallower, have higher concentrations of plant nutrients, higher organic content, and more abundant aquatic vegetation, can support higher mink populations than less productive oligotrophic lakes (Allen 1986).

The size of a water body and water depth can also affect use by this species. For example, large open water areas are not suitable habitat for mink unless water depths are shallow because mink lack the underwater endurance necessary for locating and pursuing prey (Dunstone and O'Connnor 1979). In large open water areas, mink are capable of efficient hunting only when water depths are shallow or fish density is high (Dunstone 1983 as cited in Allen 1986). In riverine systems, pools that are less than about 3 ft deep appear to provide suitable foraging opportunities for this species (Burgess 1978 as cited in Allen 1986).

Beyond the presence of a waterbody, cover availability also affects habitat use by mink. Mink avoid exposed or open areas and are often associated with shrub or wooded habitat adjacent to a water source. Emergent areas, even if dominated by tall grasses, generally do not provide adequate year-round cover for the mink. The exception seems to be the use of marshes containing dense stands of sawgrass (*Cladium janaicense*) in Louisiana. However, even in this setting mink are more common in wooded swamps than in the sawgrass marshes (Allen 1986).

In palustrine forested and scrub-shrub wetland systems, optimum conditions for cover, denning, and foraging are assumed to be present when the combined canopy cover of woody or persistent herbaceous vegetation is $\geq$75%. In addition, for smaller wetlands ($\leq$1,000 acres) the presence of woody vegetation $\leq$330 ft from the edge of the wetland may also affect habitat suitability in part because mink may rely more heavily on terrestrial prey in these areas. When mink do venture into upland habitats, they appear to select edge habitat where both cover and prey are available (Allen 1986).

In palustrine emergent wetlands, ideal cover conditions for the mink are assumed to be present when cover of emergent vegetation is between 50 to 75%. The presence of woody vegetation within 330 ft of the edge of an emergent wetland can further enhance use by mink (Allen 1986). Since foraging in riverine and lacustrine systems occurs primarily along the shoreline, cover and structural diversity within the vegetative community affect habitat use by mink. Cover can be provided by overhanging or emergent vegetation, rocks or rock crevices, exposed roots, debris, log jams, undercut banks, or boulders (Allen 1986).

Habitat use by mink can be enhanced through the placement of logs and other cover within stream channels (Burgess 1978 as cited in Allen 1986). Optimum cover is assumed when woody cover within 330 ft of the water's edge is ≥75% and 100% of the shoreline provides cover within about 3 ft of the water's edge (Allen 1986). Similarly, in coastal areas, mink select well-established overstory and understory cover protected from wave action (Ben-David *et al.* 1995).

Wetlands and waterbodies with irregular shorelines and diverse habitats appear to provide better cover and, thereby, are better habitat for mink (Arnold and Fritzell 1990). In areas where wetlands and waterways have been altered by channelization, habitat suitability for this species is reduced due to reduced shoreline diversity and elimination of aquatic vegetation, which reduces prey availability and cover for the mink (Allen 1986).

The availability of suitable den sites may also affect habitat use by mink. Typically, several dens sites are located close to preferred foraging sites within an individual's home range (Allen 1986). Den sites have been identified in tree cavities or in cavities beneath tree roots, in rock piles, log jams, culverts, or bridge foundations, under fallen branches, brush, and other debris, and within abandoned or seldom-used muskrat, rabbit, or ground squirrel burrows (Eagle and Sargeant 1985, Allen 1986, Lariviere 1999).

In The Primary Study Area: Table 1 contains a summary of the literature review and observational data on the use by mink of the natural community types found within the primary study area.

HIBERNATION

Although activity levels decrease during periods of cold weather, mink remain active throughout the year and do not hibernate. During the winter in England, mink restrict daily travel, use fewer den sites, and remain at individual den sites for longer periods of time (Birks and Linn 1982 as cited in Allen 1986 and Lariviere 1999).

HOME RANGE AND TERRITORIALITY

Adult males occupy home ranges that are exclusive of other adult males, but include the home ranges of one or more females (Mitchell 1961, Birks and Dunstone 1985, Whitaker and Hamilton 1998). Adult males also appear to tolerate the presence of juvenile males within their territories (Mitchell

Table 1. Habitat use by mink in the primary study area

Habitat Codes and Natural Community Classifications																				
Wetland Habitats													Terrestrial Habitats							
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

1961). Adult males have larger home ranges (average 85.4% larger) than adult females, and adults occupy larger home ranges than juveniles (Gerell 1970 as cited in Lariviere 1999, Birks and Linn 1982 as cited in Allen 1986, Whitaker and Hamilton 1998). The minimum home range sizes of two adult females along the Madison River in Montana were reportedly 19.3 acres and 50.4 acres (Mitchell 1961). The larger home range of one female was attributed to marginal habitat quality stemming from poor cover created by grazing activities. Average home range size for males has been reported to range between 766 and 1,920 acres (Arnold and Fritzell 1987 as cited in Lariviere 1999; Arnold and Friztel 1990; Whitaker and Hamilton 1998). Linear home ranges of between 0.7 mi (female mink in a coastal habitat) and 4.7 mi (male mink in unspecified habitat) have been reported (Melquist *et al*. 1981 as cited in Allen 1986, Lariviere 1999).

BREEDING

Increasing day length stimulates the onset of the mink's breeding season (Duby and Travis 1972). Mating in the northern part of the mink's range takes place from January to early April, with peak breeding activity occurring in March (Whitaker and Hamilton 1989, Lariviere 1999, DeGraaf and Yamasaki 2001). The exception to this time period seems to be areas along the southern tip of Alaska where breeding occurs from late April to early May (Ben-David 1991). This delay in breeding allows lactating females to have an ample food supply in the form of salmon carcasses during the energetically-demanding period of lactation.

Mink reach sexual maturity at 10 months of age (Mitchell 1961, DeGraaf and Yamasaki 2001). Ovulation in the female is induced by either the presence of a male or by copulation. Implantation in this species is delayed from 9 – 46 days (Lariviere 1999; Whitaker and Hamilton 1998). Gestation has been estimated to range from 40 – 75 days (mean 51 days) with actual embryonic development lasting 30 – 32 days (Svihla 1931, Lariviere 1999, DeGraaf and Yamasaki 2001). Young are born between April and June with litters ranging from 1 – 10 (mean 4 – 5) (Whitaker and Hamilton 1998, Lariviere 1999, DeGraaf and Yamasaki 2001). A single litter is produced each year. Litter size increases with the age of the female (Sidorovich 1993 as cited in Lariviere 1999, DeGraaf and Yamasaki 2001).

GROWTH AND DEVELOPMENT

At birth, the young weigh approximately 6 grams. They are lightly furred and their eyes are closed. Their eyes open at about 27 days and they are weaned at about 5 weeks of age (Svihla 1931, Whitaker and Hamilton 1998). The female brings food to the young for the first few weeks after weaning and by eight weeks of age the young begin to hunt for themselves. Although the young are able to hunt for themselves, they remain with the mother until fall (Lariviere 1999). Juvenile females reach adult weight at approximately four months of age and males between 9 and 11 months of age (Mitchell 1961).

FOOD HABITS AND DIET

The mink is almost strictly carnivorous with only a limited amount of plant material reported in its diet (Proulx *et al*. 1987). Its diet includes fish (e.g., salmonids, northern pike, brook stickleback, white sucker, and arctic grayling), amphibians (e.g., frogs, salamanders), crustaceans (e.g., crayfish and crabs), muskrats (*Ondatra zibethicus*), meadow voles (*Microtus pennsylvanicus*), other voles (*Mircrotus* sp.), mice (*Peromyscus* sp.), jumping mice (*Zapus* spp.), short-tailed shrews (*Blarina brevicauda*), other shrews (*Sorex* sp.), lagamorphs (e.g., snowshoe hare), woodchucks (*Marmota monax*), northern bog lemmings (*Synaptomys borealis*), southern red-backed voles (*Clethrionomys gapperi*), bats (*Myotis* spp.), least and short-tailed weasels (*Mustela rixosa* and *M. erminea*), birds and their eggs (Anseriformes, Gaviformes, Ciconiformes, Passeriformes, Charadriformes, and Gruiformes), reptiles (e.g. snakes), insects, earthworms, snails, bivalves (e.g., clams), and carrion (DeGraaf and Yamasaki 2001; Lariviere 1999; Proulx *et al*. 1987; Gilbert and Nancekivell 1982).

A number of factors including geographic location, habitat selection, and local prey availability influence the mink's diet. For example, mink

feeding in lake habitats prey more heavily on fish, birds, and insects whereas mink in streams fed more often on mammals (Gilbert and Nancekivell 1982). Prey selection by this species in all habitats is related to the relative abundance of available prey species, which often varies with the time of year. During the waterfowl breeding season in North Dakota, almost 50% of the mink's diet may be comprised of waterfowl, including adults, ducklings, and eggs (Arnold and Fritzell 1987 as cited in Lariviere 1999; Arnold and Fritzell 1990). Crayfish form the most important component of their diet in the summer throughout much of their geographic range, whereas small terrestrial mammals are often important in the fall and winter (Allen 1986).

The mink's diet also will vary based on different environmental conditions. In one study conducted in Ontario, Canada, mink fed preferentially on aquatic birds and muskrats when low water levels allowed the mink access to the interior portion of the marsh. When water levels were high, the mink confined their foraging activity to the edge of the marsh where they preyed primarily on crayfish and meadow voles (Proulx *et al.* 1987). In addition, mink show some variation in prey selection based on the sex of the animal, with females feeding more often on smaller prey items (e.g., fish, crustaceans, and birds) and males on larger prey (i.e., lagamorphs) (Birks and Dunstone 1985).

ENERGETICS AND METABOLISM

Daily consumption of dry matter averages 40 g/kg of body mass for male and 53 g/kg of body mass for female mink (Bleavins and Aulerich 1981 as cited in Lariviere 1999). A 1 kg mink requires 152 $\pm$ 11 calories of digestible energy everyday for maintenance. A nursing female can require three times that amount at 3 weeks postpartum (Lariviere 1999).

POPULATIONS AND DEMOGRAPHY

Population Densities: Population densities can reach levels of up to approximately one animal per 30 acres (Whitaker and Hamilton 1998). Population densities have been reported from 0.3 to 20 mink per mi^2 (Mitchell 1961 as cited in DeGraaf and Yamasaki 2001, Halliwell and Macdonald 1996 as cited in Lariviere 1999). Linear densities along shorelines on Vancouver Island, British Columbia were 4.2 – 9.3 mink per mile (Ritcey and Edwards 1956 as cited in DeGraaf and Yamasaki 2001).

Population changes in this species may be linked to their available prey base. Mink populations in Alberta and other parts of Canada have been shown to have a synchronous, 10-year cycle with that of the snowshoe hare (Keith and Cary 1991).

Age at Maturity and Life Span: Both the male and female of this species reach sexual maturity at about 10 months of age (DeGraaf and Yamasaki 2001). Mink typically live about eight years in captivity, but life span in the wild is appears to be much shorter (Lariviere 1999). Mitchell (1961) found almost a complete turnover in a Montana population of mink during a three-year period.

Mortality: In addition to predation, other sources of mortality include, trapping, drowning in fish cages or gill nets, and collisions with vehicles (Lariviere 1999). Disease such as Aleutian disease, amyloidosis, botulism, distemper, hemorrhagic pneumonia, mink viral enteritis, feline panleukopenia, urolithiasis, and canine parvovirus can also impact mink populations. Mink are affected by environmental contaminants including pesticides, mercury, and polychlorinated biphenlys (PCBs). Mink are highly susceptible to PCB contamination, which impairs reproduction and causes death. In one study, mink fed a diet of 3.57 ppm of PCBs were unable to successfully reproduce and all died after 105 days on the laboratory diet (Platonow and Karstad 1973). In the same study, one female fed a diet containing 0.64 ppm of PCBs was able to produce kits, but all of the kits died within a few days of birth.

Enemies: Predators of the mink include great-horned owls (*Bubo virginianus*), hawks (*Buteo sp.)*, coyotes (*Canis latrans*), red foxes (*Vulpes vulpes*), lynx (*Lynx canadensis*), bobcats (*Lynx rufus*), alligators (*Alligator* sp.), and river otters (Lariviere 1999).

STATUS

General: The mink occurs throughout New England and its regional status ranges from common to uncommon (DeGraaf and Yamasaki 2001).

In The Primary Study Area: Figure 2 illustrates the locations where mink, or their sign, were observed in the primary study area in the course the 1998 to 2000 field studies.

REFERENCES

Allen, A. W. 1986. Habitat suitability index models: mink, revised. U.S. Fish and Wildlife Service Biological Report 82(10.127). 23pp.

Arnold, T. W., and E. K. Fritzell. 1987. Activity patterns, movements, and home ranges of prairie mink. Prairie Naturalist. 19:25-32.

Arnold, T. W., and E. K. Fritzell. 1990. Habitat use by male mink in relation to wetland characteristics and avian prey abundance. Canadian Journal of Zoology. 68:2205-2208.

Ben-David, M. 1991. Timing of reproduction in wild mink: the influence of spawning Pacific salmon. Canadian Journal of Zoology. 75:376-382.

Ben-David, M., R. T. Bowyer, and J. B. Faro. 1995. Niche separation by mink and river otters: coexistence in a marine environment. Oikos. 75:41-48.

Birks, J. D. S., and N. Dunstone. 1985. Sex-related differences in the diet of the mink *Mustela vison*. Holarctic Ecology. 8:245-252.

Birks, J. D. S., and I. J. Linn. 1982. Studies of home range of the feral mink, *Mustela vison*. Symposium of the Zoological Society of London. 49:231-257.

Bleavins, M. R., and R. J. Aulerich. 1981. Feed consumption and food passage time in mink and European ferrets. Laboratory Animal Science. 31:268-269.

Brown, J. H., and R. C. Lasiewski. 1972. Metabolism of weasels: The cost of being long and thin. Ecology. 53(5):939-943.

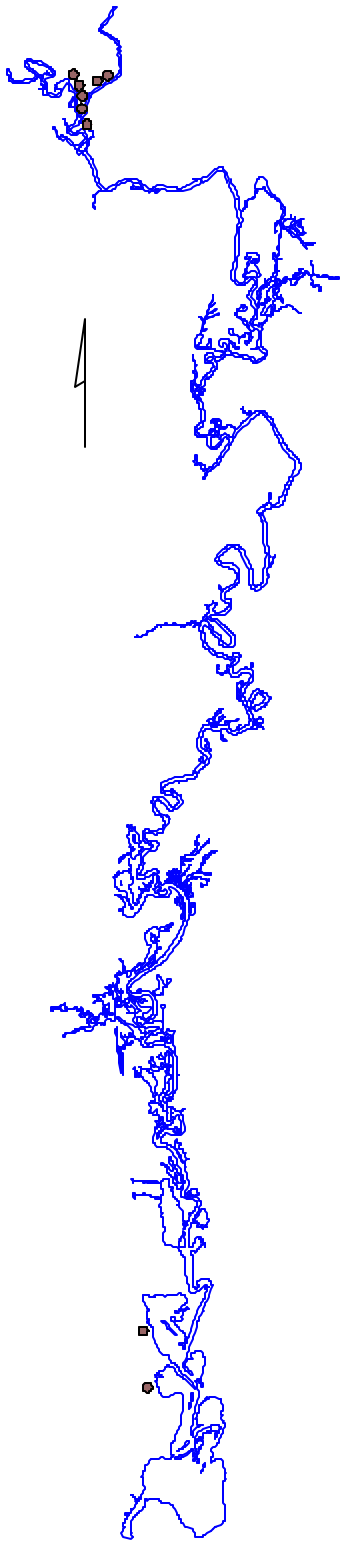


Figure 2. Mink sightings in the primary study area

Burgess, S. A. 1978. Aspects of mink (*Mustela vison*) ecology in the Southern Laurentains of Quebec. M. S. Thesis. MacDonald College of McGill University, Montreal, Quebec. 112p

.

DeGraaf, R. M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History and Distribution. University Press of New England, Hanover, New Hampshire, USA. 482pp.

Duby, R. T., and H. F. Travis. 1972. Photoperiodic control of fur growth and reproduction in the mink (*Mustela vison*). Journal of Experimental Zoology. 182:217-226.

Dunstone, N. 1983. Underwater hunting behavior of the mink (*Mustela vison* Schreber): an analysis of constraints of foraging. Acta Zoologica Fennica. 174:201-203.

Dunstone, N., and R. J. O'Connor. 1979. Optimal foraging in an amphibious mammal. II. A study using principal component analysis. Animal Behavior. 27:1195-1201.

Eagle, T. C., and A. B. Sargeant. 1985. Use of den excavations, decoys, and barrier tunnels to capture mink. Journal of Wildlife Management. 49(1):40-42.

Gilbert, F. F., and E. G. Nancekivell. 1982. Food habits of mink (*Mustela vison*) and otter (*Lutra canadensis*) in northeastern Alberta. Canadian Journal of Zoology. 60:1282-1288.

Gerell, R. 1970. Home ranges and movements of the mink *Mustela vison* Schreber in southern Sweden. Oikos. 21(2):160-173.

Halliwell, E. C., and D. W. Macdonald. 1996. American mink, *Mustela vison*, in the upper Thames catchment: relationship with selected prey species and den availability. Biological Conservation. 76:51-56.

Humphrey, S. R., and T. L. Zinn. 1982. Seasonal habitat use by river otters and Everglades mink in Florida. Journal of Wildlife Management. 46(2):375-381.

Keith, L. B., and J. R. Cary. 1991. Mustelis, squirrel, and porcupine population trends during a snowshoe hare cycle. Journal of Mammology. 72(2):373-378.

Lariviere, S. 1999. *Mustela vison*. Mammalian Species No. 608. American Society of Mammalogist. 9pp.

Melquist, W. E., J. S. Whitman, and M. G. Hornocker. 1981. Resource partitioning and coexistence of sympatric mink and river otter populations. Pages 187-200 In J. A. Chapman and D. Pursley, eds., Worldwide Furbearer Conference Proceedings, Vol. I. Frostberg, Maryland.

Mitchell, J. L. 1961. Mink movements and populations on a Montana river. Journal of Wildlife Management. 25:48-54.

Platonow, N. S., and L. H. Karstad. 1973. Dietary effects of polychlorinated biphenyls on mink. Canadian Journal of Comparative Medicine. 37:391-400.

Proulx, G., J. A. McDonnell, and F. F. Gilbert. 1987. The effect of water level fluctuations on muskrat, *Ondatra zibethicus*, predation by mink, *Mustela vison*. Canadian Field Naturalist. 101(1):89-92.

Ritcey, R.W., and R. Y. Edwards. 1956. Live trapping mink in British Columbia. Journal of Mammalogy. 37:114-116.

Sidorovich, V. E. 1993. Reproductive plasticity of the American mink (*Mustela vison*) in Belarus. Acta Theriologica. 38:175-183.

Svihla, A. 1931. Habits of the Louisiana mink (*Mustela vison vulgivagus*). Journal of Mammalogy. 12:366-368.

USEPA. 1993. Wildlife Exposure Factors Handbook. Volume 1 of 2. EPA/600/R-93/187a. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC

Whitaker, J.O., Jr., and W.J. Hamilton, Jr. 1998. Mammals of the Eastern United States. Cornell University Press, Ithica, NY. 583pp.

Osprey

Pandion haliaetus

DESCRIPTION

The osprey is a large raptor also known as the fish hawk. Ospreys are often seen hovering over open water, plunging into water after fish, or calling from relatively exposed perches. Adult ospreys are dark brown over their backs, shoulders, coverts, and outer primaries. Underneath, they are mostly white with variable amounts of brown appearing in upper chest and neck feathers. Females often show darker streaking on the neck that often forms a distinct necklace. The head is mostly white with a broad brown stripe extending from the lores, through the eye, and down the side of the neck. In flight, dark carpal patches are evident and wings typically are held bent at the wrist. The underside of the primary feathers and retrices show white barring. Juvenile birds appear generally speckled due to buff outer edges on back, shoulder, and covert feathers.

BODY SIZE

Average osprey body size ranges from 53 – 61 cm in length, with a wingspan of 1,400 – 1,800 cm. Females tend to have a greater average mass (1.6 kg) than males (1.4 kg) and have slightly larger body sizes (Rattner *et al.* 2001).

DISTRIBUTION

Ospreys are cosmopolitan and can be found on every continent with the exception of Antarctica. The North American population breeds from Alaska across Canada and along the Atlantic coast from Newfoundland to Florida. Populations also occur clustered around the Great Lake states, northern Rocky Mountain states, and on the west coast from Washington south through Northern California. Eight thousand active nests have been found in the United States, and about 50% of the North American population is estimated to be located along the Atlantic Coast or the Gulf of Mexico (Poole 1989, as cited in Rattner et al 2001).

Figure 1. Range of the osprey in North America

Although winter occurrences of osprey have been recorded throughout the United States, the densest wintering populations in the States occur in Florida and along the gulf coast of Texas. The winter range of the osprey can extend through Mexico, Central America, and south to Argentina (Veit and Petersen 1993).

MIGRATION

Spring osprey migration in Massachusetts occurs mainly in April. Fall migration begins in August and peaks during October (Veit and Petersen 1993). Early arriving birds have been recorded during the first week of March (Forbush 1927). Males are thought to arrive earlier than females, most likely to reclaim territories and begin nest maintenance (Bent 1961). During fall migration, adult birds tend to leave the nesting territory and head southward before juvenile birds (Bent 1961). Juvenile osprey will remain in their wintering grounds during their second year, disperse further north during their third year, and typically will not return to natal areas until their fourth year (Newton 1979). Osprey migration patterns and timing are linked directly to the availability of prey (Newton 1979).

HABITAT

Although osprey can be found in both salt and freshwater habitats, they occur primarily in marine ecosystems (Rattner *et al*. 2001). Ospreys that breed in freshwater ecosystems depend on lakes, rivers, and increasingly on reservoirs. Ospreys prefer to hunt in shallow water areas of rivers, bays, or lakes where fish occur near the water surface (DeGraaf and Yamasaki 2001).

Nest site fidelity is strong. Single nests have been used for 45 years (Newton 1979). The nests consist of large masses of interwoven sticks located in sturdy trees, often large conifers with broken tops, or artificial structures including nesting platforms, utility poles, and bridge supports. As a result of prolonged use and annual repairs, nests can get as large as 6 feet high and 5 feet wide. In habitat lacking large trees, or tall structures, osprey will construct nests on bare ledge (Canadian Wildlife Service 2000).

In The Primary Study Area: Table 1 contains a summary of the literature review and observational data on the use by ospreys of the natural community types found within the primary study area.

Table 1. Habitat use by ospreys in the primary study area

Habitat Codes and Natural Community Classifications																			
Wetland Habitats												Terrestrial Habitats							
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
B	B	B	B																	

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

HOME RANGE AND TERRITORIALITY

Nest site availability and prey abundance are the most important determining factors for osprey home range size and territorial behavior (Newton 1979). The nest site is the focus of the home range and is typically the location of display, pair bonding, courtship feeding, and copulation (Newton 1979). Ospreys will occasionally nest in loose colonies with nests placed as close as 160 ft apart. Colonies occur mostly on islands or in close proximity to salt marshes (Bent 1961, Newton 1979). Ospreys will also use communal feeding areas in coastal bays and estuaries (Newton 1979). In situations with lower prey abundance, ospreys are solitary nesters, with nest sites spaced 6 or more miles apart (Rattner *et al.* 2001).

BREEDING

Ospreys are generally late-season breeders relative to other raptors of their size. This is likely due to an adaptive delay to allow ice to break up and to allow fish to move into shallow waters (Newton 1979). Breeding pairs in New England arrive at a nest site in early to mid-April and begin nest repairs and courtship. During the courtship period the male continually offers food to the female. This behavior continues throughout the breeding cycle, and is critical for pair bond formation and female fidelity (Poole 1985). Egg laying typically begins by early May (Veit and Petersen 1993). The clutch generally consists of 2 – 3 eggs and incubation lasts 37 – 38 days (Newton 1979). The male feeds the female throughout the incubation and brooding period. Male birds will also relieve the female for short durations (Newton 1979). Nestlings are fed in the nest for 4 – 60 days, and then remain in the area for an additional 3 – 4 weeks after fledging (Newton 1979). On average, nesting success of ospreys ranges from 0.7 – 1.4 young per nesting cycle.

GROWTH AND DEVELOPMENT

Like all diurnal birds of prey, osprey hatchlings emerge as "semi-precocial" young. This means that down covers their bodies and their eyes open hours after hatching, and they actively take food with their bills. By 10 – 20 days after hatching, a thick buff-colored plumage replaces hatchling down. Ten-day-old chicks are already mobile and quickly approach the female for food. The first feathers to appear are the rusty-golden pinfeathers on the head and neck. Darker body feathers develop slightly later, and primaries, secondaries, and outer feathers of the wings and tail emerge at 20 – 25 days. At 30 days old, they have reached 70 – 80% of their total body weight (Poole 1989, as cited in USEPA 1993).

The highest quantities of food are brought to the nest once the nestlings are 40 days old. At this period, the males are bringing up to 6 fish to the nest per day. During the early stages of brooding 2 – 3 fish are brought to the nest per day (Newton 1979). At the time of fledging, parents will make food transfer to the young increasingly difficult and attempt to lure the young progressively further from the nest site (Newton 1979).

MOLTING

Juvenile plumage is fully developed by 60 days of age (Henny 1988, as cited in USEPA 1993). By 18 months of age, juvenile birds have developed plumage similar to adult plumage, but do not develop full adult plumage until the end of their second year (Newton 1979). Basic molt in adult birds occurs in two phases; the first phase occurs while birds are on the wintering ground, and the second phase takes place in the summer prior to fall migration (Henny 1988 as cited in USEPA 1993).

FOOD HABITS AND DIET

Ospreys are primarily piscivorous, but will consume reptiles, small mammals, crustaceans and birds on occasion. This species forages by hovering over water and diving feet first for prey. The osprey feeds almost exclusively on medium-sized (i.e., 11 – 30 cm) live fish that remain in shallow waters or near the water's surface. The osprey is known to feed specifically on menhaden (*Brevoortia* sp.), channel catfish (*Ictalurus punctatus*), white perch (*Morone Americana*), shad (*Alosa* sp.), sunfish (Centrarchidae), largemouth bass (*Micropterus salmoides*), winter flounder (*Pseudopleuronectes americanus*), herrings (Clupeidae), and silversides (*Medidia* sp.), and will travel up to 6 – 10 miles to find food (Clark 1995, USEPA 1993 as cited by Rattner *et al*. 2001).

Ospreys are opportunistic and will hunt those species of fish most readily available at any certain time or location. As a result of this, the fish species preyed upon varies between osprey populations. Although the majority of osprey prey is live fish, they will often cruise weed beds looking for dead fish tangled in the littoral vegetation (Newton 1979).

ENERGETICS AND METABOLISM

Adult female ospreys have an estimated free living metabolic rate of 69 kcal/kg-day, and adult males have an estimated metabolic rate of 71 kcal/kg-day. A study of courtship feeding behavior completed at a Massachusetts osprey colony estimated daily food consumption at 940 g/pair/day or 1,175 kcal/pair/day, with males consuming on average 1.4 times more food mass than females (Poole 1985).

POPULATIONS AND DEMOGRAPHY

Survivorship: Estimated mortality among first-year birds is 57%. This rate decreases to 18% annually after the first year (Newton 1979).

Age at Maturity and Life Span: On average, ospreys reach maturity at 4.8 years of age (Newton 1979). Based on banding data, one osprey was 26 years and 2 months at time of recapture (Klimkiewicz 2000). This species has been known to live to 35 years of age, and the greatest number of recorded breeding seasons for a single bird is 23 (Canadian Wildlife Service 2000).

Mortality: The best-documented sources of mortality among osprey include nest collapses killing nestlings, and collisions with power lines near nest sites (Newton 1979). Adverse weather (i.e., cold rains, high winds, etc.) can cause high mortality among nestlings and fledglings.

Enemies: Direct predation of adult ospreys is poorly documented. The eagle owl (*Bubo bubo*) is known to kill both adult and nestling ospreys in Europe. In North America, great horned owls (*Bubo virginianus*) are known to take over nest sites and have been documented to prey on young and adults (Government of Canada 1996). Bald eagles (*Haliaeetus leucocephalus*) compete directly with osprey for food resources and will often harass ospreys forcing them to drop fish. Ospreys will typically avoid nesting in close proximity to eagle territories (Newton 1979). Osprey nests are often robbed by raccoon (*Procyon lotor*), American crow (*Corvus brachyrhynchos*), and common raven (*Corvus corax*) (Bent 1961).

STATUS

General: The use of the pestic ide DDT resulted in a dramatic decline of osprey populations in the northeast. By 1970, fewer than 10 successful nests occurred in Massachusetts (Veit and Petersen 1993). In 1990, surveys documented 190 nesting pairs of osprey nesting in Massachusetts. Populations are currently increasing in Cape Cod and outer islands as a result of nest platform construction. Given the present trend, population increases are expected to continue in the northern portion of the breeding range. Current osprey populations in Massachusetts exceed pre-DDT numbers in several portions of the state (Veit and Petersen 1993).

In The Primary Study Area: Figure 2 shows the locations where ospreys were observed during the 1998 – 2000 field surveys. In general, ospreys were uncommon visitors to the study area, and no active nesting was observed. Most observations were during late summer and fall (i.e., the fall migration period), and many of the osprey were seen feeding on goldfish (*Carassius auratus*) taken from the river and backwaters.

REFERENCES

Bent, A.C. 1961. Life Histories of North American Birds of Prey, Part 1. Dover Publications, Inc, New York, NY, USA.

Canadian Wildlife Service. 2000. Hinterland Who's Who - Osprey. URL http://www.cws-scf.ec.gc.ca/hww-fap/osprey/osprey.html.

Clark, K.E. 1995. Osprey. p. 395-400. In L.E. Dove and R.M. Nyman (ed.) Living Resources of the Delaware Estuary. The Delaware Estuary Program, DE, USA.

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH, USA.

Forbush, E.H. 1927. Birds of Massachusetts and Other New England States. Vol. 2. Massachusetts Department of Agriculture, Commonwealth of Massachusetts, MA, USA.

Government of Canada. 1996. Great Lakes Fact Sheet - The Fall and Rise of Osprey Populations in the Great Lakes Basin. URL http://www.on.ec.gc.ca/glimr/data/osprey-glbasin/intro.html.

Henny, C.J. 1988. Osprey. In R.S. Palmer (ed) Handbook of North American Birds, Vol. 4. Yale University Press, New Haven, CT, USA.

Klimkiewicz, M.K. 2000. Longevity Records of North American Birds. Version 2000.1. Patuxent Wildlife Research Center. Bird Banding Laboratory. Laurel, MD, USA. URL http://www.pwrc.usgs.gov/bbl/homepage/longvrec.htm.

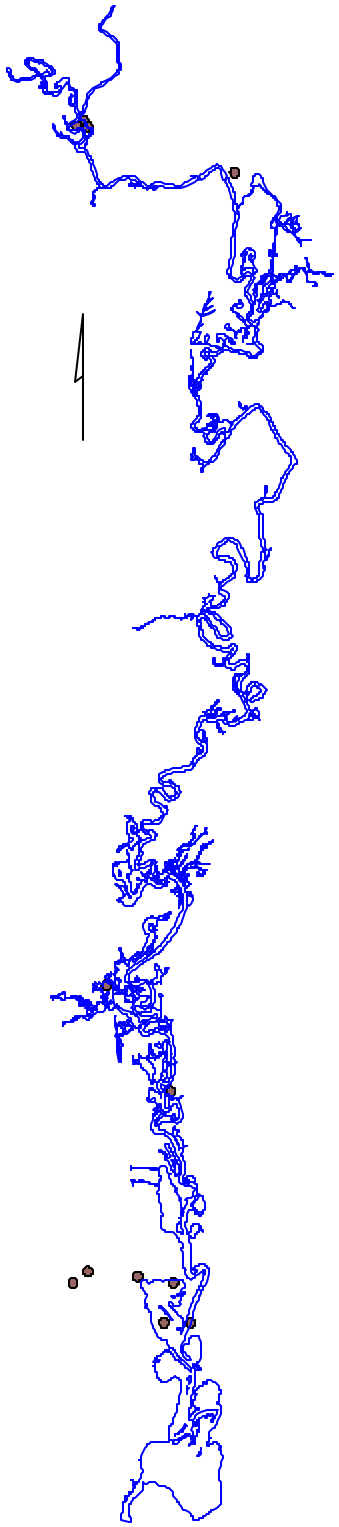


Figure 2. Osprey sightings in the primary study area

Newton, I. 1979. Population Ecology of Raptors. Buteo Books, Vermillion, SD, USA.

Poole, A. 1985. Courtship feeding and osprey reproduction. Auk 102(3):479-492.

Poole, A.F. 1989. Ospreys: A Natural and Unnatural History. Cambridge University Press, Cambridge, MA, USA.

Rattner, B.A., N.H. Golden, J.L. Pearson, J.B. Cohen, L.J. Garrett, M.A. Ottinger, and R.M. Erwin. 2001. Biological and Ecotoxicological Characteristics of Terrestrial Vertebrate Species Residing in Estuaries. URL http://www.pwrc.usgs.gov/bioeco/default.htm.

USEPA. 1993. Wildlife Exposure Factors Handbook. Volume 1 of 2. EPA/600/R-93/187a. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC, USA.

Veit, R.R., and W.R. Peterson. 1993. Birds of Massachusetts. Massachusetts Audubon Society, Lincoln, MA, USA.

Red Fox

Vulpes vulpes

DESCRIPTION

The red fox is a ubiquitous wild canine occurring in a variety of habitats throughout its range. Although its typical pelage color is red, the red fox also occurs in a melanistic form called a "silver fox" and with a gray and yellow mixed pelage referred to as a "cross fox." Regardless of its color phase, the red fox can be identified by its characteristic bushy, white-tipped tail, pointed muzzle, and prominent ears.

BODY SIZE

The red fox varies in size throughout its geographic range with males typically larger than females (Lariviere and Pasitschniak-Arts 1996). In an Indiana study, male foxes (n = 195) averaged 105.2 cm in length and 4.9 kg in weight. Females (n = 126) averaged 95.1 cm in length and 4.0 kg in weight. For males and females combined, lengths ranged from 89 – 111 cm and weight ranged from 3.4 – 6.4 kg (Whitaker and Hamilton 1998). In Ontario, Canada, male foxes averaged 102.6 cm in length (n = 34) and 4.1 kg in weight (n = 37). Females averaged 97.3 cm in length (n = 34) and 3.4 kg in weight (n = 37) (Voigt 1987, as cited in Lariviere and Pasitschniak-Arts 1996).

DISTRIBUTION

The red fox is the most widely distributed carnivore in the world, occurring throughout most of Europe and Asia and in parts of Africa and the Middle East (Lariviere and Pasitschniak-Arts 1996). The species was introduced to Australia where it is now widespread. In North America the red fox is present throughout Canada and the United States (Figure 1), excluding the arctic, portions of the south Atlantic coastal region, the southwestern desert, the Pacific coastal region, and portions of the south-central Great Plains (Lariviere and Pasitschniak-Arts 1996, Whitaker and Hamilton 1998).

The red fox is native to the North American continent, but prior to the 1600's it was either rare or not present along the eastern seaboard. The species was introduced from England to this portion of the United States between 1650 and 1750 for the sport of fox hunting (Gilmore 1946). Both the native and introduced red fox are now considered to be the same species (Whitaker and Hamilton 1998). Competition from other wild canids, in particular the coyote (*Canis latrans*), may be one of the primary limiting factors on the local distribution of this species (Harrison *et al*. 1989, Englehardt 1986, Voigt and Earle 1983).

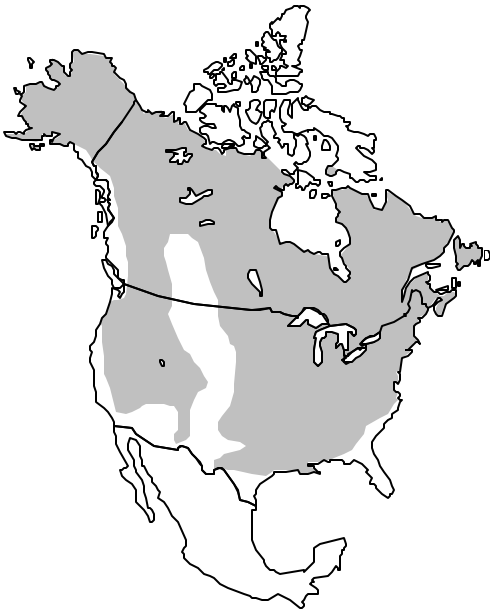


Figure 1. Range of red fox in North America

MIGRATION

The red fox is a non-migratory species that maintains its territory throughout the year (Voigt 1987, as cited in Lariviere and Pasitschniak-Arts 1996).

HABITAT

The red fox occupies a wide range of habitats including semi-arid deserts, tundra, farmland, boreal forests, and metropolitan areas (Lariviere and Pasitschniak-Arts 1996). The species appears to thrive in heterogeneous and fragmented landscapes as opposed to large unbroken tracts of land. Its preferred habitat is an interspersion of

forest, cropland, and pastureland (Voigt 1987, Lariviere and Pasitschniak-Arts 1996).

In Maine, the species has been found to preferentially use riparian habitats when they are available, provided coyote territories have not been established in these areas. Eighty-one percent of the locations (n = 669) of radio-collared foxes (n = 11) were < 1 km from a major river, stream, or lakeshore (Harrison *et al*. 1989). Red foxes also occur in developed areas including the outskirts of large metropolitan areas such as New York City and Boston, but are more abundant in residential suburbs than in industrial and commercial areas (Whitaker and Hamilton 1998, Lariviere and Pasitschniak-Arts 1996).

In New England, within forested habitats, red foxes may use a wide variety of forest cover types, but mostly preferred early successional stands (DeGraaf and Yamasaki 2001). Other habitats used by this species include upland fields, savannas, orchards, alpine zone, palustrine wetland systems (excluding ponds), riparian zones, coastal beaches, sand/gravel banks, and areas with exposed bedrock, cliffs, or talus (DeGraaf and Yamasaki 2001).

Availabilities of prey and suitable den sites are key factors affecting habitat selection by red fox (Whitaker and Hamilton 1998, Lariviere and Pasitschniak-Arts 1996). They prefer to locate their dens in a forest, but close to an open area, or in areas that provide thick cover (Whitaker and Hamilton 1998; Voigt and Broadfoot 1983). Typically, a den will be located on a hillside underlain by sandy loam or other soft soil, usually within 100 meters (330 feet) of a source of water (Whitaker and Hamilton 1998).

Other environmental factors such as snow depth also may affect habitat selection. For example, during the winter in Maine, red fox preferentially utilized softwood stands and open areas over hardwood forests to avoid deep or soft snow. Crusts that develop in open areas also make travel easier for foxes, but restrict prey availability. During winters with deep snow, red foxes in Maine shift their habitat use to areas with dense understory vegetation (i.e., alder thickets and mixed or softwood stands). These habitats not only have lower snow depths, but they also support higher populations of snowshoe hare, which form a large component of the red fox's diet. (Halpin and Bissonette 1988).

In The Primary Study Area: Table 1 contains a summary of the literature review and observational data on the use by red fox of the natural community types found within the primary study area.

HIBERNATION

The red fox does not hibernate, but remains active throughout the year. Kolb (1986) found that the ranges of adult European vixens were stable throughout the year regardless of the season.

HOME RANGE AND TERRITORIALITY

An individual home range for the red fox is occupied by a single family unit composed of a male-female pair and their pups (DeGraaf and Yamasaki 2001). Home ranges of this species typically are well defined, non-overlapping and contiguous, and conform to natural physical boundaries (Sargeant 1972). In cases where home ranges do overlap, the family units may be genetically related (Voigt 1987). The red fox appears to display at least some site fidelity. Family units in Poland occupied the same territory during several winters (Goszczynski 1989 as cited in Lariviere and Pasitschniak-Arts 1996). According to Voigt (1987), home ranges in this species may be synonymous with territories because foxes actively defend their home ranges. In Maine, the average annual home range size of six adult foxes was 14.7 km^2 (6.0 – 27.5 $\pm$ 3.7 SE) (Harrison *et al*. 1989). In an Ontario (Canada) study, territory size ranged from 5 to 20 km^2, with an average size of 9 km^2 (Voigt and Tinline 1980 as cited in DeGraaf and Yamasaki 2001). Available prey biomass and the patchiness of prey appear to affect territory size in this species (Voigt and Macdonald 1984).

At the time of dispersal, young male and female foxes have been documented to disperse more than 8 km from their natal ranges during their first year,

with distances of 24 to 32 km common (DeGraaf and Yamasaki 2001). Storm *et al*. (1976) reported mean dispersal distances of 31 km for males and 11 km for females in the Midwestern U.S. A 5-year study conducted in North Dakota found that straight-line dispersal distances ranged from 0 to 302 km, the average dispersal distance increased with the age of the fox, and males had a greater average dispersal distance than females (Allen and Sargeant 1993).

BREEDING

Female foxes typically breed the first fall or winter after their birth, but in areas with high population densities most yearling do not breed successfully (Lariviere and Pasitschniak-Arts 1996). Harris (1979) found that in areas with high fox population densities, 52% of yearling vixens did not breed. Some studies have seen a strong correlation between food availability and the number of yearling vixens that breed, while others indicate that breeding may also be limited by social behavior. Social groups in suburban London are often comprised of one dog fox and several vixens and typically only the dominant vixen breeds. In southwestern Ontario (Canada) where population levels were lower than in suburban London and family groups were generally pairs, 80 – 90% of the yearling vixens and 95% of older females successfully produced litters (Voigt and Macdonald 1984). Litter size (i.e., female fecundity) is also influenced by food supply (abundance of *Microtus* and *Clethrionomys* populations), mortality, and age of the female (Harris 1979, Voigt 1987 as citied in DeGraaf and Yamasaki 2001).

Red foxes are seasonally monogamous, although monogamy is not always exclusive (Whitaker and Hamilton 1998). They breed from mid-January to late February, sometimes extending into March. This species is monestrous and only one litter is produced per year Young are born in late March or early April after an average gestation period of 53 days (range 51 to 56 days). Litter size can range from one to 12 with an average of four to five pups per litter (Lariviere and Pasitschniak-Arts 1996, Whitaker and Hamilton 1998, DeGraaf and Yamasaki 2001).

GROWTH AND DEVELOPMENT

At birth, the pups (or kits) weigh a little over 100 g, are lightly furred, and their eyes are closed. Their eyes open at about 10 to 12 days old and they are well-furred by that time (Whitaker and Hamilton 1998). During the first two weeks after birth, the female remains in the den nursing and providing warmth for the pups. The male brings food to the den for the vixen during this time. The pups have established a dominance hierarchy by the time they are three to four weeks old and during this time weaker individuals may die from malnutrition (Whitaker and Hamilton 1998).

By four to five weeks of age, the pups are eating solid food brought to the den by both parents. "Helper" foxes, which are usually females from a previous litter, also may help feed pups from the current litter. Kits are weaned by 8 to 10 weeks of age (Whitaker and Hamilton 1998; Sargeant 1978). The kits remain at their natal den until they are about 3.5 months old, at which time they begin to hunt for themselves.

By September, young males begin to disperse and attempt to establish their own territories. Females also may disperse or they may remain up to several years in their natal territory (Whitaker and Hamilton 1998). Allen and Sargeant (1993) found that 64% of males and only 29% of females dispersed during their first year. As the animals aged, a larger percentage of both males and females had dispersed from their parental territories.

FOOD HABITS AND DIET

Reports of food consumption for this species are variable and range from 0.38 to 0.57 kg of prey per day (Whitaker and Hamilton 1998). In one study (Sargeant 1978), captive adult red foxes required 2.25 kg of food per week. Pups 5 – 8 weeks of age, 9 – 12 weeks, and pups more than 12 weeks old required 1.38, 1.9, and 2.54 kg of food per week, respectively.

Red foxes are omnivorous and feed on a variety of prey and plant material. Their diet includes insects, small mammals (e.g., rodents and

lagamorphs), birds, turtles, frogs, snakes, fish, eggs, carrion, earthworms, berries, fruits, seeds, and garbage (DeGraaf and Yamasaki 2001). Mustelids, raccoons (*Procyon lotor*), opossums (*Didelphis virginiana*), muskrats (*Ondarta zibethicus*), deer fawns, and ringed seal (*Phoca hispida*) pups are also know to be taken by red fox (Lariviere and Pasitschniak-Arts 1996). Birds in the fox's diet include galliformes, passeriformes, columbiformes, anseriformes, and raptors (Lariviere and Pasitschniak-Arts 1996). Anseriformes consumed by red foxes include blue-winged teal (*Anas discors)*, northern pintail *(Anas acuta)*, mallard *(Anas platyrhynchos*), northern shoveler (*Anas clypeata)*, gadwall (*Anas strepera)*, American wigeon (*Anas americana*), and green-winged teal, (*Anas crecca)* (Sargeant *et al*. 1984).

In a Maine study, scat analysis (n = 500) showed that the diet of the Maine red foxes include a variety of prey and plant material. Prey included snowshoe hare (*Lepus americanus)*, white-tailed deer (*Odocoileus virginianus*), mice (*Peromyscus* spp.), woodland jumping mice (*Napaeozapus insignis*), southern red-backed vole (*Clethrionomys gapperi*), meadow vole (*Microtus pennsylvanicus*), short-tailed shrew (*Blarina brevicauda*), other species of shrews (*Sorex* spp.), birds, red squirrel red squirrel (*Tamiasciurus hudsonicus*), muskrat, moose (*Alces alces)*, insects, beaver (*Castor canadensis)*, porcupine (*Erethizon dorsatum*), and raccoon (DiBello *et al*. 1990). It is assumed that most, if not all, white-tailed deer and moose remains present in scat were the result of scavenging activities rather than actual kills. Plant material present in the diet included blueberries (*Vaccinium* spp.), raspberries (*Rubus* spp.), pin cherries (*Prunus pensylvanica*), chokecherries (*Prunus virginiana*), serviceberries (*Amelanchier* spp.), apples (*Malus* spp.), beech nuts (*Fagus grandifolia*), and sarsaparilla (*Aralia* spp.).

The red fox's diet varies throughout the year and changes with food availability. During the winter, their diet includes mice, rabbits, birds, carrion, apples, and dried berries. The spring and summer diet includes rabbits, rodents and other small mammals, woodchucks, poultry, birds, snakes, turtles and their eggs, deer fawns, raspberries, and blackberries. Wild cherries, grapes, grasshoppers, and mice are consumed during the fall (Whitaker and Hamilton 1998). In Maine, consumption of small mammals by red foxes increases from winter to summer and from summer to fall, which

Table 1. Habitat use by red fox in the primary study area

Habitat Codes and Natural Community Classifications																				
Wetland Habitats												Terrestrial Habitats								
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
		Y	Y	Y	Y	Y	Y	Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

coincides with increases in small mammal production resulting in peak populations during September and October (DiBello *et al.* 1990). In the northern prairies states, nesting dabbling ducks form a major portion of the red fox diet during the denning season (Sargeant *et al.* 1984).

Environmental conditions such as snow depth can also result in dietary changes. For example, in Maine foxes appear to eat more snowshoe hare and fewer small mammals during severe winters (Halpin and Bissonette 1988, DiBello *et al.* 1993). Diet selection can also vary with availability based on geographic location. Blueberries occurred in 74.7% of the fox scat that contained fruits in a study area that included large commercial blueberry barrens, versus 1.5% of the scats in a second study area without commercial barrens (DiBello *et al.* 1990).

Red foxes will cache surplus food under leaf litter or snow and mark the location with urine (Whitaker and Hamilton 1998, DeGraaf and Yamasaki 2001). Cashes appear to be relocated by memory and scent, but these cashes may be raided by other animals.

POPULATIONS AND DEMOGRAPHY

Population Densities: Population density estimates of red fox in southern Ontario ranged from 0.1 fox/km^2 to 3 fox/km^2 depending on the habitat quality (Voigt 1987).

Age at Maturity and Life Span: Both the male and female of this species reach sexual maturity the fall or winter following their birth (DeGraaf and Yamasaki 2001). Red fox typically live between three to seven years, although they have been documented to live up to about nine years in the wild (Allen and Sargeant 1993 as cited in Lariviere and Pasitschniak-Arts 1996, Whitaker and Hamilton 1998).

Mortality: In addition to predation, other sources of mortality include trapping, hunting and collisions with vehicles. In a study conducted in North Dakota, 51% of 363 tagged red foxes were trapped, 28% were shot, and 21% died from other causes including collisions with vehicles (Allen and Sargeant 1993). Disease also can impact red fox populations. For example, in Ontario, Canada rabies has been enzootic since 1954 and most areas experience epizootic events every three to four years (Voigt and Macdonald 1984).

Enemies: Wolves (*Canis lupus*), coyotes, mountain lions (*Puma concolor*), lynx (*Lynx canadensis*), bobcats (*Lynx rufus*), and domestic dogs (*Canis familiaris*) may kill adult red foxes (Lariviere and Pasitschniak-Arts 1996). Young foxes also are killed by a number of different mammalian and avian predators (Whitaker and Hamilton 1998).

STATUS

General: The red fox occurs throughout New England and its regional status ranges from common to uncommon (DeGraaf and Yamasaki 2001).

In The Primary Study Area: During snow tracking surveys in 1999 and 2000, fox tracks were identified at scent post stations on at least six occasions. Observations of the animals or their sign (i.e., tracks or scat) were relatively uncommon. Figure 2 illustrates the locations where red fox, or their sign, were observed in the primary study area in the course of the 1998 to 2000 field work.

REFERENCES

Allen, S. H., and A. B. Sargeant. 1993. Dispersal patterns of red foxes relative to population density. Journal of Wildlife Management. 57:526-533.

DeGraaf, R. M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History and Distribution. University Press of New England, Hanover, New Hampshire. 482pp.

DiBello, F., S. Arthur, and W. Krohn. 1990. Food habits of sympatric coyotes, red foxes, and bobcats in Maine. Canadian Field Naturalist. 104:403-408.

Engelhardt, E. 1986. Analysis of red fox and coyote home range use in relation to artificial scent marks. University of Maine, Orono, Maine. 62pp.

Goszczynski, J. 1989. Population dynamics of the red fox in central Poland. Acta Theriologica. 34:141-154.

Halpin, M. A., and J. A. Bissonette. 1988. Influence of snow depth on prey availability and habitat use by red fox. Canadian Journal of Zoology. 66:587-592.

Harris, S. 1979. Age-related fertility and productivity in red foxes, *Vulpes vulpes*, in suburban London. Journal of Zoology. 187:195-199.

Harrison, S. J., J. A. Bissonnette, and J. A. Sherburne. 1989. Spatial relationships between coyotes and red foxes in eastern Maine. Journal of Wildlife Management. 53:181-185.

Kolb, H. H. 1986. Some observations on the home ranges of vixens in the suburbs of Edinburg. Journal of Zoology. 210:636-639.

Lariviere, S., and M. Pasitschniak-Arts. 1996. *Vulpes vulpes*. Mammalian Species No. 537. American Society of Mammalogist. 11pp.

Sargeant, A. B. 1972. Red fox spatial characteristics in relation to waterfowl predation. Journal of Wildlife Management. 36(2):225-236.

Sargeant, A. B. 1978. Red fox prey demands and implications to prairie duck production. Journal of Wildlife Management. 42:520-527.

Sargeant, A. B., S. H. Allen, and R. T. Eberhardt. 1984. Red fox predation on breeding ducks in mid-continent North America. Wildlife Monographs. 89:1-41.

Storm, G. L., R. D. Andrews, P. L. Phillips, R. A. Bishop, D. B. Siniff, and J. R. Tester. 1976. Morphology, reproduction, dispersal, and mortality of Midwestern red fox populations. Wildlife Monograph No. 49. 82pp.

Voigt, D. R. 1987. Red fox *In* M. Novak, J. A. Baker, M. E. Obbard, and B. Mallock, eds., Wild Furbearer Management and Conservation in North America, pp. 378-392. Toronto: Ontario Ministry of Natural Resources.

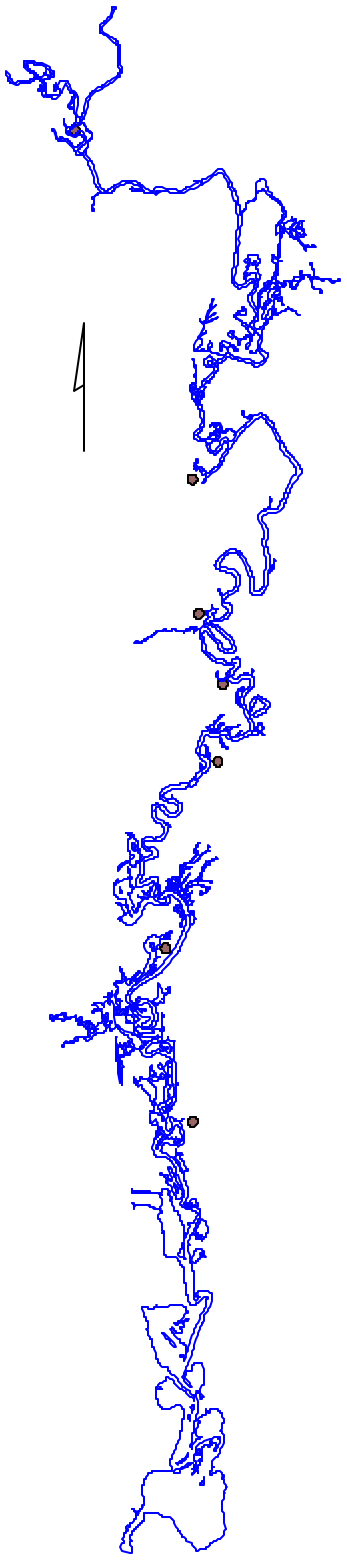


Figure 2. Red fox sightings in the primary study area

Voigt, D. R., and J. Broadfoot. 1983. Locating pup-rearing dens of red foxes with radio-equipped woodchucks. Journal of Wildlife Management. 47(3): 858-859.

Voigt, D. R., and B. D. Earle. 1983. Avoidance of coyotes by red fox families. Journal of Wildlife Management. 47(3):852-857.

Voigt, D. R., and D. W. Macdonald. 1984. Variation in the spatial and social behaviour of the red fox, *Vulpes vulpes*. Acta Zoologica Fennica. 171:261-265.

Voigt, D. R., and R. L. Tinline. 1980. Strategies for analyzing radio tracking data *In* C. J., Anlaner, Jr, D. W. Macdonald, eds. A handbook on biotelemetry and radio tracking, pp. 387-404. Oxford, U.K., Pergamon Press.

Whitaker, J.O., Jr., and W.J. Hamilton, Jr. 1998. Mammals of the Eastern United States. Cornell University Press, Ithica, NY. 583pp.

River Otter

Lontra canadensis (formerly *Lutra canadensis*)

DESCRIPTION

The river otter is a large, aquatically-adapted member of the weasel family. This shy and secretive animal is a strong and graceful swimmer, with an ability to dive to depths of about 60 ft. Like other members of its family, the river otter has a long body, short legs, and a long neck. The head is broad and flattened and its muscular, tapering tail typically equals about one third of its total body length. The pelage is dark brown above and lighter below. The lips cheeks, chin, and throat also are a lighter brown (Whitaker and Hamilton 1998).

BODY SIZE

River otters display sexual dimorphism in body size, with adult males reported to be about 17% heavier and significantly longer than adult females. Average measurements of four adult males from Idaho (Whitaker and Hamilton 1998) were: total length 117.7 cm (range = 115.0 – 120.1, SE 1.05); tail 46.3 cm (range = 44.5 – 47.9, SE 0.77); and hind foot 13.3 cm (range = 12.8 – 13.7, SE 0.19). Six adult females from the same study area had the following average measurements: total length 111.1 cm (range = 107 – 113.2, SE 0.91); tail length 43.7 cm (range = 42.4 – 45.2, SE 0.37); and hind foot 12.7 cm (11.9 – 13.4, SE .26).

The adult males in the Idaho study area had an average body weight of 9.2 kg (range = 8.0 – 11.0, SE = 0.6), while the body weight of adult females averaged 7.9 kg (range = 7.5 – 8.0, SE = 0.2). These measurements fall within the ranges of river otters from the eastern U.S. as reported by Whitaker and Hamilton (1998). Interestingly, the weight of adult females may decrease after they reach four years of age (Stephenson 1977 as cited in Melquist and Hornocker 1983).

DISTRIBUTION

The current range of the river otter in North America is shown in Figure 1 (from Whitaker and Hamilton 1998). Historically, the river otter occurred throughout much of the U.S. and Canada excluding the drier Southwestern states and the northern tundra of Alaska and Canada (Melquist and Hornocker 1983). Beginning in the 19th century or earlier, river otter numbers and distribution declined significantly (Organ 1989). A 1976 study suggested that river otter were believed to be present in 44 states and 11 Canadian provinces and territories (Deems and Pursley 1978, as cited in Melquist and Hornocker 1983). Whitaker and Hamilton (1998), however, indicate that habitat loss, over-harvesting, and pollution

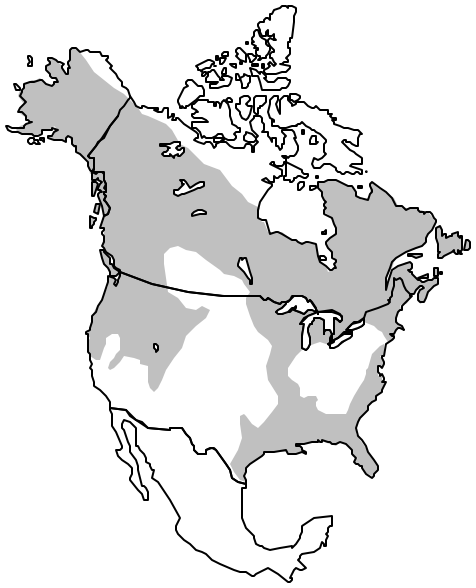


Figure 1. Range of the river otter in North America

have reduced the otter's range to a third of its original distribution and caused its extirpation from portions of the mid-Atlantic and central U.S. Recent protection and re-introduction efforts in Ohio, Illinois, Indiana, and Pennsylvania have allowed the species to make a comeback in those areas. In 1977, the river otter was included in Appendix II of the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES), which limited trade of otter pelts. Some states have prohibited harvesting of the river otter to provide additional protection for this species (Melquist and Hornocker 1983).

MIGRATION

The river otter is non-migratory, but will travel between different foraging locations throughout the course of the year. In Idaho, conservative estimates of average daily distance traveled by otters (including family groups) ranged from 0.4 to 3.1 miles (Melquist and Hornocker 1983). During dispersal and exploration of their home ranges, river otters will travel much greater distances in a single day (i.e., up to 26 miles).

HABITAT

River otters use both freshwater and brackish habitats. They occur in lacustrine (i.e., lake) and riverine waterbodies, as well as their associated wetland habitats (Whitaker and Hamilton 1998). Prey availability appears to be the primary factor affecting habitat selection (Melquist and Hornocker 1983). Also of importance is the presence of adequate shelter and limited human activity. Habitat use varies during the course of the year based on accessibility and food availability. For example, mudflats and open marshes in Idaho were often used during the summer, but rarely during the winter when snow and ice limited accessibility. In Florida, river otter will move from temporarily flooded marshes to cypress swamps that include permanent ponds. These swamps represent the little remaining aquatic habitat for both the otter and fish, which are the otter's primary prey, during the driest part of the year (Humphrey and Zinn 1982).

In New England, river otters will preferentially select riverine and lacustrine systems, but will also use estuaries, salt marshes, and most palustrine wetlands. They may also be present in a variety of forest cover types provided a waterbody is nearby (DeGraaf and Yamasaki 2001). In coastal Maine, river otters select habitat associated with beaver flowages, which provided abundant food, stable water levels, escape cover, and resting and dens sites. These areas also are relatively free from human disturbance. Habitat use by river otter in Maine is positively correlated with the length of the stream and the average shoreline diversity (e.g., the amount of shallow habitat available for foraging). River otters in coastal Maine avoid watersheds within mixed hardwood-softwood communities, which are typically less productive, headwater streams (Dubuc *et al.* 1990).

In Massachusetts, river otters use a variety of palustrine, riverine and lacustrine wetland systems with no particular preference for any one community type (Newman and Griffin 1994). In Idaho, river otters use a variety of habitats throughout the course of the year, including mudflats, open marshes, forest streams, swamps and backwater sloughs, large lakes and reservoirs, and smaller ponds. Idaho river otters preferred stream-associated habitats to lakes, reservoirs, and ponds (Melquist and Hornocker 1983).

Within any given habitat, river otters select locations referred to as latrines, where they leave the water to defecate, urinate, scent mark, and groom (Newman and Griffin 1994). Habitat characteristics specifically associated with otter latrines include the presence of rock formations, backwater sloughs, fallen logs, vertical banks, large conifers, points of land, beaver bank dens and lodges, isthmuses, and the mouths of permanent streams (Newman and Griffin 1994, Swimley *et al.* 1998).

River otters also have numerous den and resting sites within their home range that they use over the course of a year. These sites provide river otters with protection as well as isolation (Melquist and Hornocker 1983). Den and resting sites may be located in logjams, riparian vegetation, snow or ice cavities, rip-rap, talus rock, boulders, brush and log

piles, undercut banks, boat docks, abandoned dam spillways, and dens constructed by other animals (e.g., beaver, muskrat, woodchuck, fox, or coyote) (Liers 1951, Melquist and Hornocker 1983). Melquist and Hornocker (1983) found that river otters used active and abandoned beaver bank dens and lodges more often than any other den or resting site, probably because they provide shelter as well as underwater egress.

In the Primary Study Area: River otter signs were observed at only three locations in the primary study area during the 1998, 1999, and 2000 field surveys. Each of these observations was adjacent to the main stem of the Housatonic River. One in the northern portion of the study area was an apparent latrine site at a section of the river bank with a possible den site offering water access. That site was located at the edge of a floodplain forest. The second observation was in the central portion of the study area, consisting of a scat found at one of the study's scent post stations within a wet meadow at the river edge. The third observation was also a scat, located in an open shrub swamp near the river (refer to Figure 2 below). Table 1 contains a summary of the literature review and observational data on the use by river otters of the natural community types found within the primary study area.

HIBERNATION

River otters do not hibernate. They remain active throughout the year and actually show an increase in activity level during the winter. Although activity levels generally increase during the winter, travel may be restricted by snow and ice cover. During much of the year river otters are primarily nocturnal, with peak activity occurring around mid-night and just before dawn. During the winter, however, river otters appear to be more diurnal (Melquist and Hornocker 1983).

HOME RANGE AND TERRITORIALITY

Home range for the river otter is often expressed in linear measurements because they typically occur along rivers and lake shores. Melquist and Hornocker (1983) reported home ranges from 5 – 50 linear miles for a population in Idaho. Area home ranges have been estimated from 448 – 14,080 acres (0.7 – 22 sq. mi.) (Melquist and Dronkert 1987, as cited in DeGraaf and Yamasaki 2001). Male river otters typically occupy larger home ranges than females (DeGraaf and Yamasaki

Table 1. Habitat use by river otter in the primary study area

Habitat Codes and Natural Community Classifications																			
Wetland Habitats													Terrestrial Habitats						
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
Y	Y	Y	Y		Y			Y	Y	Y	Y									

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

2001). River otter display a high degree of individual and seasonal variation in home range size. Home range size in Idaho was somewhat influenced by the age, sex, and social status (i.e., solitary versus family group), although no clear association was evident. Adult females with pups are generally restricted to the area around the natal dens in the spring while pups are young.

Home ranges include activity centers, where a river otter spends at least 10% of its time during a given season. Activity centers are located in areas with both an abundant prey base and sufficient shelter (Melquist and Hornocker 1983). Activity centers vary during the course of the year with changing prey availability, which may affect seasonal home range size. For example, Melquist and Hornocker (1983) found that individual home range lengths typically increased during the winter in their Idaho study area.

Other than family groups, otters are generally solitary. They will, however, form temporary associations that may consist of related or unrelated individuals. Home ranges in this species have been shown to overlap extensively, with some otters sharing essentially the same home range. Separation appears to occur at the activity centers, with individuals or family groups using different activity centers within the home range or using the same activity centers, but at different times throughout the day (Melquist and Hornocker 1983). When a food source is abundant and concentrated, such as during a spawning run of fish, river otters may use the same activity center at the same time. River otters do not appear to defend a defined area within their home range that would represent a territory, but rather will defend an area surrounding their immediate physical location (Melquist and Hornocker 1983). Animals using overlapping home ranges or activity centers prevent confrontation through mutual avoidance.

BREEDING

River otters are polygamous; males mate with more than one female during a breeding season. River otters mate shortly after the young are born. Breeding in the northern part of the range occurs between March and April with estrus beginning soon after parturition and lasting 42 to 46 days (Hamilton and Eadie 1964, Melquist and Hornocker 1983, DeGraaf and Yamasaki 2001). Implantation in this species is delayed for approximately 8 to 9.5 months. Implantation of the embryo occurs approximately in February in New York, earlier in the south (Whitaker and Hamilton 1998). Gestation has been estimated to range from 11 to 12 months, with actual embryonic development lasting 61 to 63 days (Hamilton and Eadie 1964; Melquist and Hornocker 1983). Typically the young are born between February and April, although the timing of birth varies with geographic location (range: November through May). Litter sizes range from 1 – 6 pups, with an average of 2 – 3 pups (mean = 2.6 based on embryo counts) (Hamilton and Eadie 1964, Chilelli *et al*. 1996). Studies in Georgia and Alabama have shown a 50% pregnancy rate in some areas, suggesting that females may breed only every other year there (Whitaker and Hamilton 1998).

GROWTH AND DEVELOPMENT

Pups weigh about 275 g at birth. They are fully furred, but their eyes are closed and they are toothless. Their eyes open when the pups are about 35 days old and pups are weaned at about five months of age (Liers 1951, Whitaker and Hamilton 1998). They forage with the mother at about 10 to 11 weeks. Pups may remain with their mother until they disperse at 12 to 13 months of age, usually in the fall or winter. Juveniles do not reach adult length until they are three to four years of age even though they may breed at two years (Melquist and Hornocker 1983, Whitaker and Hamilton 1998).

FOOD HABITS AND DIET

The river otter is a carnivorous and piscivorous feeder that occupies an upper trophic level. Fish typically represent the primary prey item in the diet, with crayfish, amphibians, insects, birds, reptiles, and mammals also consumed (Sheldon and Toll 1964, Knudsen and Hale 1968, Toweill 1974, Melquist and Hornocker 1983). In two studies, fish remains were found in 92 – 100% of the analyzed scat (Sheldon and Toll 1964, Melquist and Hornocker 1983). One study in Massachusetts

found that otters also consume blueberries when they are available (Sheldon and Toll 1964).

The diet of the river otter varies during the course of the year with changing prey availability. For example, in areas where spawning runs of fish occur, river otters will shift their hunting efforts to these concentrated prey items when they are available (Melquist and Hornocker 1983). Because prey availability also varies with geographic location, the diet of the river otter does differ throughout its range. Crayfish form an important part of the river otter's diet in much of its range, but because crayfish do not occur in the upper Payette River drainage in Idaho, they were not present in the diet there (Melquist and Hornocker 1983). Analyses of stomach contents indicate that some insects present in stomach were the result of direct consumption by river otter, whereas other insects were most likely the result of secondary ingestion (i.e., insects initially consumed by fish) (Toweill 1974, Melquist and Hornocker 1983).

River otters consume a wide range of fish including: Cyprinidae (minnows, carp, northern squawfish), Centrarchidae (smallmouth bass and sunfish), Percidae (yellow perch, darters), Cyperinodontidae (killifish), Catostomidae (e.g., white sucker, largescale sucker), Ictaluridae (bullheads, catfish), Salmonidae (salmon, trout, whitefish, Arctic grayling), Petromyzontidae (lampreys), Gadidae (burbot), Cottidae (sculpins), Gasterosteidae (sticklebacks), Umbridae (mudminnows), and Esocidae (northern pike and pickerel) (Hamilton 1961, Sheldon and Toll 1964, Knudsen and Hale 1968, Toweill 1974, Gilbert and Nancekivell 1982, Melquist and Hornocker 1983).

Prey selection by river otters seems to be dependent upon the species most vulnerable to predation, a function of the prey species' abundance, size, and swimming ability (Melquist and Hornocker 1983). In general, river otters preferentially prey upon slower-moving and schooling species of fish, which are easier to catch, and focus their effort upon the more prevalent and less agile species (Ryder 1955 as cited in Toweill 1974, Whitaker and Hamilton 1998). Sheldon and Toll (1964) also reported that habitat selection, time of day, fish spawning periods, and environmental conditions such as ice cover and water temperature may affect prey selection by river otter. River otters consume fish ranging in size from 2.0 – 50.0 cm. The length of the three predominant prey species in an Idaho study being greater than 30 cm long (Hamilton 1961, Melquist and Hornocker 1983).

Other components of the river otter's diet include: crustaceans (crayfish, crabs, shrimp, pillbugs), mollusks (clams, periwinkles, freshwater mussels), amphibians (adult and larval frogs, salamanders, newts), reptiles (turtles, snakes), insects (Coleoptera, Plecoptera, Diptera, Neuroptera, Tricoptera, Odonata), mammals (*Sorex fumeus, Microtus pennsylvanicus, Clethrionomys gapperi, Peromyscus maniculatis, Thononys talpoides, Tamiasciurus hudsonicus, Ondatra zibethicus, Castor canadensis, Synaptomys borealis, Lepus americanus, Odocoileus* sp., *Zapus* sp., *Mustela vison*), and birds (Gaviformes, Anseriformes, Ciconiformes, Gruiformes, Passeriformes, and Charadiformes) (Liers 1951, Hamilton 1961, Gilbert and Nancekivell 1982, Melquist and Hornocker 1983).

ENERGETICS AND METABOLISM

Sample and Suter (1999) report the estimated food ingestion rate for river otters to be 0.9 kg/d (fresh weight of fish or aquatic prey) and the water ingestion rate to be 0.64 L/d.

POPULATIONS AND DEMOGRAPHY

Population Densities: Population densities have been reported from 1 otter per 2.3 miles of waterway to 1 otter per 6 – 11 miles of waterway (Melquist and Hornocker 1983, Melquist and Dronkert 1987 as cited in DeGraaf and Yamasaki 2001).

Age at Maturity and Life Span: Both males and females reach sexual maturity by two years of age although males may not successfully breed until they are much older (Liers 1951, Melquist and Hornocker 1983). Some studies indicate that females actually may breed during their first year

based on the presence of corpora lutea within the ovaries. Once reaching sexual maturity, females are capable of producing one litter per year and litter size may increase significantly with the age of the female (Docktor *et al.* 1987). The literature provides little information on the life expectancy of river otter in the wild, although Melquist and Hornocker (1983) did report one female that was 10 years old.

Mortality: Trapping has historically been one of the primary causes of mortality for the river otter. Direct trapping of river otters still occurs in some states, and some may be incidentally caught in beaver traps (Melquist and Hornocker 1983, Chilelli *et al.* 1996). In addition, river otters may be killed by hunters and in collisions with vehicles and watercraft (Melquist and Hornocker 1983). Because of their upper position in the food chain and their aquatic habits, river otter are susceptible to environmental contaminants, including dioxin, mercury, and polychlorinated biphenyls (PCBs) that are present in the lakes and rivers (Foley *et al.* 1988, Sloan and Brown 1988, Organ 1989, Sample and Suter 1999). Though relatively little is known about the specific effects of PCB contamination on river otter, PCBs have been found to impair reproduction and cause death in the closely-related mink (Platonow and Karstad 1973).

Organ (1989) compared PCB and mercury residues in river otters from 20 different Massachusetts watersheds. While variability was high in all watersheds, individuals from the Housatonic River watershed had the highest mean PCB residues. He also found a correlation between mercury residues in river otters and those in whole-body fish from the same watershed, and suggested that river otters could be used to assess the general background levels on a watershed basis. Mercury levels in adults were higher than those in juveniles, implying bioaccumulation over the animal's lifetime. Studies in Europe also report high levels of PCBs in river otters and suggest that population declines there are due to PCB accumulations in this species (Leonards *et al.* 1997, Traas *et al.* 2001). One study of Eurasian otters (Kruuk and Conroy 1996), however, found no evidence that PCBs accumulated in otters with age.

Enemies: Humans are probably the most important enemy of the river otter, affecting this species through direct (i.e., trapping) and indirect (habitat alteration, pollution) means. There appears to be very little published information on natural enemies of the river otter, although there are reports of predation by coyotes (*Canis latrans*) and domestic dogs (Melquist and Hornocker 1983).

STATUS

General: In New England, the river otter is considered to be uncommon based on sightings and trapping data, but may be more common than this information suggests (DeGraaf and Yamasaki 2001). In some parts of Massachusetts, river otter populations have increased to nuisance levels (Whitaker and Hamilton 1998).

In The Primary Study Area: Despite thousands of person-hours of field surveys in the study area in all seasons from 1998 to 2000, river otter signs (i.e., scat and tracks) were seen on only four occasions in three locations within the study area (Figure 2). Interestingly, otter signs and a few individuals were observed in nearby reference areas on many occasions, often with very little effort. Reasons for the river otter's conspicuous absence from the primary study area are unknown.

REFERENCES

Chilelli, M., B. Griffith, and D.J. Harrison. 1996. Interstate comparisons of river otter harvest data. Wildife Society Bulletin 24(2):238-246.

Deems, E.F.J., and D. Pursley. 1978. North American furbearers: their management, research, and harvest status in 1976. International Association of Fish and Wildlife Agencies, College Park, MD, USA.

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH.

Docktor, C.M., R.T. Bowyer, and A.G. Clark. 1987. Number of corpora lutea as related to age and distribution of river otter in Maine. Journal of Mammalogy 68(1):182-185.

Dubuc, L.J., W.B. Krohn, and R.B. Owen. 1990. Predicting occurrence of river otters by habitat on Mount Desert Island, Maine. Journal of Wildlife Management 54:594-599.

Foley, R.E., S.J. Jackling, R.J. Sloan, and M.K. Brown. 1988. Organochlorine and mercury residues in wild mink and otter: a comparison with fish. Environmental Toxicology and Chemistry 7:363-374.

Gilbert, F.F., and E.G. Nancekivell. 1982. Food habits of mink (*Mustela vison*) and otter (*Lutra canadensis*) in northeastern Alberta. Canadian Journal of Zoology 60:1282-1288.

Hamilton, W.J.J. 1961. Late fall, winter, and early spring foods of 141 otters from New York. New York Fish and Ga me Journal 8(2):106-109.

Hamilton, W.J.J., and W.R. Eadie. 1964. Reproduction in the otter, *Lutra canadensis*. Journal of Mammalogy 45(2):242-252.

Humphrey, S.R., and T.L. Zinn. 1982. Seasonal habitat use by river otters and everglades mink in Florida. Journal of Wildlife Management 46:375-381.

Knudsen, G.J., and J.B. Hale. 1968. Food habits of otters in the Great Lakes region. Journal of Wildlife Management 32(2):89-93.

Kruuk, H., and J.W.H. Conroy. 1996. Concentrations of some organochlorines in otters (*Lutra lutra* L.) in Scotland: implications for populations. Environmental Pollution 92(2):165-171.

Leonards, P.E.G., Y. Zierikzee, U.A.T. Brinkman, W.P. Cofino, N.M. van Straalen, and B.V. van Hattum. 1997. The selective dietary accumulation of planar polychlorinated biphenyls in the otter (*Lutra lutra*). Environmental Toxicology and Chemistry 16(9):1807-1815.

Liers, E.E. 1951. Notes on the river otter (*Lutra canadensis*). Journal of Mammalogy 32:1-9.

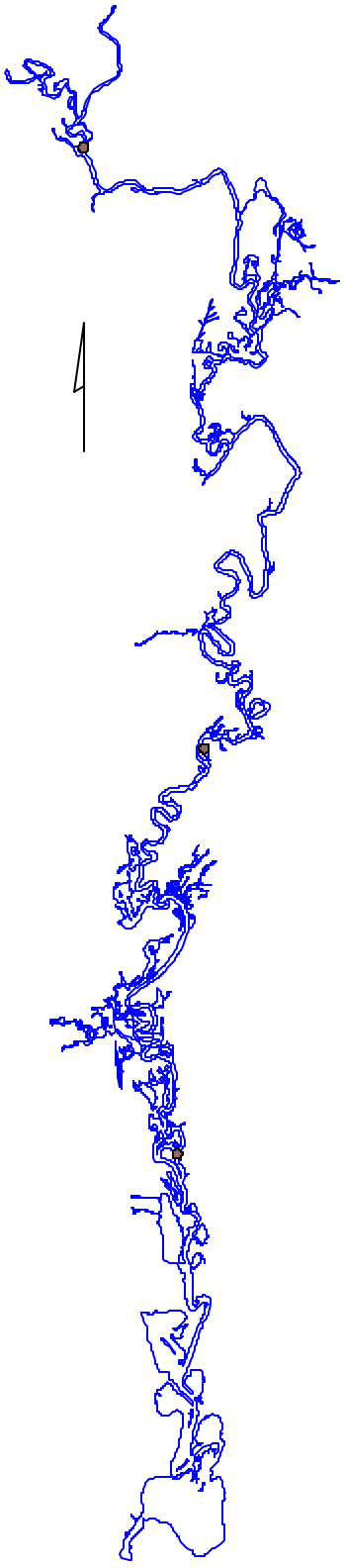


Figure 2. River otter sightings in the primary study area

Melquist, W.E., and A.E. Dronkert. 1987. River Otter. p. 626-641. *In* M. Novak, J.A. Baker, M.E. Obbard and B. Malloch (ed.) Wild Furbearer Management and Conservation in North America. Ontario Ministry of Natural Resources and Ontario Trappers Association, Toronto, Canada.

Melquist, W.E., and M.G. Hornocker. 1983. Ecology of river otters in west central Idaho. Wildlife Monograph 83:1-60.

Newman, D.G., and C.R. Griffin. 1994. Wetland use by river otters in central Massachusetts. Journal of Wildlife Management 58(1):18-23.

Organ, J. 1989. Mercury and PCB residues in Massachusetts river otters: comparisons on a watershed basis. Ph.D. Dissertation. University of Massachusetts, Amherst.

Platonow, N.S., and L.H. Karstad. 1973. Dietary effects of polychlorinated biphenyls on mink. Canadian Journal of Comparative Medicine 37:391-400.

Ryder, R.A. 1955. Fish predation by the otter in Michigan. Journal of Wildlife Management 19(4):497-498.

Sample, B.E., and G.W. Suter II. 1998. Ecological risk assessment in a large river-reservoir: 4. Picivorous wildlife. Environmental Toxicology and Chemistry 18(4):610-620.

Sheldon, W.G., and W.G. Toll. 1964. Feeding habits of the river otter in a reservoir in central Massachusetts. Journal of Mammalogy 45:449-454.

Sloan, R.J., and M.K. Brown. 1988. Organochlorine and mercury residues in wild mink and otter: comparison with fish. Environmental Toxicology and Chemistry 7:363-374.

Stephenson, A.B. 1977. Age determination and morphological variation of Ontario otters. Canadian Journal of Zoology 55:1577-1583.

Swimley, T.J., T.L. Serfass, R.P. Brooks, and W.M. Tzilkowski. 1998. Predicting river otter latrine sites in Pennsylvania. Wildife Society Bulletin 26(4):836-845.

Toweill, D.E. 1974. Winter food habits of river otters in western Oregon. Wildife Society Bulletin 26(4):836-845.

Traas, T.P., R. Luttik, O. Kleeper, J.E.M. Beurskens, M.D. Smit, P.E.G. Leonards, A.G.M. van Hattum, and T. Aldenberg. 2001. Congener-specific model for polychlorinated biphenyl effects on otter (*Lutra lutra*) and associated sediment quality criteria. Environmental Toxicology and Chemistry 20(1):205-212.

Whitaker, J.O., Jr., and W.J. Hamilton Jr. 1998. Mammals of the Eastern United States. 3rd ed. Cornell University Press, Ithica, NY.

Northern Short-tailed Shrew

Blarina brevicauda

DESCRIPTION

The northern short-tailed shrew is an energetic small animal with dark slate-colored pelage. It is readily identified as a shrew by its pointed snout, minute eyes, concealed ears, and five toes on each foot. Similar to all other New World shrews, the northern short-tailed shrew has dark red-brown to dark chestnut coloration at the apex of the teeth (Whitaker and Hamilton 1998). As its name implies, the short tail, which is approximately 20 percent of total animal length, readily distinguishes this shrew from close relatives in the genus *Sorex*, whose tail lengths exceed 40 percent of total animal length (George *et al.* 1986).

BODY SIZE

The northern short-tailed shrew is a large stout shrew. Total length and weight of 60 males from Indiana ranged from 100 – 126 mm (mean 115) and 11.0 – 26.3 g (mean 17.5), respectively. Mean measurements of adults of both sexes from New York were 124 mm for total length (n=60) and 19.3 g for weight (n=50) (Whitaker and Hamilton 1998).

In The Primary Study Area: Total lengths, tail lengths, and weights of 58 adults of both sexes caught during small mammal trapping studies in 1998 – 2000 were 104 – 150 mm (mean = 123 mm), 21 – 34 mm (mean = 25 mm), and 15 – 33 g (mean = 22g), respectively. Total lengths, tail lengths, and weights of six juveniles were 102 – 122 mm (mean = 111 mm), 24 – 30 (mean = 23mm), and 11 – 15 g (mean = 14g), respectively.

DISTRIBUTION

The northern short-tailed shrew is primarily a species of northeastern and north-central United States and adjacent southern Canada (George *et al.* 1986). It is found from Cape Breton Island and southern Quebec, south to Maryland, continuing south to Georgia and Alabama in the Appalachian Mountains,

Figure 1. Range of northern short-tailed shrew in North America

west to Nebraska, and north to southeastern Saskatchewan (Figure 1). An isolated subspecies (*B. b. telmalestes*) is also found in a small region on the coastal plain of Virginia and North Carolina. The northern short-tailed shrew is replaced to the south by Elliot's short-tailed shrew (in the west) and southern short-tailed shrew (in the east). In Massachusetts, the northern short-tailed shrew is represented by subspecies *talpoides*, a race found mainly in New England and adjacent Quebec, south to New York, Pennsylvania, and New Jersey.

MIGRATION

Northern short-tailed shrews do not undergo seasonal migration, and remain in their home area year round.

HABITAT

The northern short-tailed shrew is a ubiquitous species that occupies a diversity of habitat types, including wetlands and uplands (Whitaker and Hamilton 1998). It is reported to occur in both forested and open habitats by Miller and Getz (1977). Wrigley *et al.* (1979) found that vegetation cover (e.g., herb, shrub, tree) did not appear to influence northern short-tailed shrew presence in Manitoba. In forested communities, northern short-tailed shrews are less common in conifer stands (DeGraaf *et al.* 1991, Miller and Getz 1977). This shrew is known to lose much water through dermal evaporation and therefore rarely occurs in xeric habitats (Whitaker and Hamilton 1998, Getz 1961). In New York and Michigan, northern short-tailed shrews were found in a variety of habitats, so long as there was enough moisture to maintain 100% humidity in its burrows (Whitaker and Hamilton 1998).

Northern short-tailed shrews are active on the surface, in leaf litter, and below ground. A well-developed leaf litter is thought to be important in protecting shrews from moisture and temperature extremes (Pruitt 1953, Pruitt 1959). Northern short-tailed shrews can burrow in loose soil and push under rocks and other objects. Burrows are usually found in the upper 4 inches of soil, rarely as deep as 20 inches (Hamilton 1931, Jameson 1943). Use of echolocation to explore subterranean habitats has been documented in northern short-tailed shrews by Tomasi (1979).

In the Primary Study Area: Northern short-tailed shrews were found in a variety of natural communities within the 10-year floodplain of the Housatonic River in Pittsfield, Lenox, and Lee. Transitional floodplain forests, red maple swamps, black ash–red maple–tamarack calcareous seepage swamps, and high-terrace floodplain forests were communities utilized by this shrew. Data on habitat use by northern short-tailed shrews from the Housatonic River ecological characterization studies are presented in Table 1 below.

HIBERNATION

Northern short-tailed shrews are reported to be active day and night throughout the year (Whitaker and Hamilton 1998). Studies by Buckner (1964), Randolph (1973), Martin (1983) and Merritt (1986) demonstrate, however, a pronounced nocturnal

Table 1. Habitat use by the short-tailed shrew in the primary study area from 1998-2000 surveys

Habitat Codes and Natural Community Classifications																				
Wetland Habitats													Terrestrial Habitats							
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
				Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

activity pattern. Although northern short-tailed shrews do not hibernate, they do show reduced activity during extended periods of cold temperatures (Merritt 1986).

HOME RANGE AND TERRITORIALITY

Although estimates of home range for northern short-tailed are frequently reported as 6 acres, as noted by DeGraaf and Yamasaki (2001), Whitaker and Hamilton (1998) state that this number is too large. They instead found that an area of 0.06 acres was used by this species in central New York.

Northern short-tailed shrews are thought to have overlapping territories (i.e., they do not defend territories) (Blair 1940). Many authors considered this shrew to be solitary and unfriendly to members of the same species (Jackson 1961, Martin 1981a, Shull 1907). Rood (1958) instead found the sociability of northern short-tailed shrews to depend on individual characteristics, with age and sex playing a lesser role.

BREEDING

Northern short-tailed shrews breed from March to September (DeGraaf and Yamasaki 2001, Whitaker and Hamilton 1998). As many as four litters may be produced, though two peak breeding times occur, one in spring and one in late summer and early fall (Blair 1940, Whitaker and Hamilton 1998). The gestation period ranges from 17 to 22 days (DeGraaf and *Yamasaki* 2001, Hamilton 1929, Pearson 1944). Litter size ranges from three to seven, with a maximum of nine and an average of 4.5 (DeGraaf and *Yamasaki* 2001, Pearson 1944, Whitaker and Hamilton 1998).

Multiple matings are required for ovulation in female northern short-tailed shrews. At least 6 matings per day are needed to induce ovulation, which occurs from 55 to 71 hours after the first copulation (Pearson 1944). As many as 20 matings in one day have been observed. Copulation lasts an average of five minutes. Shrews become locked together and the male is dragged about by the female until separation occurs. No post-copulatory plug is formed in the vagina as it is in some cricetid rodents.

GROWTH AND DEVELOPMENT

Neonates are approximately the size of honeybees. They are born essentially naked of fur, with dark pink skin and closed eyes and ears. Mean external measurements at two days of age were: total length 31 mm; length of tail 4 mm; weight 1.3 g. Young northern short-tailed shrews are reported to grow quickly and reach half of adult size in one month (Whitaker and Hamilton 1998). Those produced from spring litters mature more rapidly than those produced from late summer litters (Pearson 1944).

Pearson (1944) noted receptivity in a female at 50 days of age and the earliest successful breeding by a male was at 83 days. Northern short-tailed shrews, therefore, are capable of breeding in the same year they are born. Though this phenomenon has been observed by Blus (1971), Dapson (1968), and Pearson (1944), most are thought not to breed in the same season they are born (Whitaker and Hamilton 1998).

FOOD HABITS AND DIET

Earthworms are reported to be the most important food item for northern short-tailed shrews (Mumford and Whitaker 1982, Whitaker and Ferraro 1963, Whitaker and Hamilton 1998). Millipedes, slugs, snails, and insect larvae are also important prey items (Linzey and Linzey 1973, Whitaker and Hamilton 1998). Arachnids, mollusks, other small vertebrates, and plant materials are additional reported food items (Hamilton 1941). Plant materials include roots, nuts, and berries. Northern short-tailed shrews are thought to consume the fungus *Endogone*, as do many other small mammals (Whitaker and Hamilton 1998).

Northern short-tailed shrews do utilize limited food storage (Whitaker and Hamilton 1998). This is practiced primarily during the winter season to conserve energy and limit foraging time. Piles of snails have been observed in and around shrew burrows (Whitaker and Hamilton 1998). Their role as predators of mice and voles has been debated. Merriam (1884) asserted that northern short-tailed shrews were not heavy predators of cricetids. Allen (1938) and Platt and Blakely (1973) thought that small mammals become important prey items when insects were unavailable. Eadie (1944, 1948)

found that although insects represent the majority of the northern short-tailed shrew diet, the frequency of meadow vole (*Microtis pennsylvanicus*) remains in shrew feces was positively correlated with meadow vole population cycles.

Short-tailed shrews (genus *Blarina*) and the European water shrew are the only mammals known to produce toxic saliva (Whitaker and Hamilton 1998). The poison is produced by the salivary glands and is secreted from a duct at the base of the lower incisors. It flows along a groove between the two incisors and, therefore, can be introduced into wounds made by their bite. The toxin can cause death in small mammals (Ellis and Krayer 1955, Pearson 1942). Death occurs from respiratory failure produced by severe dilation of peripheral vascular tissue. One function of the venom may be to stun or paralyze prey, as has been observed in insects. This may allow northern short-tailed shrews to utilize prey at a later date through food caching (Martin 1981b, Tomasi 1978).

POPULATIONS AND DEMOGRAPHY

Survivorship: Pearson (1945) found that 72.6 percent of young survived from birth to weaning. In mark and release experiments, six percent of the originally marked population was recaptured the subsequent season. Blus (1971) studied a captive colony and found that 11.1 percent of individuals lived for two years or more. Mean minimum life span for males and females is 4.6 months and 4.4 months, respectively.

Age at Maturity and Life Span: Northern short-tailed shrews reach breeding maturity in 50 – 83 days (see Growth and Development). Pearson (1945) reported that a wild-captured male and female northern short-tailed shrew lived to 33 months and at least 30 months of age, respectively. Examination of tooth wear from wild individuals, however, reveals that maximum age is likely 18 months.

Mortality: Factors contributing to northern short-tailed shrew mortality include predation and parasitism. Due to their small size, they are preyed on by a large number of mammalian and avian predators. One-hundred and forty-four parasites are listed to occur on or in northern short-tailed shrews. This represents 32 species of ectoparasites and three orders of endoparasites (George *et al*. 1986).

Enemies: Northern short-tailed shrews have few defenses against larger predators. Their odor, however, produced from pair of glands along the flanks, is noted to cause some potential predators to discard the shrews (Whitaker and Hamilton 1998). Many species of diurnal and nocturnal raptors prey on northern short-tailed shrews. These include northern saw-whet owl, long-eared owl, short-eared owl, great horned owl, northern screech owl, barred owl, rough-legged hawk, northern harrier, and American kestrel (Choate 1972, Dexter 1978, Getz 1961, Kirkpatrick and Conway 1947, Mumford and Whitaker 1982, Williams 1936). Shrikes are also reported to prey on northern short-tailed shrews (Jackson 1961).

Mammals are also important predators of northern short-tailed shrews. House cats are considered to be the most important enemy in some areas (Whitaker and Hamilton 1998). Other mammalian predators include bobcat, feral dog, coyote, red fox, gray fox, least weasel, short-tailed weasel, long-tailed weasel, mink, striped skunk, raccoon, and Virginia opossum (Andrews and Boggess 1978, Blumenthal and Kirkland 1976, Errington 1936, Fowle and Edwards 1955, Hamilton 1928, Hamilton 1936, Hamilton 1959, Mumford and Whitaker 1982, Story *et al*. 1982). Fish and snakes are also reported to be predators (Whitaker and Hamilton 1998). Rattlesnakes, northern copperheads, brown snakes, and pine snakes are serpents known to feed on northern short-tailed shrews (Jackson 1961). Shrews have been found in the stomachs of Lake trout and green sunfish (Fowle and Edwards 1955, Huish and Hoffmeister 1947).

Intestinal roundworms, flukes, and tapeworms are some of the species of endoparasites that use northern short-tailed shrews as hosts (Whitaker and Hamilton 1998). A subcutaneous nematode was found to be common on shrews in Indiana. Thirty-two total species of ectoparasites were found on northern short-tailed shrews in that study (Whitaker and Hamilton 1998).

STATUS

General: Northern short-tailed shrews have broad habitat requirements and, therefore, are found in a wide variety of natural communities (Miller and Getz 1977). Because they can occur in many mesic and hydric communities, they are common and routinely collected during trapping efforts throughout New England.

In The Primary Study Area: Northern short-tailed shrews were found to be ubiquitous in many shrub and forested communities in the primary study area. Although they were not as common as white-footed mice, they were always encountered during trapping efforts. Furthermore, they were the most commonly observed shrew in the primary study area, occurring much more often than masked (*Sorex cinereus*), smokey (*S. fumeus*) and northern water (*S. palustris*) shrews. They were observed from the confluence downstream to the large backwater areas north of Woods Pond (Figure 2).

REFERENCES

Allen, D.L. 1938. Ecological studies on the vertebrate fauna of a 500-acre farm in Kalamazoo County, Michigan. Ecological Monographs 8:347-436.

Andrews, R.A., and E.K. Boggess. 1978. Ecology of Coyotes in Iowa. p. 249-265. *In* M. Beckoff (ed.) Coyotes: Biology, Behavior, and Management. Academic Press, New York NY, USA.

Blair, W.F. 1940. Notes on home ranges and populations of the short-tailed shrew. Ecology 21:284-288.

Blumenthal, E.M., and G.L. Kirkland Jr. 1976. The biology of the opossum, *Didelphis virginiana*, in southcentral Pennsylvania. Proceedings of the Pennsylvania Academy of Sciences 50:81-85.

Blus, L.J. 1971. Reproduction and survival of short-tailed shrews (*Blarina brevicauda*) in captivity. Laboratory Animal Science 50:81-85.

Buckner, C.H. 1964. Metabolism and feeding behavior of three species of shrews. Canadian Journal of Zoology 42:259-279.

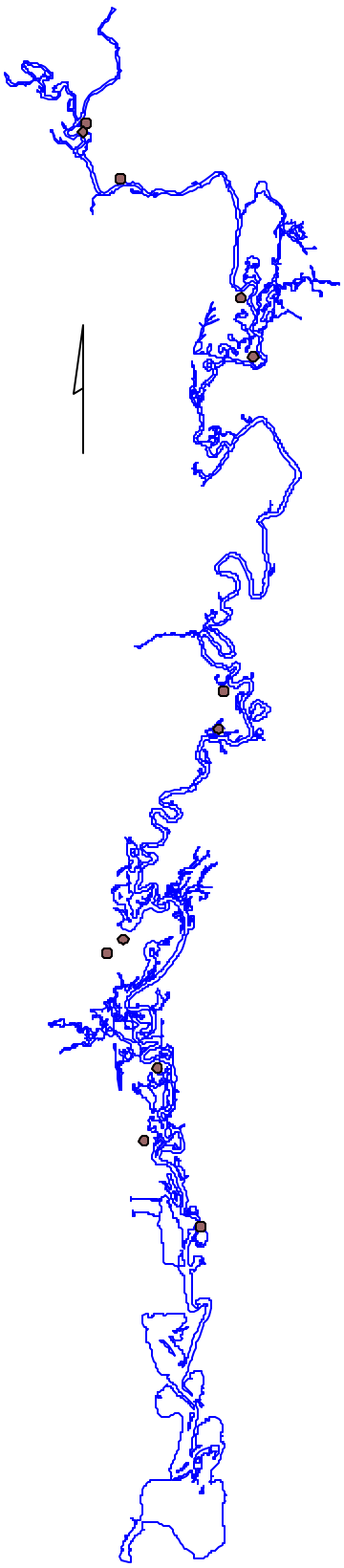


Figure 2. Northern short-tailed shrew sightings in the primary study area

Choate, J.R. 1972. Notes on geographic distribution and habitats of mammals eaten by owls in southern New England. Transactions of the Kansas Academy of Sciences 74:212-216.

Dapson, R.W. 1968. Reproduction and age structure in a population of short-tailed shrews, *Blarina brevicauda*. Journal of Mammalogy 49:205-214.

DeGraaf, R.M., D.P. Snyder, and B.J. Hill. 1991. Small mammal habitat associations in pole timber and sawtimber stands of four forest cover types. Forest Ecology and Management 46:227-242.

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH, USA.

Dexter, R.W. 1978. Mammals utilized as food by owls in reference to the local fauna of northeastern Ohio. Kirtlandia 24:1-6.

Eadie, W.R. 1944. The short-tailed shrew and field mouse predation. Journal of Mammalogy 25:359-364.

Eadie, W.R. 1948. Shrew-mouse predation during low mouse abundance. Journal of Mammalogy 29:35-37.

Ellis, S., and O. Krayer. 1955. Properties of a toxin from the salivary gland of the shrew, *Blarina brevicauda*. Journal of Pharmacology and Experimental Therapeutics 114:127-137.

Errington, P.L. 1936. Notes on food habits of southern Wisconsin house cats. Journal of Mammalogy 17:64-65.

Fowle, C.D., and R.Y. Edwards. 1955. An unusual abundance of short-tailed shrews, *Blarina brevicauda*. Journal of Mammalogy 36:36-41.

George, S.B., J.R. Choate, and H.H. Genoways. 1986. *Blarina brevicauda*. p. 1-9. *In* T.E. Lawlor (ed.) Mammalian Species Number 261. American Society of Mammalogists, Baltimore, MD, USA.

Getz, L.L. 1961. Factors influencing the local distribution of shrews. American Midland Naturalist 65:67-88.

Hamilton, W.J., Jr. 1928. Weasels eat shrews. Journal of Mammalogy 9:249-250.

Hamilton, W.J., Jr. 1929. Habits of the short-tailed shrew, *Blarina brevicauda*. Journal of Mammalogy 10:125-134.

Hamilton, W.J., Jr. 1931. Habits of the short-tailed shrew, *Blarina brevicauda* (Say). Ohio Journal of Science 31:97-106.

Hamilton, W.J., Jr. 1936. The food and breeding habits of the raccoon. Ohio Journal of Science 36:131-140.

Hamilton, W.J., Jr. 1941. The foods of small forest mammals in eastern United States. Journal of Mammalogy 22:250-263.

Hamilton, W.J., Jr. 1959. Foods of mink in New York. New York Fish and Game Journal 6:77-85.

Huish, M.T., and D.F. Hoffmeister. 1947. The short-tailed shrew (*Blarina*) as a source of food for the green sunfish. Copeia 1947:198.

Jackson, H.H.T. 1961. Mammals of Wisconsin. University of Wisconsin Press, Madison, WI, USA.

Jameson, E.W., Jr. 1943. Notes on the habits and siphonapterous parasites of the mammals of Welland County, Ontario. Journal of Mammalogy 24:194-197.

Kirkpatrick, C.M., and C.H. Conway. 1947. The winter foods of some Indiana owls. American Midland Naturalist 38:755-766.

Linzey, D.W., and A.V. Linzey. 1973. Notes on food of small mammals from Great Smokey Mountains National Park, Tennessee-North Carolina. J. Elisha Mitchell Science Society 89:6-14.

Martin, I.G. 1981a. Tolerance of conspecifics by short-tailed shrews (*Blarina brevicauda*) in simulated natural conditions. American Midland Naturalist 106:206-208.

Martin, I.G. 1981b. Venom of the short-tailed shrew (*Blarina brevicauda*) as an immobilizing agent. Journal of Mammalogy 62:189-192.

Martin, I.G. 1983. Daily activity of short-tailed shrews (*Blarina brevicauda*) in simulated natural conditions. American Midland Naturalist 109:136-144.

Merriam, C.H. 1884. The vertebrates of the Adirondack region, northeastern New York. Transactions of the Linnaean Society of New York 2:1-233.

Merritt, J.F. 1986. Winter survival adaptations of the short-tailed shrew (*Blarina brevicauda*) in the Appalachian Montane Forest. Journal of Mammalogy 67:450-464.

Miller, H., and L.L. Getz. 1977. Factors influencing local distribution and species diversity of forest small mammals in New England. Canadian Journal of Zoology 55:806-814.

Mumford, R.E., and J.O. Whitaker Jr. 1982. Mammals of Indiana. Indiana University Press, Bloomington, IN, USA.

Pearson, O.P. 1942. On the cause and nature of a poisonous action produced by the bite of a shrew (*Blarina brevicauda*). Journal of Mammalogy 23:159-166.

Pearson, O.P. 1944. Reproduction in the shrew (*Blarina brevicauda*, Say). American Journal of Anatomy 75:39-93.

Pearson, O.P. 1945. Longevity of the short-tailed shrew. American Midland Naturalist 34:531-546.

Platt, W.J., and N.R. Blakely. 1973. Short-term effects of shrew predation upon invertebrate prey sets in prairie ecosystems. Proceedings of the Iowa Academy of Sciences 80:60-66.

Pruitt, W.O., Jr. 1953. An analysis of some physical factors affecting the local distribution of the short-tailed shrew (*Blarina brevicauda*) in the northern part of the Lower Peninsula of Michigan. Miscellaneous Publications of the Museum of Zoology, University of Michigan 79:1-39.

Pruitt, W.O., Jr. 1959. Microclimates and local distribution of small mammals on the George Reserve, Michigan. Miscellaneous Publications of the Museum of Zoology, University of Michigan 109:1-27.

Randolph, J.C. 1973. Ecological energetics of a homeothermic predator, the short-tailed shrew. Ecology 45:1166-1187.

Rood, J.P. 1958. Habits of the short-tailed shrew in captivity. Journal of Mammalogy 39:499-507.

Shull, A.F. 1907. Habits of the short-tailed shrew *Blarina brevicauda* (Say). American Naturalist 41:495-522.

Story, J.D., W.J. Galbraith, and J.T. Kitchings. 1982. Food habits of bobcats in eastern Tennessee. Journal of the Tennessee Academy of Sciences 57:29-32.

Tomasi, T.E. 1978. Function of venom in the short-tailed shrew, *Blarina brevicauda*. Journal of Mammalogy 59:852-854.

Tomasi, T.E. 1979. Echolocation by the short-tailed shrew *Blarina brevicauda*. Journal of Mammalogy 60:751-759.

Whitaker, J.O., Jr., and W.J. Hamilton Jr. 1998. Mammals of the Eastern United States. 3rd ed. Cornell University Press, Ithica, NY, USA.

Whitaker, O.J., Jr., and M.G. Ferraro. 1963. Summer food of 220 short-tailed shrews from Ithaca, New York. Journal of Mammalogy 44:419.

Williams, A.B. 1936. The composition and dynamics of a beech-maple climax community. Ecological Monographs 6:317-408.

Wrigley, R.E., J.E. Dubois, and H.W.R. Copland. 1979. Habitat, abundance, and distribution of six species of shrews in Manitoba. Journal of Mammalogy 60(3):505-520.

Tree Swallow

Tachycineta bicolor

DESCRIPTION

The tree swallow is a medium-sized member of the Hirundinidae family with characteristic slender body form and long, pointed wings. This species has contrasting blue to brown plumage above and bright white below. Adult males and older female birds are metallic blue above, while second year female retain varying amounts of brown plumage typically associated with juvenile birds. Tree swallows are often observed hunting flying insects with long, gliding flight patterns, or perched on exposed branches or wires. This species is known to soar more than other members of the family.

BODY SIZE

Tree swallow body length averages 140 mm as measured from bill to tip of tail. Body weight varies seasonally, but typically averages 21 g during the breeding season, independent of sex (Robertson *et al.* 1992).

In The Primary Study Area: No body size data are available for tree swallows from the primary study area.

DISTRIBUTION

The tree swallow is distributed throughout northern and central North America and is one of the most widespread members its genus. Tree swallows breed on both coasts and northward to the limit of treeline. Currently, this species is expanding its range southward in the central US (Robertson *et al.* 1992). The densest breeding populations occur in the northeast and the Great Lakes Region. In Massachusetts, tree swallows are common throughout the state, with the greatest reported breeding densities occurring in the western portion of the state (Veit and Petersen 1993).

In winter months, the tree swallow's range includes the southeastern US and Gulf of Mexico coastline. Greatest winter densities occur in Florida and the Mississippi Delta. Occasionally, tree swallows winter as far north as southern New England due to their ability to subsist on fruit, especially bayberry (*Myrica* sp.) (Robertson *et al.* 1992).

Figure 1. Range of tree swallow in North America

MIGRATION

Fall migration of tree swallow populations in the eastern US begins soon after breeding season in July and August. Southward migration typically peaks in early to mid-Fall. East coast and eastern Great Lakes populations are likely to migrate along the eastern seaboard to Florida and the Caribbean (Butler 1988). The tree swallow is a diurnal migrant and birds often congregate in large flocks during the early evening to share nocturnal roosts usually located in dense woody and emergent vegetation (Forbush 1929). Flocking behavior along the outer coast of Massachusetts is a well-documented phenomenon with some flocks estimated in the hundreds of thousands as birds gather to exploit ripening bayberry and insect swarms (Veit and Petersen 1993). Tree swallows are able to return to their breeding grounds earlier than other swallow species due to their ability to subsist on fruit. In New England, tree swallows arrive on territories in early April (Forbush 1929).

HABITAT

Due to their aerial foraging technique and propensity to glide and soar, tree swallows require open spaces. However, tree swallows are cavity nesters and are dependent on excavated cavities in dead trees or artificial nest boxes. Preferred habitats include old fields and pond margins, wooded swamps, beaver flowages, and cranberry bog reservoirs (Veit and Petersen 1993).

In The Primary Study Area: Table 1 contains a summary of the literature review and observational data on the use by tree swallows of the natural community types found within the primary study area.

In a 1998 – 2000 study of tree swallows that focused on clutch size and nesting success within the primary study area and nearby reference areas, it was found that tree swallows' use of artificial nest boxes varied according to physical characteristics of the available habitat. The West Branch site had lower nest occupancy, likely due to the smaller stream order present and less food availability. Lower nest occupancy at the Canoe Meadows site is likely due to the density of standing trees that may have resulted in a greater population of house wrens (*Troglodytes aedon*) and black-capped chickadees (*Poecile atricapillus*) using the nest boxes (C. Custer, USGS, pers. com. to Woodlot Alternatives, Inc., March 2001).

HOME RANGE AND TERRITORIALITY

Tree swallow home range sizes vary with geographic area, habitat type and prey abundance. When defending a nest site, and especially when feeding nestlings, tree swallows show the greatest home range tenacity and typically remain within 320 – 650 feet of the nest site (McCarty and Winkler 1999). As colonial nesters, tree swallows are not aggressively territorial, but will typically defend an area of 30 – 50 feet surrounding the nest site. Large colonies can reach densities of 150 pairs per 0.7 acres (DeGraaf and Yamasaki 2001).

BREEDING

In Massachusetts, nesting activities typically take place between April 19 and June 15 (Veit and Petersen 1993). Pairs are generally monogamous during the breeding season and may develop year-to-year fidelity to an individual nest site. Selected nesting cavities are typically located from 3 – 25 feet above the ground (Baicich and Harrison 1997). Preferred natural nesting cavities are located in standing dead trees with average diameters of approximately 11 – 30 inches as measured at breast height (Robertson *et al.* 1992). Nests typically

Table 1. Habitat use by tree swallow in the primary study area

Habitat Codes and Natural Community Classifications																				
Wetland Habitats													Terrestrial Habitats							
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
B	B							B			B							B	B	B

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

consist of a woven grass cup with varying amounts of feathers, with quills interwoven into the cup, forming overhanging walls. A study conducted in the Hudson River Valley suggests that nest mass and numbers of feathers used decline with increasing PCB concentration in foraging areas (McCarty and Secord 1999).

Clutch sizes vary with age of nesting individuals and date at which egg laying begins. Typical clutch size ranges from 2 – 8 eggs with an average of 4 – 7 eggs being the most common (DeGraaf and Yamasaki 2001). In Massachusetts, the average clutch was found to be 5.2 eggs with a 79.5% hatch rate over an 11-year period from 1938 to 1953 (Veit and Petersen 1993). The incubation period usually lasts 13 – 16 days, and nestlings are fed at the nest 15 – 25 days prior to fledging (DeGraaf and Yamasaki 2001). It is rare for tree swallows to produce two broods in a season, but the birds commonly re-nest if the first clutch is destroyed early in the season.

In the Study Area: Clutch size in the Housatonic River study area averaged 5.4 eggs/clutch during the 1998 and 1999 sampling seasons (C. Custer, USGS, pers. com. to Woodlot Alternatives, Inc., March 2001). Hatching success during this same period was lowest (85.7%) at the Roaring Brook sample population, and highest (96.9%) at the New Lenox Road site.

GROWTH AND DEVELOPMENT

On average, nestlings weigh between 1.5 and 1.7 g at hatch (Robertson *et al*. 1992). Nestling body mass increases on a sigmoidal growth curve (i.e., begins at a slow rate and gradually increases and then rapidly increases), with maximum weights attained at 12 – 14 days of age, followed by a gradual loss of weight prior to fledging (Robertson *et al*. 1992). Maximum weight for tree swallow nestlings is 22 – 24g, and average recorded weight at fledging is 20 – 21g. Asynchronous hatching may result in the largest nestling averaging 94% greater body mass than the last nestling to hatch (Zach 1982, as cited in Robertson *et al*. 1992). This accumulation rate was also found to decline with tissue dilution as nestling body size growth rates increased after 12 days of age.

MOLT

Initial juvenile feather growth begins at 6 – 7 days of age as contour feathers begin to emerge. Primary feather growth starts between 7 and 8 days (Marsh 1980, as cited in Robertson *et al*. 1992). Juvenile plumage is noticeably different from adult plumage of either sex. Juveniles appear grayish brown above with no iridescent blue coloration. Similar to the adult plumage, juveniles are mostly white below with a faint broken collar of grayish brown similar to bank swallows (*Riparia riparia*).

Male swallows go through a definitive prebasic molt during their first fall, at which time they obtain adult, iridescent plumage. Female tree swallows initially undergo a complete prebasic molt during their first fall. After this molt, their appearance varies from drab brown with green iridescence above to extensive iridescent greenish blue feathers interspersed through otherwise drab plumage. Increases in exposure to PCB contamination has been linked to earlier development of adult type plumage in second year females (McCarty and Secord 1999). During the Fall of their second year, females complete a definitive prebasic molt at which time their plumage becomes similar to that of the adult male, but slightly duller and greener (Cohen 1984a, as cited in Robertson *et al*. 1992).

FOOD HABITS AND DIET

Tree swallows actively pursue flying insects, and occasionally glean insects from the water surface or vegetation. Frugivory is well documented during spring migration and especially fall migration, but constitutes a relatively minor portion of their diet during nesting. Tree swallows feed primarily on emergent aquatic insects that can potentially assimilate sediment-associated contaminants. Prey sizes typically range from 0.04 to 1.7 inches. The 0.1- to 0.2-inch prey class is the best represented in average diet samples collected (McCarty and Winkler 1999). An analysis of food items delivered to nestlings consisted of Diptera (46%), Homoptera (26%), Ephemeroptera (11%), Odonata (5%), Coleoptera (4%), Molluska (4%), Aranae (2%), Psocoptera (1%), Hymenoptera (1%), plus trace amounts of Hemiptera, Neuroptera,

Trichoptera, and Lepidoptera (Blancher *et al.* 1987, as cited in Robertson *et al.* 1992). Parents begin feeding young as soon as they hatch, making 10 – 20 feeding trips per hour. The average size of meal delivered to the nest is 28 mg (Quinney and Ankney 1985). Foraging typically takes place between 0 and 40 feet above the ground. When feeding nestlings, adult swallows typically stay within 330 – 660 feet of the nest.

In The Primary Study Area: Well-used foraging areas within the study area include open portions of the river, Woods Pond, and other backwater marshes and ponded areas (C. Custer, USGS, pers. com. to Woodlot Alternatives, Inc., March 2001)

POPULATIONS AND DEMOGRAPHY

Survivorship: Estimates from band recovery data indicate that tree swallow survivorship during the first year is 21% (Butler 1988). Survivorship after the first year ranges from 40 – 60% annually (Houston and Houston 1987 as cited in Robertson *et al.* 1992).

Age at Maturity and Life Span: Tree swallows are able to breed during their second year. The average lifespan is 2.7 years and the maximum life span is 8 years (Butler 1988).

Enemies: House sparrows (*Passer domesticus*), European starlings (*Sturnus vulgaris*), and house wrens are known to destroy nests and eggs and compete for nesting cavities. Tree swallows tend to avoid nesting in close proximity of forest cover to minimize potential for house wren intrusions (Rendell and Robertson 1990, as cited in Robertson *et al.* 1992). Known mammalian nest predators include raccoons (*Procyon lotor*), chipmunks (*Tamias striatus*), deer mice (*Peromyscus maniculatus*), and feral house cats. American kestrels (*Falco sparverius*), northern flickers (*Colaptes auratus*), common grackles (*Quiscalus quiscula*), and American crows (*Corvus brachyrhynchos*) will raid nests for eggs and nestlings. Adult tree swallows are taken by a variety of avian predators including American kestrels, sharp-shinned hawks (*Accipiter striatus*) merlins (*Falco columbarius*), and peregrine falcons (*Falco peregrinus*).

STATUS

General: The tree swallow is a common bird throughout its range with the greatest abundance occurring in central New England and the Adirondack Mountains (Robertson *et al.* 1986, as cited in Robertson *et al.* 1992). The population of tree swallows has been increasing over the past 25 years. In the eastern United States an average of 6 tree swallows are reported per Breeding Bird Survey route completed.

In The Primary Study Area: Tree swallows were frequently observed in the primary study area during the breeding season in suitable habitats in the course of 1998 – 2000 field surveys (Figure 2).

REFERENCES

Baicich, P.J., and C.J.O. Harrison. 1997. The Guide to the Nests, Eggs, and Nestlings of North American Birds. 2nd ed. Academic Press, San Diego, CA, USA.

Blancher, P.J., C.L. Furlonger, and D.K. McNicol. 1987. Diet of nestling tree swallows near Sudbury, Ontario, summer 1986. Canadian Wildlife Service Technical Report No. 31.

Butler, R.W. 1988. Population dynamics and migration routes of tree swallows, *Tachycineta bicolor*, in North America. Journal of Field Ornithology 59(4):395-402.

Cohen, R.R. 1984. Criteria for distinguishing breeding male tree swallows from brightly colored females prior to capture. North American Bird Bander 9:2-3.

Custer, C. 2001. U.S. Geological Survey. Personal Communication to Woodlot Alternatives, Inc. regarding study of breeding tree swallows along the Housatonic River.

DeGraaf, R.M., and M. Yamasaki 2001. New England Willife Habitat, Natural History, and Distribution. University Press of New England , Hanover, NH, USA.

Forbush, E.H. 1929. Birds of Massachusetts and Other New England States. Vol. 3. Massachusetts Department of Agriculture, Commonwealth of Massachusetts, MA, USA.

Houston, M.I., and C.S. Houston. 1987. Tree swallow banding near Saskatoon, Saskatchewan. North American Bird Bander 12:103-108.

Marsh, R.L. 1980. Development of temperature regulations in nestling tree swallows, *Iridoprocne bicolor*. Condor 82:461-463.

McCarty, J.P., and A.L. Secord. 1999. Nest-building behavior in PCB-contaminated swallows. Auk 116(1):55-63.

McCarty, J.P., and D.W. Winkler. 1999. Foraging ecology and diet selectivity of tree swallows feeding nestlings. Condor 101:246-254.

Quinney, T.E., and C.D. Ankney. 1985. Prey size selection by tree swallows. Auk 102:245-250.

Rendell, W.B., and R.J. Robertson. 1990. Influence of forest edge on nest-site selection by tree swallows. Wilson Bulletin 102:634-644.

Robertson, R.J., H.L. Gibbs, and B.J. Stutchbury. 1986. Spitefulness, altruism, and the cost of aggression: evidence against superterritoriality in tree swallows. Condor 88:123-124.

Robertson, R.J., B.J. Stutchbury, and R.R. Cohen. 1992. Tree Swallow (*Tachycineta bicolor*). p. 1-26. *In* A. Poole, P. Stettenheim and F. Gill (ed.) The Birds of North America, No. 11. The Birds of North America, Inc, Philadelphia, PA, USA.

Veit, R.R., and W.R. Peterson. 1993. Birds of Massachusetts. Massachusetts Audubon Society, Lincoln, MA, USA.

Zach, R. 1982. Hatching asynchrony, egg size, growth, and fledging in tree swallows. Auk 99:695-700.

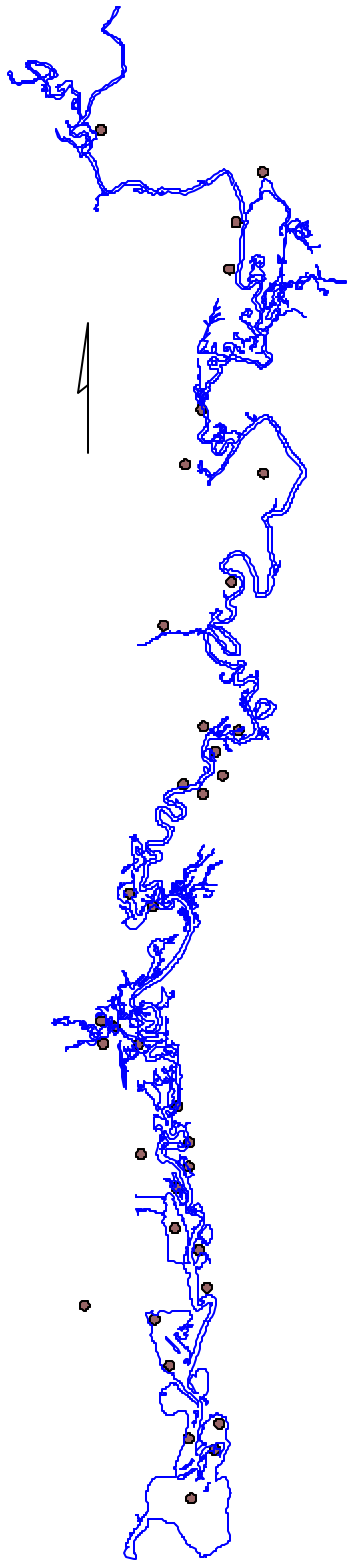


Figure 2. Tree Swallow sightings in the primary study area

Water Shrew

Sorex palustris

DESCRIPTION

The water shrew is a relatively large shrew with soft, dark pelage. Similar to other members of its genus, it has a long tail commonly more than 40 percent of the total body length. The pointed snout, tiny eyes, concealed ears, and five toes on front and hind feet serve to identify this small mammal as a shrew. The large broad hind feed provided with stiff cilia, slightly webbed toes, and an aquatic life style separate this shrew from other congenerics in the northeast.

BODY SIZE

Water shrews are one of the largest shrews in eastern North America. Total length, tail length, and weight ranges from 138 – 164 mm, 63 – 72 mm, and 12 – 18 grams, respectively (Whitaker and Hamilton 1998). Jackson (1928) reported no difference in color, size, or proportions between males and females. Conaway (1952) and van Zyll de Jong (1983) found, however, that significant size differences occurred between adult males and females, with males measuring longer and weighing more than females.

In the Primary Study Area: No measurements of water shrews from the Housatonic River in Pittsfield, Lenox, and Lee are known to have been collected. One dead water shrew was found at the river edge in 2000, but no measurements were taken.

DISTRIBUTION

Water shrews are found in north-central and northeastern United States and adjacent Canada, extending southward in the eastern United States as a disjunct population in the Appalachian Mountains. Water shrews also occur throughout a large area of western North America largely separated from eastern North American populations (Figure 1). In Massachusetts, the water shrew is represented

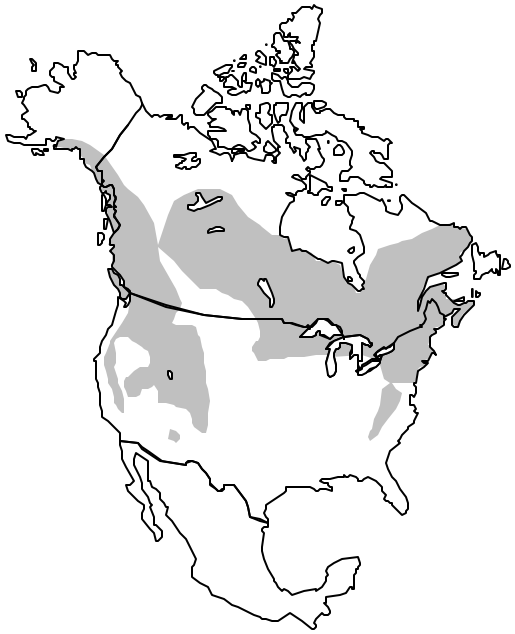


Figure 1. Range of the water shrew in North America.

by subspecies *albibarbis*, which is primarily a northeastern race found in Pennsylvania and New York, north through New England to Quebec and Labrador. Whitaker and Hamilton (1998) suggest, however, that this subspecies should be included in subspecies *palustris* due to overlap in morphological characteristics observed in Canada.

MIGRATION

Water shrews do not undergo seasonal migration, remaining in their home area year-round.

HABITAT

As its name implies, water shrews are rarely found far from water (Conaway and Pfitzer 1952, Jackson 1928, Starret *et al*. 1952). It is typically found near high-gradient streams with swift flowing water and exposed rocks, banks, and downed logs (Baker 1983, Banfield 1974, Conaway 1952). They do, however, also utilize springs, low-gradient streams, backwater sloughs, mud flats, and beaver impoundments (Wible 1946, Whitaker and Hamilton 1998). In Connecticut, water shrews have been captured along shaded streams (Wetzel and Shelar 1964). They are occasionally captured in forested settings, but then are rarely far from a body of water (Wrigley *et al*. 1979). The first record of a water shrew from Rhode Island demonstrates this fact. Although it was collected in a dry, rocky, oak-pine woodland, it was only a short distance from a temporary pond (Layne and Shoop 1971). Clark (1973) found that water shrews inhabited communities with a mean ground cover of 75 percent. This is thought to be important for maintaining high humidity near the ground, which in turn supports greater abundance of invertebrates.

Although occurring in open and forested habitats, water shrews were found to prefer stream shores with graminoid and shrub vegetation (Wrigley *et al*. 1979). Water shrews were less frequently captured in wetlands with saturated soil only, as these habitats lack the abundant invertebrate fauna associated with moving streams. Wrigley *et al*. (1979) also found water shrew observations to be positively correlated with beaver concentration, as flooded areas create open water and often grass/sedge-dominated wetlands. Water shrews were noted to utilize recently constructed and older beaver dams for foraging. Table 1 below contains a summary of the literature review and observational data on the use by water shrews of the natural community types found within the primary study area.

In the Primary Study Area: The single observation from the Housatonic River study area was from a forested shoreline south of New Lenox Road in 2000. This portion of the river is considered a low-gradient stream community, and significant stands of forested wetlands, shrub wetlands, and emergent marshes are found in this region. It is possible, however, that the individual died farther up river and floated down to where it was found.

HIBERNATION

Table 1. Habitat use by water shrew in the primary study area

Habitat Codes and Natural Community Classifications																			
Wetland Habitats													Terrestrial Habitats						
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
Y	Y	Y	B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed

VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

Shading = observed in study area

Water shrews do not undergo hibernation during the winter. They are active throughout the year (Sorensen 1962). Though shrews are reported to forage day and night, two periods of intense activity normally occur: after sunset and prior to sunrise. Shrews use watercourses even in winter and have been observed swimming under the ice (van Zyll de Jong 1983). Water shrews are capable of reducing metabolic demands, entering daily torpor, and nasal cooling, all of which may help them to cope with the winter season and frigid mountain streams (Beneski and Stinson 1987). Additionally, water shrews have enzymes that work well at low temperatures, and their pelage is known to trap air, resulting in a slower rate of cooling while active underwater.

HOME RANGE AND TERRITORIALITY

Little information has been collected concerning the home range of water shrews. Buckner and Ray (1968, as cited in Beneski and Stinson 1987) reported home range size of 0.5 to 0.75 acres for live-trapped individuals in Manitoba. Movement patterns indicate that water shrews move along routinely-used tracks adjacent to stream sides (Goodwin 1932). Studying this species is difficult due to low trapping success relative to other shrews (Beneski and Stinson 1987, *Yamasaki* 1997).

In a study on captive water shrews, individuals were generally solitary and interactions between either sex were usually antagonistic. Posturing, vocalization, and physical attacks were noted between shrews in enclosures. No dominance hierarchy or territoriality was evident, as outcomes of aggressive encounters did not appear to correlate with body size or location of encounter (Sorenson 1962).

Sorenson (1962) observed that captive water shrews did not appear to defend individual nests or food caches. Shrews were observed eating from caches they did not create. Water shrews occasionally defecated on food caches, and this caused some shrews to avoid the food. Water shrews were also noted to defecate in middens, so long as the population density was low, otherwise, defecation became indiscriminate. Food marking and defecating in middens were the only activities noted to be territorial in the study.

BREEDING

Female water shrews are thought to become reproductively mature in nine months (DeGraaf and *Yamasaki* 2001). However, most do not breed until after their first winter (Beneski and Stinson 1987, Whitaker and Hamilton 1998). As with other shrews, ovulation does not appear to be spontaneous, but rather is induced by copulation (Conaway 1952). Breeding season is thought to be from February to August based on indications of ovarian and testicular activity observed in wild captured individuals, which is notably earlier than most shrews (Conaway 1952). Two or three litters are produced each year, each comprised of three to ten neonates (mode of 6) (Jackson 1928). The gestation period of water shrews is unknown, but is believed to be similar to other shrews (ca. 21 days).

GROWTH AND DEVELOPMENT

Little is known about growth and development of young water shrews. The lactation period usually does not exceed seven weeks. Through examination of tooth wear, Conaway (1952) was able to classify water shrews into two distinct age classes: first year and second year individuals. He examined 61 first-year males in Montana and found that none showed evidence of reproductive activity, based on immaturity of testes and other reproductive structures. Mean body mass of first year individuals is significantly less than second year individuals of both sexes.

FOOD HABITS AND DIET

Water shrews are primarily insectivorous (Conaway 1952, Conaway and Pfitzer 1952, Sorenson 1962). A large number of invertebrates, however, are preyed on, including slugs, earthworms, spiders, leaches, and snails (Beneski and Stinson 1987). Insects commonly reported in the stomachs of water shrews include stonefly larvae (Plecoptera), mayfly larvae (Ephemoptera), caddis fly larvae (Tricoptera), tipulid larvae and other flies (Diptera), and crickets (Orthoptera).

Vertebrate prey includes salamander larvae, small fish, and dead mice. Water shrews are known to feed on fish eggs in hatchery ponds (Banfield 1974). Plant material is also included in the diet of water shrews (Clark 1973).

Water shrews are active divers, entering the water to capture prey or to elude danger (Banfield 1974, Davis 1939). The stiff bristles along the outer edge of the front and hind feet and slightly webbed toes are adaptations for aquatic mobility. They propel themselves by a walking motion of the feet (Beneski and Stinson 1987). Captive shrews are capable of sustaining dives for up to 47 seconds (Calder 1969). The stiff bristles also allow water shrews to run across the surface of calm or turbulent water by trapping small globules of air (Jackson 1928). Water shrews probe the substrate for prey with their snout while they are underwater. Due to a layer of tiny air bubbles trapped in the fur, water shrews will rise to the surface and float if they stop paddling (Banfield 1974, Svihla 1934). The pelage will saturate with water after a few minutes, at which time the water shrew returns to shore to dry by shaking and passing its hind feet rapidly over its body (Conaway 1952).

Water shrews have been observed preying on common shiners (Buckner 1970, Lampman 1947). The fish were captured by the stomach and brought to the shore. Water shrews have also been observed feeding on a larval Pacific giant salamander and a sculpin (Nussbaum and Maser 1969). In these cases, the prey was seized by the head and appeared to be immobilized.

Water shrews rely on multiple sensory systems while hunting for prey. While the functional significance of any given sense is poorly understood, some studies indicate that shrews would have difficulty catching prey relying on any one sense (Sorenson 1962). Maximum reported distance for prey detection by eyesight is about 6 inches. In some studies, however, prey were not noticed unless they were in motion, regardless of how close they were. Vibrissae and a sensitive muzzle are thought to be important for prey location, especially while underwater. Water shrews have acute hearing to distances of about 10 feet. The continuous emission of high-pitched noises while moving was suggested by Sorenson (1962) to be a form of echolocation.

Water shrews feed for short periods of time (30 to 90 seconds). Feeding periods are separated by longer intervals of time (mean 10 minutes). Water shrews are capable of eating large items by tearing off small pieces. When supplied with an abundance of insects, captive water shrews cached them one at a time in a hollow log. Cached foods were excavated and eaten within three to four weeks. Captive shrews drink water immediately after eating, sleeping, or being released from confined areas (Conaway 1952, Sorenson 1962).

POPULATIONS AND DEMOGRAPHY

Survivorship: No information was found on year-to-year or age-class survivorship for water shrews.

Age at Maturity and Life Span: Female water shrews can be reproductively active in their first year, but this represents a small proportion of individuals observed. The maximum life span is considered to be about 18 months (Conaway 1952).

Mortality: Factors contributing to water shrew mortality include predation and parasitism. Due to their small size and their use of aquatic habitat, they are preyed on by many predators that inhabit river and stream systems, including mammals, herpetiles, birds, and fish (Beneski and Stinson 1987). Water shrews have a large number of endo- and ectoparasites that are largely unique to their species (Beneski and Stinson 1987).

Enemies: Weasels and mink do occur in similar communities as water shrews and are known to prey on them. Garter snakes, water snakes, and possibly large frogs are herpetile enemies. Hawks and owls prey on many small mammals, including water shrews. Brown trout, brook trout, rainbow trout, black bass, pickerel, and walleye are fish predators (Grierson 1948, Jackson 1961, Linzey and Linzey 1973, Marshall 1951, Wetzal and Shelar 1964).

Ectoparasites reported for water shrew includes several species of mites, chiggers, fleas, and ticks. In New Brunswick, a hypopial mite (*Glycyphagus hypudaei*), a myobiid mite (*Protomyobia claparedei*), and a chigger (*Miyatrombicula esoensis*) were the most abundant ectoparasites on water shrews (Whitaker and French 1982). Documented endoparasites include two groups of organisms: nematodes and cestodes. Two species of subcutaneous nematodes, one from the stomach and one from the bladder, parasitize water shrews. Known species of cestodes inhabit the duodenum and coelomic cavity of the water shrew (Beneski and Stinson 1987).

STATUS

General: Water shrews are considered to be present throughout much of New England but uncommon in any given area (DeGraaf and *Yamasaki* 2001). Low trapping success relative to other shrews suggests that this species is uncommon. Whitaker and Hamilton (1998), however, assert that the water shrew is more common than museum specimens would indicate. Water shrews are difficult to observe due to their habit and habitat and are likely under reported.

In The Primary Study Area: Only one water shrew was observed in the primary study area. This was a dead specimen found on the bank of the Housatonic River, the cause of death unknown. Thousands of trap-nights were recorded for the study area within appropriate communities utilizing snap traps and pit traps, methods that are known to successfully capture water shrews. No captures, however, were recorded. Figure 2 provides the approximate location of the observed water shrew carcass in the primary study area.

REFERENCES

Baker, R.H. 1983. Michigan Mammals. Michigan State University Press, East Lansing, MI, USA.

Banfield, A.W.F. 1974. The Mammals of Canada. University of Toronto Press, Toronto, Ontario, Canada.

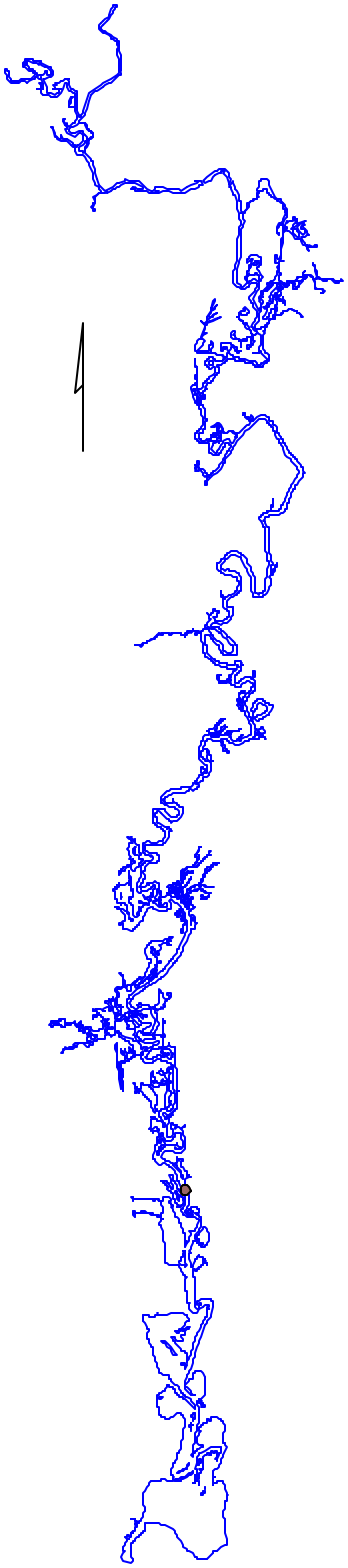


Figure 2. Single water shrew sighting in the primary study area (2000)

Beneski, J.T., and D.W. Stinson. 1987. *Sorex palustris*. p. 1-6. *In* C.J. Phillips (ed.) Mammalian Species Number 296. American Society of Mammalogists, Baltimore, MD, USA.

Buckner, C.H. 1970. Direct observation of shrew predation on insects and fish. Blue Jay 28:171-172.

Buckner, C.H., and D.G.H. Ray. 1968. Notes on the water shrew in bog habitats of southeastern Manitoba. Blue Jay 26:95-96.

Calder, W.A. 1969. Temperature relations and under water endurance of the smallest homeothermic diver, the water shrew. Comparative Biochemistry and Physiology 30A:1075-1082.

Clark, T.W. 1973. Distribution and reproduction of shrews in Grand Teton National Park, Wyoming. Northwest Science 47:128-131.

Conaway, C.H. 1952. Life history of the water shrew (*Sorex palustris navigator*). American Midland Naturalist 48:219-248.

Conaway, C.H., and D.W. Pfitzer. 1952. *Sorex palustris* and *Sorex dispar* from the Great Smokey Mountains National Park. Journal of Mammalogy 33:106-108.

Davis, W.B. 1939. The Recent Mammals of Idaho. Caxton Printers, Caldwell, ID, USA.

DeGraaf, R.M., and M. Yamasaki. 2001. New England Wildlife: Habitat, Natural History, and Distribution. University Press of New England, Hanover, NH, USA.

Goodwin, G.G. 1932. New records and some observations on Connecticut mammals. Journal of Mammalogy 13:36-40.

Grierson, S.D. 1948. Water shrew in Westchester County, NY. Journal of Mammalogy 29:777.

Jackson, H.H.T. 1928. A taxonomic revision of the American long tailed shrews. North American Fauna 51:1-238.

Jackson, H.H.T. 1961. Mammals of Wisconsin. University of Wisconsin Press, Madison, WI, USA.

Lampman, B.H. 1947. A note on the predaceous habits of water shrews. Journal of Mammalogy 28:181.

Layne, J.N., and C.R. Shoop. 1971. Records of the water shrew (*Sorex palustris*) and smokey shrew (*Sorex fumeus*) from Rhode Island. Journal of Mammalogy 52:215.

Linzey, D.W., and A.V. Linzey. 1973. Notes on food of small mammals from Great Smokey Mountains National Park, Tennessee-North Carolina. J. Elisha Mitchell Science Society 89:6-14.

Marshall, W.H. 1951. Predation on shrews by frogs. Journal of Mammalogy 32:219.

Nussbaum, R.A., and C. Maser. 1969. Observations of *Sorex paulustris* preying on *Dicamptodon ensatus*. Murrelet 50:23-24.

Sorensen, M.W. 1962. Some aspects of water shrew behavior. American Midland Naturalist 68:445-462.

Starrett, A., P. Starrett, and P.M. Youngman. 1952. Additional records for water shrews, *Sorex palustris*, in New England. Journal of Mammalogy 33:398.

Svihla, A. 1934. The mountain water shrew. Murrelet 15:44-45.

van Zyll de Jong, C.G. 1983. Handbook of Canadian Mammals: Marsupials to Insectivores. National Museum of Natural Science, National Museum of Canada, Ottowa, Ontario, Canada 1:1-210.

Wetzel, R.M., and E. Shelar. 1964. The water shrew in southern Connecticut. Journal of Mammalogy 45:311.

Whitaker, J.O., Jr., and T.W. French. 1982. Ectoparasites and other associates of some insectivores and rodents from New Brunswick. Canadian Journal of Zoology 60:2787-2797.

Whitaker, J.O., Jr., and W.J. Hamilton Jr. 1998. Mammals of the Eastern United States. 3rd ed. Cornell University Press, Ithica, NY.

Wible, M. 1946. Water shrew from Potter County, Pennsylvania. Journal of Mammalogy 27:89.

Wrigley, R.E., J.E. Dubois, and H.W.R. Copland. 1979. Habitat, abundance, and distribution of six species of shrews in Manitoba. Journal of Mammology 60(3):505–520.

Yamasaki, M. 1997. White Mountains National Forest Small Mammal Identification and Collection Report--1996. Unpublished report on file. US Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Durham, NH, USA. 38 pp.

Wood Frog

Rana sylvatica

DESCRIPTION

The wood frog is one of the smaller ranids inhabiting the northeast. Like the spotted and Jefferson salamanders, it is considered an obligate vernal pool amphibian species because it requires (or, more-accurately, prefers) vernal pools for breeding (Colburn 1995, Kenney 1995). The wood frog's life cycle includes an aquatic larval stage and terrestrial juvenile and adult stages (Berven 1990).

BODY SIZE

Wright and Wright (1949) reported lengths of wood frogs to be 34 – 60 mm for males and 34 – 78 mm typical, but up to 83 mm for females.

In The Primary Study Area: Body size data from the Housatonic vernal pool surveys are presented in Table 1.

Table 1. Body size data for adult and yearling wood frogs from 1999 live trapping surveys at vernal pools in the Housatonic study area

Parameter	Males	Females
Weight (g)		
Mean	11.2	17.6
Range	4.3–20.4	2.8–29.3
Std. Dev.	2.4	5.1
n =	265	169
Length (mm)		
Mean	47.7	54.4
Range	38.2–60.0	34.6–62.3
Std. Dev.	3.0	3.9
n =	265	169

DISTRIBUTION

The wood frog is one of the more cold-adapted amphibians, with a transcontinental range, occurring farther north than any other North American amphibian species (Figure 1). It can be found from the Canadian Maritimes west to Alaska, with southern portions of its range extending from sourthern Minnesota and Wisconsin to Arkansas, Tennessee and northern

Photo By R.D. Roy

Figure 1. Range of wood frog in North America

South Carolina to Maryland (Wright and Wright 1949). The wood frog is found farther north than any other North American reptile or amphibian, and is the only frog found north of the Arctic Circle. Some taxonomists recognize a "northern wood frog" subspecies (*R. sylvatica cantabrigensis*), but it is thought to occur only north of northern Maine into Quebec (Hunter *et al.* 1999).

MIGRATION

Wood frogs do not migrate except to move from aquatic breeding habitats to nearby terrestrial forest

habitats. In one study, dispersal distances of juvenile wood frogs from the natal pools averaged 1,169 m (± 351, N=66). The same study found that wood frogs appear to have excellent homing ability and that a high percentage of the juveniles returned to their natal pond to breed as adults (Berven and Grudzien 1990).

HABITAT

Wood frogs are entirely terrestrial except during the brief breeding season, when they move to vernal pools and other aquatic habitats to mate and lay eggs (DeGraaf and Rudis 1983, Hunter *et al*. 1999, Wright and Wright 1949). Their preferred terrestrial habitats are cool, moist upland woods, often far from water. They may also be found in wooded swamps and bogs. Wyman (1988) reported that adult wood frogs preferred to occupy moist sites near seeps, ponds, and small streams, and their distribution was not influenced by soil pH as were other amphibian species in that study (i.e., American toad, spotted salamander, northern redback salamander, northern two-lined salamander, and northern dusky salamander). In a New Hampshire study, DeGraaf and Rudis (1990) found that wood frogs were more abundant than would be expected in streamside red maple stands verses upland red maple stands.

In summer, wood frogs are active day and night. They tend to use brush piles and other terrestrial features for cover, rather than seeking aquatic escape like some other frogs. During winter (October through March in the northeast), wood frogs hibernate in upland areas under rotting wood, moss, stones, or decaying leaf litter, never in water. The preferred breeding habitat is the vernal pool, though they will also utilize ditches, cattail swamps, gravel pits, slow-moving streams, and other ephemeral habitats that lack fish (DeGraaf and Rudis 1983, Hunter *et al*. 1999, Petranka *et al*. 1994). Wood frogs show a greater tolerance for pond water with low pH when compared with the spotted salamander, with which it often shares the breeding pool (Rowe and Dunson 1993).

In The Primary Study Area: Data on habitat use by wood frogs from the Housatonic eco-characterization and vernal pool studies (1998 – 2000) are presented in Table 2.

Table 2. Habitat use by wood frogs in the Housatonic study area from 1998-2000 survey data

Habitat Codes and Natural Community Classifications																				
Wetland Habitats													Terrestrial Habitats							
ROW	ROW & PAB	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
Medium-gradient stream	Low-gradient stream	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transitional forest	Rich mesic forest	Cultural grassland	Agricultural cropland	Residential development
B	B	Y	Y	Y	Y	Y	Y	B	Y	B	B	B	Y	Y	Y	Y	Y			

ROW = Riverine Open Water
SHO = Shorelines
PFO = Palustrine Forested
PSS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Croplands
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round
Shading = observed in study area

HIBERNATION

Wood frogs hibernate during winter in terrestrial or forested wetland habitats, never in water. They typically spend the winter in rotten logs, under stumps and rocks, or in shallow burrows. Unlike frog species that hibernate under water, wood frogs are freeze-tolerant and pass the winter with their circulation and respiration stopped and much of their body tissue crystallized into ice. When spring arrives, breathing and heartbeat resume and the frog successfully emerges from hibernation.

HOME RANGE AND TERRITORIALITY

Bellis (1965) studied the summer home range and movements of wood frogs in a northern bog community using mark-recapture methods. He estimated that the mean home range size for adults was 77.2 sq. yds. (695 sq ft), with a range of 3.5 to 440 sq yds. Home range size was not significantly different between males and females. The mean distances between adult recaptures of 12.3 yds (37 ft, range=1 to 78 yds, n=298) suggested that many of the wood frogs remained in a "home area," at least during the summer. Bellis (1965) hypothesized that availability of food was one of the principal factors affecting home range size. His data also suggested that when young-of-the-year wood frogs invaded the study area in July and August, many settled into home areas similar in size to the adults. Many overwinter frogs were captured very near their capture sites from the previous summer, though it was not known whether they simply did not move out of the area seasonally, or that they used their homing ability to return to the home area after moving to hibernation or breeding sites.

Berven and Grudzien (1990) reported that adult wood frogs exhibited a high degree of fidelity to their breeding ponds each year, though they did observe some juveniles dispersing to breeding ponds other than the ones in which they were born.

No information was found in the literature regarding the territoriality of adult wood frogs in their terrestrial habits. It is thought that frogs in general may defend their shelters against conspecifics (Duellman and Trueb 1994). Male wood frogs are only somewhat territorial in the breeding pools during the brief mating period (see below).

BREEDING

Wood frogs in Massachusetts and other southern New England areas begin their migration from hibernation spots to the breeding pools in early spring (late February to early April), probably stimulated by temperature, relative humidity, and photoperiod (Crouch and Paton 2000, Howard 1980 as cited in Windmiller 1990). They reach the breeding pools shortly after, or concurrent with, the Jefferson salamander, but earlier than the spotted salamanders by a month or more (Pfingsten and Downs 1989). Ice may still be covering portions of the pool when they first arrive. The frogs may be attracted to the breeding sites by a combination of olfactory, auditory, and visual cues, possibly including the duck-like vocalizations of first arrivals, odors of the ponds, humidity gradients, or celestial cues related to the sun and moon (Hunter *et al.* 1999).

In The Primary Study Area: Chronology data on wood frog use of breeding pools during the 1999 Housatonic vernal pool surveys are presented in Figure 2.

Males gather together at a small area of the pond to vocalize and attract females. Males usually outnumber females and must compete for a mate. Because of the shortage of females and the tenacity of males who do successfully locate a mate, only a small percentage of the males will breed. Males are known to prefer the larger females. Coupling is by dorsal amplexus, and fertilization is external. The male releases his sperm into the water as the eggs are expelled from the female. The eggs then become attached to submerged twigs or vegetation. Eggs are generally deposited near shore from 1 to 2 inches below the surface, presumably where water temperatures are more favorable for development of the embryos (Wright and Wright 1949).

Much of the egg laying is completed in a pond in 4 to 6 days, though it can take over 2 weeks for all egg masses in a pond to be deposited if there are

interruptions caused by fluctuating temperatures (Crouch and Paton 2000, Herreid and Kinney 1967). Each female generally lays only one mass (Crouch and Paton 2000, Waldman 1982 as cited in Gascon and Planas 1986). Crouch and Paton (2000) found a strong correlation between the number of egg masses deposited and the number of male and female wood frogs using a pond.

Individual egg masses or clutches measure 3 to 4 inches in diameter, and may contain on average 2,000 to 3,000 eggs. Clutch size varies from year to year, but has been shown to be larger for younger females and those individuals that are larger in size (Berven 1990). Often, the egg masses from many (up to 100 or more) females are combined into communal masses that may afford survival advantages related to reduced predation, better protection from desiccation, and enhanced thermal properties (Hunter *et al.* 1999). In a Pennsylvania study of abiotic vernal pool parameters, Rowe and Dunson (1993) reported that the number of wood frog egg masses in their study was positively correlated with dissolved organic carbon. They speculated that this was because wood frog embryos are relatively intolerant to aluminum, which may be bound to a greater extent by the dissolved organics. Gascon and Planas (1986) reported that wood frog egg mass density was negatively correlated with acidity and total organic carbon, that hatching success was inversely correlated with pH, and that the length of the embryonic period was not correlated with any of the chemical parameters studied.

Wood frogs are considered "explosive" breeders, whereby the entire breeding sequence, including arrival at the pools, mating, egg laying, and departure for terrestrial habitats, is completed in a very short time. Though the onset of breeding is variable, its duration (about 1 to 2 weeks) is relatively constant year to year (Berven 1990, Hunter *et al.* 1999). Local tadpole densities in pools can be high, often exceeding 2,000 tadpoles/m^2 (Biesterfeldt *et al.* 1993, as cited in Petranka *et al.* 1994). Explosive breeding

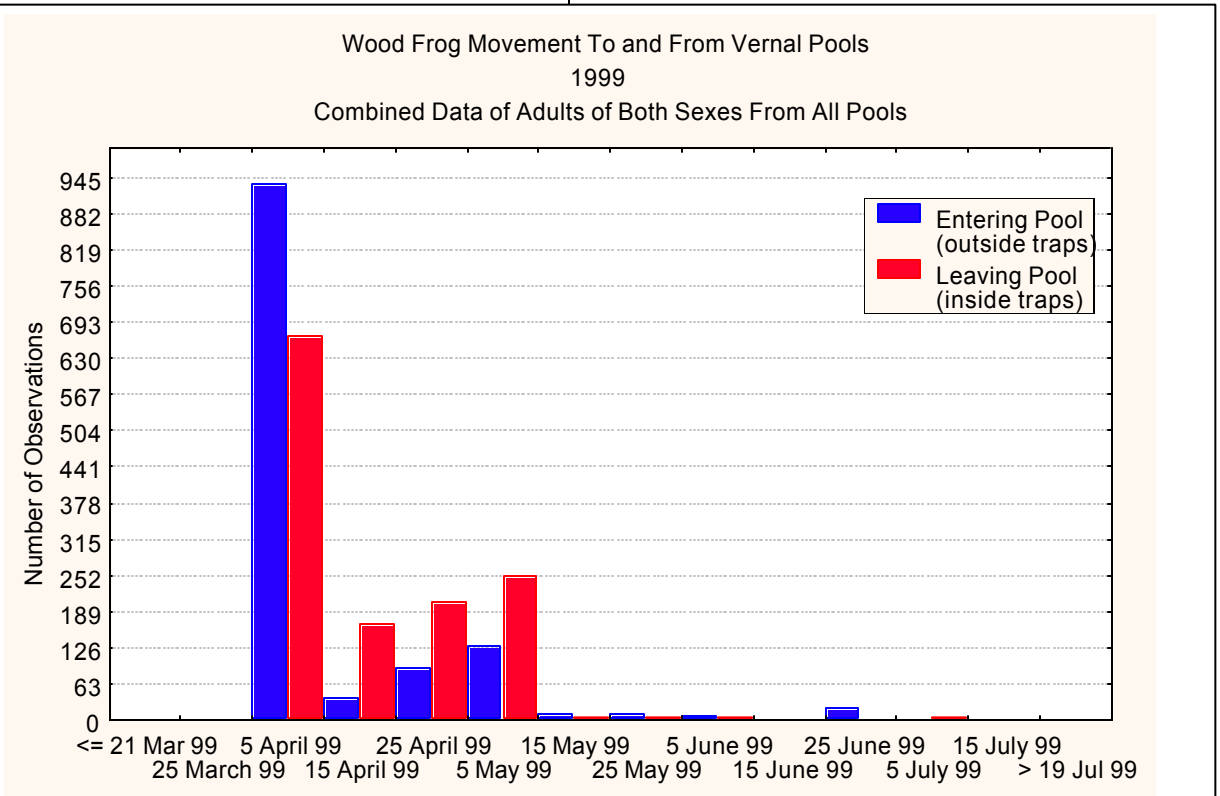


Figure 2. Chronology data related to wood frog breeding activity in the Housatonic study area.

is thought to be a survival mechanism benefiting the wood frog eggs and tadpoles. By breeding all at once, the hatchling tadpoles emerge within a few days of each other and are of similar size. This has been shown to reduce mortality of eggs and tadpoles due to cannibalism (Hunter *et al.* 1999, Petranka *et al.* 1994). Wood frog tadpoles, like those of other frog species, have also been shown to exhibit kin recognition, where siblings preferentially form tight-knit groups (Roche 1993). These groups swim and feed together, and gain the advantages of increased vigilance for avoiding predators and possibly increased growth rates caused by warmer temperatures within the group.

GROWTH AND DEVELOPMENT

Embryonic development is temperature dependent, with eggs hatching in 10 to 30 days (DeGraaf and Rudis 1983, Hunter *et al.* 1999). Newly hatched wood frog larvae are 0.3 – 0.4 inches in length. Larval development in the wood frog is relatively rapid when compared to other frogs and amphibians, presumably a strategy that allows it to metamorphose before ponds dry (or freeze, as would be the case in the northern part of its range) (Herreid and Kinney 1967). Tadpoles metamorphose in 6 to 15 weeks, but some tadpoles may overwinter in the northern parts of their range (DeGraaf and Rudis 1983, Herreid and Kinney 1967). In Massachusetts, metamorphosis would likely occur from mid-May through early August. In Berven's (1990) 7-year study in Maryland, the initial date that the wood frogs bred varied among years by up to six weeks, and the average length of the larval period ranged from 73 to 113 days (average = 90 to 94). He also found that increased egg numbers were associated with reduced survival, smaller size at metamorphosis, and prolongation of the larval stage.

Newly-metamorphosed juvenile wood frogs are 0.4 – 0.5 inches in length, and resemble adults in color and markings. Large numbers of juveniles typically congregate near the edges of the breeding pools under litter and vegetation before dispersing into surrounding terrestrial areas (Hunter *et al.* 1999). Male wood frogs generally mature at 1 to 2 years of age, while most females are mature at age two (Duellman and Trueb 1986).

In The Primary Study Area: Metamorphosed wood frogs (juveniles) were observed leaving the study pools beginning in late June and continuing until late July.

FOOD HABITS AND DIET

Foods of the adult wood frog include insects, especially beetles, flies, slugs, snails, spiders, bugs, moth larvae, and earthworms (DeGraaf and Rudis 1983, Hunter *et al.* 1999). Wood frog tadpoles are thought to be mostly herbivourous feeders, consuming algae, decaying plants (detritus), and various microorganisms scraped from aquatic plants present in the breeding pools (Hunter *et al.* 1999).

However, Petranka *et al.* (1994) found that wood frog tadpoles were extremely effective predators of American toad eggs and hatchlings inhabiting the same pool, despite the fact that American toad eggs and larvae are thought to be toxic or distasteful to other organisms. In experimentally induced pairings of the two species, wood frog tadpoles displayed instantaneous and voracious feeding frenzies, where virtually 100% of the toad eggs or young tadpoles (n = 200 – 3,000) were consumed in a matter of minutes. The authors also observed this phenomenon in the wild and noted that it is probably rare that American toads successfully breed in ponds containing wood frog tadpoles. The researchers noted that the predation rate appeared to exceed that of any other aquatic predator found in vernal pools in eastern North America. As in other similar studies, Petranka *et al.* (1994) also found that adult toads strongly avoided ovipositing in ponds that contained wood frog tadpoles, choosing instead various less-than-optimal pools or ponds where no wood frogs were present. One hypothesis is that this avoidance behavior may be the result of natural selection pressure, in much the same way that obligate vernal pool amphibians avoid breeding sites that contain fish.

POPULATIONS AND DEMOGRAPHY

Survivorship: Wood frogs are a relatively short-lived vernal pool amphibian, as compared with a species

like the spotted salamander. In a 7-year study of wood frogs in Maryland, Berven (1990) found that the breeding wood frog population fluctuated by a factor of 10 and the juvenile population by a factor of 100, and that variation in adult populations was largely due to variations in juvenile recruitment. Juvenile and adult survivorship was relatively constant among years, regardless of sex. Adult survival was largely independent of age and size.

Age at Maturity and Life Span: Berven (1990) reported that male wood frogs generally matured at one year of age (i.e., 8 months after emerging as juveniles), while females matured at age 2. Approximately 84% of the males bred once, 14% twice, and only 2% bred 3 times. Comparatively, 86.6% of the females bred once, and 14% bred twice. Only 12.6% (average) of the females and 10.8% of males in the studied cohorts survived to breed again as 3 year olds. A small number of male and even fewer female wood frogs were thought to live beyond age 3. The per annum survival rate for males was estimated at 14% as compared with 12.8% for females.

Mortality: Factors contributing to adult and juvenile wood frog mortality are not well understood. Predation, starvation, diseases and parasites, and desiccation during periods of low rainfall all contribute to wood frog mortality, but other density-dependent and density-independent factors play a roll in survivorship and overall population regulation (Berven 1990). For the wood frog, these factors appear to be interrelated, and include fecundity, larval and adult density, timing of metamorphosis, size at metamorphosis, fluctuations in adult population size, rainfall, and pond productivity and duration among others.

Enemies: Wood frogs have few defenses and are preyed upon by many other animals. In breeding habitats, adults fall prey to water snakes, snapping turtles, herons, mink, raccoon, skunk, fox, and coyote. The eggs and juveniles are fed upon by leeches, caddisfly, mayfly, and dragonfly larvae, predaceous diving beetles, salamanders, adult frogs and toads, turtles, snakes, birds, and various carnivorous mammals (Hunter *et al*. 1999, Whitlock *et al*. 1994).

STATUS

General: The wood frog is common in suitable habitat throughout Massachusetts and has been found to be one of the most abundant amphibians in the Northeast in forested habitats (DeGraaf and Rudis 1983, DeGraaf and Rudis 1990, deMaynadier and Hunter 1998). It is currently not a listed species in Massachusetts or other New England States. The wood frog is considered an obligate vernal pool species, and as with other amphibians whose life histories are tied to vernal pool habitats, this species faces continual and cumulative pressure from development as vernal pools and their surrounding upland forests are impacted by ongoing development.

In The Primary Study Area: Wood frogs were by far the most common amphibian species observed during the vernal pool surveys in 1999. Approximately 1,300 wood frogs were caught as they entered the four vernal pools in the study, as compared to 154 leopard frogs, 87 green frogs, and 70 spotted salamanders. Figure 3 below illustrates the locations within the primary study area where wood frogs were observed during the 1998, 1999, and 2000 field studies.

REFERENCES

Bellis, E.D. 1965. Home range and movements of the wood frog in a northern bog. Ecology 46(1):90-98.

Berven, K.A. 1990. Factors affecting population fluctuations in larval and adult stages of the wood frog (*Rana sylvatica*). Ecology 71:1599-1608.

Berven, K.A., and T.A. Grudzien. 1990. Dispersal in the wood frog (*Rana sylvatica*): Implications for genetic population structure. Evolution 44(8):2047-2056.

Biesterfeldt, J.M., J.W. Petranka, and S. Sherbondy. 1993. Prevalance of chemical interference competition in natural populations of wood frogs, *Rana sylvatica*. Copeia 1993:688-695.

Colburn, E.A. 1995. Certified: A Citizen's Step-By-Step Guide to Protecting Vernal Pools. March 1995. Sixth ed. Massachusetts Audubon Society, Lincoln, MA.

Crouch, W.B., and P.W.C. Paton. 2000. Using egg-mass counts to monitor wood frog populations. Wildife Society Bulletin 28(4):895-901.

DeGraaf, R.M., and D.D. Rudis. 1983. Amphibians and Reptiles of New England: Habitats and Natural History. University of Massachusetts Press, Amherst.

DeGraaf, R.M., and D.D. Rudis. 1990. Herpetofaunal species composition and relative abundance among three New England forest types. Forest Ecology and Management 32(2-3):155-165.

deMaynadier, P.G., and M.L. Hunter Jr. 1998. Effects of silvicultural edges on distribution and abundance of amphibians in Maine. Conservation Biology 12(2):340-352.

Duellman, W.E., and L. Trueb. 1986. Biology of Amphibians. John Hopkins University Press, Baltimore.

Gascon, C., and D. Planas. 1986. Spring pond water chemistry and the reproduction of the wood frog. Canadian Journal of Zoology 64:543-550.

Herreid, C.F., II, and S. Kinney. 1967. Temperature and development of the wood frog *Rana sylvatica* in Alaska. Ecology 48:579-590.

Howard, R.D. 1980. Mating behaviour and mating success in wood frogs. Animal Behaviour 28:705-716.

Hunter, M.L., A. Calhoun, and M. McCollough. 1999. Maine Amphibians and Reptiles. The University of Maine Press, Orono.

Kenny, L.P. 1995. Wicked Big Puddles: A Guide to the Study and Certification of Vernal Pools. 2nd ed. Reading Memorial Highschool and the Vernal Pool Association, Reading.

Petranka, J.W., M.E. Hopey, and B.T. Jenning. 1994. Breeding habitat segregation of wood frogs and American toads: the role of interspecific tadpole predation and adult choice. Copeia 3:691-697.

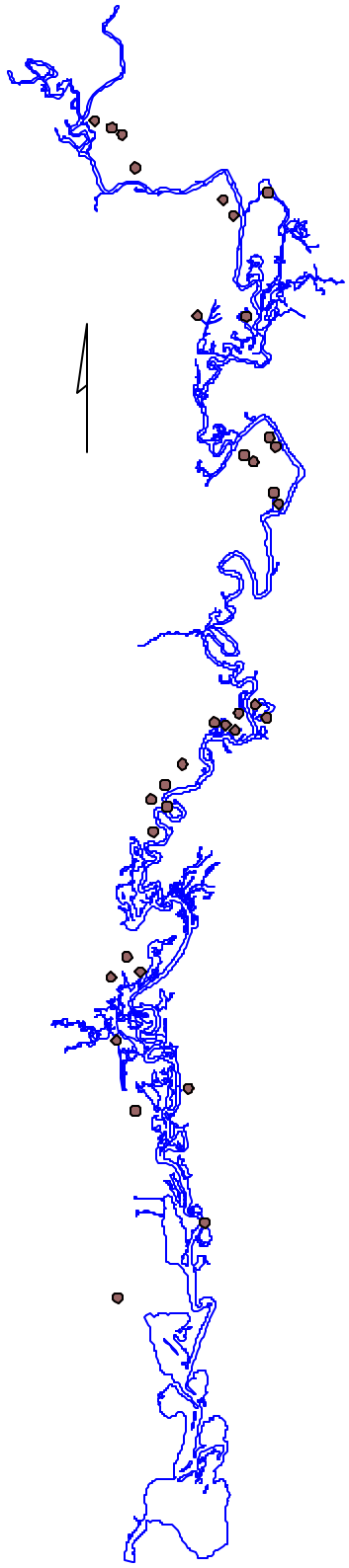


Figure 3. Wood frog sightings in the primary study area, from 1998 – 2000 field studies

Pfingston, R.A., and F.L. Downs. 1989. Salamanders of Ohio. Vol. 7, No. 2. Ohio Bilo. Surv. Bull. New Series, Columbus, Ohio.

Rowe, C.L., and W.A. Dunson. 1993. Relationships among abiotic parameters and breeding effort by three amphibians in temporary wetlands of central Pennsylvania. Wetlands 13(4):237-246.

Waldman, B. 1982. Adaptive significance of communal oviposition in wood frogs (*Rana sylvatica*). Behav. Ecol. Sociobiol. 10:169-174.

Whitlock, A.L., N.M. Jarman, and J.S. Larson. 1994. WEThings. Wetland Habitat Indicators for NonGame Species (New England). Vol. II. The Environmental Institute, University of Massachusetts, Amherst, MA.

Windmiller, B.S. 1990. The limitations of Massachusetts regulatory protection for temporary pool-breeding amphibians. Master's Thesis. Tufts University.

Wright, A.H., and A.A. Wright. 1949. Handbook of Frogs and Toads of the United States and Canada. 3rd ed. Cornell Universtiy Press, Ithica.

Wyman, R.L. 1988. Soil acidity and moisture and the distribution of amphibians in five forests of southcentral New York. Copeia 1988(2):394-399.

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																								
								Wetland Habitats**																	Terrestrial Habitats								
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES			
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development			
Fish	*Fundulus diaphanus*	Banded killifish	Quiet waters of lakes						Y		Y																					
Fish	*Pomoxis nigromaculatus*	Black crappie	Quiet, weedy waters of streams and ponds	C			Ci		Y		Y																					
Fish	*Rhinichthys atratulus*	Blacknose dace	Quiet, sluggish, weedy waters	C			Ci	Y	Y	Y	Y																					
Fish	*Lepomis macrochirus*	Bluegill	Quiet, warm, weedy water	A			Ci		Y		Y																					
Fish	*Pimephales notatus*	Bluntnose minnow	Moderate-sized lakes and streams	R				Y	Y		Y																					
Fish	*Notropis bifrenatus*	Bridle shiner	Sluggish streams and backwaters with mud substrate	R	SC				Y		Y																					
Fish	*Salvelinus fontinalis*	Brook trout	Cool, fast-flowing streams	U			Ci	Y		Y																						
Fish	*Ameiurus nebulosus*	Brown bullhead	Sluggish streams and ponds with mud substrate	C			Ci		Y		Y																					
Fish	*Salmo trutta*	Brown trout	Cool, fast-flowing streams	U			Ci	Y		Y																						
Fish	*Esox niger*	Chain pickerel	Quiet, shallow, weedy water, with mud substrate	C			Cp		Y		Y																					
Fish	*Cyprinus carpio*	Common carp	Warm, quiet, weedy water	A			O		Y		Y																					
Fish	*Notropis cornutus*	Common shiner	Cool, flowing streams with sparse vegetation	A			O	Y	Y	Y	Y																					
Fish	*Semotilus atromaculatus*	Creek chub	Small streams with gravel substrate	U				Y		Y																						
Fish	*Erimyzon oblongus*	Creek chubsucker	Sluggish, weedy waters with mud substrate	R			O		Y	Y	Y																					
Fish	*Semotilus corporalis*	Fallfish	Adaptable to lakes, rivers, and streams	C			Ci	Y	Y	Y	Y																					
Fish	*Pimephales promelas*	Fathead minnow	Boggy lakes, ponds, and streams	R					Y	Y	Y																					
Fish	*Notemigonus crysoleucas*	Golden shiner	Quiet, weedy waters of ponds and sluggish streams	C			O		Y		Y																					
Fish	*Carassius auratus*	Goldfish	Warm, quiet, weedy water	A			O		Y		Y																					
Fish	*Lepomis cyanellus*	Green sunfish	Large and small lakes, rivers, and streams	R			Ci	Y	Y		Y																					
Fish	*Micropterus salmoides*	Largemouth bass	Warm, shallow, weedy water with mud substrate	A			C		Y		Y																					
Fish	*Rhinichthys cataractae*	Longnose dace	Riffles of fast-flowing streams	C			Ci	Y		Y																						

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

State/Federal Status
E - Endangered
T - Threatened

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																									
								Wetland Habitats**																		Terrestrial Habitats								
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES			
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development			
Fish	*Catostomus catostomus*	Longnose sucker	Cold, rapid-flowing streams,	R	SC		O	Y		Y																						
Fish	*Esox lucius*	Northern pike	Quiet, shallow, weedy water, with mud substrate	C			Cp		Y		Y																					
Fish	*Lepomis gibbosus*	Pumpkinseed	Quiet, slow-moving water with aquatic vegetation	A			Ci		Y		Y																					
Fish	*Oncorhynchus mykiss*	Rainbow trout	Cool, fast-flowing streams	U			Ci	Y		Y																						
Fish	*Lepomis auritus*	Redbreast sunfish	Lakes, ponds, and moderately-flowing streams	R			Ci	Y	Y		Y																					
Fish	*Lepomis microlophus*	Redear sunfish	Large, quiet waters	R			Ci		Y		Y																					
Fish	*Esox americanus*	Redfin pickerel	Acidic, lowland streams in shallow, dense vegetation	R			Cp		Y		Y																					
Fish	*Ambloplites rupestris*	Rock bass	Rocky, flowing streams with dense aquatic vegetation	C			Ci	Y	Y		Y																					
Fish	*Cottus cognatus*	Slimy sculpin		U			Ci	Y		Y																						
Fish	*Micropterus dolomieui*	Smallmouth bass	Cool, clear water, rocky substrate, scant vegetation	C			Ci	Y		Y																						
Fish	*Notropis hudsonius*	Spottail shiner	Clear rivers and lakes with gravel substrate	A				Y	Y	Y	Y																					
Fish	*Etheostoma olmstedi*	Tessellated darter	Small upland streams to large rivers	U				Y	Y	Y	Y																					
Fish	*Esox lucius x. masquinongy*	Tiger muskellunge	Stocked by Massachusetts Fish and Wildlife	U			Cp		Y		Y																					
Fish	*Pomoxis annularis*	White crappie	Silty rivers and lakes	R			Ci		Y		Y																					
Fish	*Catostomus commersoni*	White sucker	Adaptable to a diversity of habitats	A			O	Y	Y	Y	Y																					
Fish	*Ictalurus natalis*	Yellow bullhead	Weedy, fast-flowing water	R			Ci	Y	Y	Y	Y																					
Fish	*Perca flavescens*	Yellow perch	Weedy areas of lakes and slow-moving streams	C			Ci		Y		Y																					
Reptile	*Clemmys muhlenbergii*	Bog turtle	Wet meadows	R	E		O		B		B			Y	Y	B	B	Y	Y	Y	B	B						Y	Y			
Reptile	*Sternotherus odoratus*	Common musk turtle	Permanent water bodies	R			C	Y	Y		Y	B																B	B			
Reptile	*Terrapene c. carolina*	Eastern box turtle	Old fields, clearings, sandy soil	R	SC		O					Y	Y								Y	B	Y	Y	Y	Y	Y	Y	Y			
Reptile	*Thamnophis s. sirtalis*	Eastern garter snake	Moist areas, forest edges, stream edges, swamps	A			C	B	B		B	B	B	Y	Y	Y	Y	B	B	B	Y	B	Y	Y	Y	Y	Y	Y	Y	Y		

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																							
								Wetland Habitats**																	Terrestrial Habitats							
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development
Reptile	*Lampropeltis t. triangulum*	Eastern milk snake	Slash, woodpiles, debris, lose soil for laying eggs	U			C																	Y	Y	Y	Y	Y	Y	Y
Reptile	*Thamnophis s. sauritus*	Eastern ribbon snake	Mesic woods with aquatic habitat	R			C					B		Y	Y	Y	Y	Y	Y	Y	Y	B					Y			
Reptile	*Coluber c. constrictor*	Northern black racer	Wooded areas, fields, swamps, marshes	R			C							Y	Y	Y	Y	Y		B			Y	Y	Y	Y	Y	Y	Y	Y
Reptile	*Storeria d. dekayi*	Northern brown snake	Damp woods, swamps, bogs, open fields	U			C							Y	Y	Y	Y	B	Y	Y	Y	B	Y	Y	Y	Y	Y	Y	Y	Y
Reptile	*Storeria o. occipitomaculata*	Northern red-bellied snake	Moist woods, hillsides with surface debris	C			Ci											B			B		Y	Y	Y	Y	Y	Y	Y	
Reptile	*Diadophis punctatus edwardsii*	Northern ringneck snake	Mesic areas with abundant cover	U			C																	Y	Y	Y	Y	Y	Y	Y	
Reptile	*Nerodia s. sipedon*	Northern water snake	Branches or logs overhanging water	U			C	B	B		B	B	B					B	B	B	Y										
Reptile	*Chrysemys picta*	Painted turtle	Ponds with projecting or floating logs	A			O	Y	Y		Y	B	B					B	B	B		B									
Reptile	*Opheodrys v. vernalis*	Smooth green snake	Upland grassy openings	C			Ci													B					Y			Y	Y	
Reptile	*Chelydra s. serpentina*	Snapping turtle	Aquatic habitat; sandy, gravely soil	C			O	Y	Y		Y	B	B		B			B	B	B	B	B									
Reptile	*Clemmys guttata*	Spotted turtle	Unpolluted shallow water	R	SC		O		B		B	B						Y	Y	Y	B	B						B	B	
Reptile	*Clemmys insculpta*	Wood turtle	Wooded river or stream banks	U	SC		O	Y	Y	Y	Y	B		B	B	B	B	B	B	B	B	B						B		
Amphibian	*Bufo a. americanus*	American toad	Moist upland woods	C			Ci		B		B			B	B	B	B	B	B	B	Y	B	Y	Y	Y	Y	Y	Y	Y	
Amphibian	*Ambystoma laterale*	Blue-spotted salamander	Ponds or semi-permanent water for breeding	R	SC		Ci							Y	Y		Y	Y	Y	Y		B		Y	Y		Y			
Amphibian	*Rana catesbeiana*	Bullfrog	Deep water, floating and emergent vegetation	A			C	Y	Y		Y	B	B	B	B	B	B	B	Y	Y	B	B								
Amphibian	*Hemidactylium scutatum*	Four-toed salamander	Wet woodlands	U	SC		Ci							Y	Y		Y	Y		B	B	B	Y	Y	Y	Y	Y			
Amphibian	*Bufo woodhousii fowleri*	Fowler's toad	Sandy soils, shallow water for breeding	R			Ci	B													Y	B		Y	Y	Y	Y	Y	Y	
Amphibian	*Hyla versicolor*	Gray tree frog	Seeps, aquatic sites for breeding	C			Ci		B		B			Y	Y	Y	Y	B	B	B		B		Y	Y	Y	Y			
Amphibian	*Rana clamitans melanota*	Green frog	Riparian habitat	A			Ci	Y				B	B	Y	Y	Y	Y	Y	Y	Y	B	B			W	W	W			
Amphibian	*Ambystoma jeffersonianum*	Jefferson salamander	Temporary pools for breeding	U	SC		Ci							Y	Y		Y	Y	B	B	Y	B			Y		Y			
Amphibian	*Ambystoma opacum*	Marbled salamander	Woodland ponds or swamps for breeding	R	T		Ci											Y				B			Y		Y			

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																								
								Wetland Habitats**																		Terrestrial Habitats							
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES		
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development		
Amphibian	*Desmognathus f. fuscus*	Northern dusky salamander	Permanent woodland streams or seeps	U			Ci			Y													Y	Y	Y	Y	Y				
Amphibian	*Rana pipiens*	Northern leopard frog	Wet meadows	C			Ci	Y	Y	Y	Y			B	B	B	B	B	Y	B	B	B			B	B	B	B	B			
Amphibian	*Pseudacris (Hyla) crucifer*	Northern spring peeper	Pools for breeding	A			Ci		B	B	B			B	B	B	B	B	B	B	B	B	Y	Y	Y	Y	Y				
Amphibian	*Gyrinophilus p. porphyriticus*	Northern spring salamander	Streams, seeps, springs	U	SC		Ci	Y		Y													Y	Y			Y				
Amphibian	*Eurycea b. bislineata*	Northern two-lined salamander	Streams for breeding	U			Ci	Y	Y	Y	Y			Y									Y	Y	Y	Y	Y				
Amphibian	*Rana palustris*	Pickerel frog	Shallow, clear water of bogs or woodland streams	U			Ci	Y	Y		Y	B		B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
Amphibian	*Plethodon cinereus*	Red-backed salamander	Logs, stumps, rocks, etc.	C			Ci							Y	Y	Y	Y					B	Y	Y	Y	Y	Y				
Amphibian	*Notophthalmus v. viridescens*	Red-spotted newt	Water with aquatic vegetation for adults	A			Ci	Y	Y		Y	Y	Y					Y	Y	Y		B	Y	Y	Y	Y	Y				
Amphibian	*Ambystoma maculatum*	Spotted salamander	Mesic woods, semi-permanent water for breeding	C			Ci		B		B			Y	Y		Y	B	B	B		B	Y	Y	Y	Y	Y				
Amphibian	*Rana sylvatica*	Wood frog	Vernal woodland pools	A			Ci	B	B		B	Y	Y	Y	Y	Y	Y	B	Y	B	B	B	Y	Y	Y	Y	Y				
Bird	*Empidonax alnorum*	Alder flycatcher	Thickets, low shrubs, clearings	U			Ci							B	B	B	B	B		B	B							B			
Bird	*Botaurus lentiginosus*	American bittern	Undisturbed tall marsh vegetation	U	E		Cp		B		B	B	B					B	B	B	B										
Bird	*Anas rubripes*	American black duck		C			O	Y	B		B	Y	Y	B	B	B	B	Y	Y	Y	B	B			Y	Y	Y	Y	Y			
Bird	*Fulica americana*	American coot	Shallow water with emergent vegetation	U			O	B	B		B								B	B											
Bird	*Corvus brachyrhynchos*	American crow		A			O					Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Carduelis tristis*	American goldfinch	Open, weedy fields with scattered small trees	A			H					Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Falco sparverius*	American kestrel	Tall trees with cavities, open country	C			C													Y	Y								Y	Y		
Bird	*Setophaga ruticilla*	American redstart		A			Ci					B		B	B	B	B	B			B	B		B	B	B	B	B			B
Bird	*Turdus migratorius*	American robin		A			O					B		B	B	B	B	B			B	B	B	B	B	B	B	B	B	B	B
Bird	*Spizella arborea*	American tree sparrow		C			O											W			W							W	W	W	
Bird	*Scolopax minor*	American woodcock	Moist soils, small clearings and dense swales	C			Ci							B	B	B	B	B		B	B			B	B	B	B	B	B	B		

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																								
								Wetland Habitats**																	Terrestrial Habitats								
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES		
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development		
Bird	*Haliaeetus leucocephalus*	Bald eagle	Large bodies of water with fish	U	E	T	C	Y	Y		Y	Y	Y																		
Bird	*Icterus galbula*	Baltimore oriole	Tall scattered deciduous trees	C			O							B	B	B	B	B						B	B	B	B	B	B			
Bird	*Riparia riparia*	Bank swallow	Stabilized sandy or clay banks	U			Ci	B	B		B							B										B	B			
Bird	*Hirundo rustica*	Barn swallow	Abandoned or little used buildings	C			Ci	B	B		B	B	B	B	B	B	B	B	B	B									B	B	B		
Bird	*Strix varia*	Barred owl	Cool, damp lowlands, cavity trees >20" dbh	C			C							Y	Y	Y	Y						Y	Y	Y	Y	Y	Y				
Bird	*Ceryle alcyon*	Belted kingfisher	Perches over streams, ponds, banks for nests	C			Cp	B	B		B	B	B					B	B	B		B										
Bird	*Mniotilta varia*	Black-and-white warbler		C			Ci							B	B	B	B	B						B	B	B	B					
Bird	*Coccyzus erythropthalmus*	Black-billed cuckoo	Low, dense thickets	U			Ci																B	B	B	B	B	B				
Bird	*Dendroica fusca*	Blackburnian warbler	Coniferous forests, mixed woodlands	U			Ci							B	B	B	B						B	B								
Bird	*Poecile atricapillus*	Black-capped chickadee	Cavity trees in small woodlands or clearings	A			O							Y	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y		
Bird	*Nycticorax nycticorax*	Black-crowned night heron		U			Cp					B	B	B	B	B	B	B	B	B	B											
Bird	*Dendroica striata*	Blackpoll warbler		R	SC		Ci							M	M	M		M					M	M	M	M						
Bird	*Dendroica caerulescens*	Black-throated blue warbler	Hardwoods with well-developed understory	C			Ci							B	B	B	B							B	B	B	B					
Bird	*Dendroica virens*	Black-throated green warbler	Coniferous or mixed woodlands	C			Ci									B							B	B	B	B	B					
Bird	*Cyanocitta cristata*	Blue jay		A			O	Y						Y	Y	Y	Y	Y		Y		Y	Y	Y	Y	Y	Y	Y	Y	Y		
Bird	*Polioptila caerulea*	Blue-gray gnatcatcher		C			Ci					B		B	B	B	B	B				B	B	B	B	B	B					
Bird	*Vireo solitarius*	Blue-headed vireo	Mixed or predominantly coniferous forests	C			Ci							B	B	B	B						B	B		B	B					
Bird	*Anas discors*	Blue-winged teal		U			O	B	B		B	B	B					B	B	B	B							B				
Bird	*Vermivora pinus*	Blue-winged warbler	Old fields with scatted shrubs and small trees	U			Ci							B	B	B	B	B							B			B				
Bird	*Dolichonyx oryzivorus*	Bobolink	Wide expanses of grasslands	A			O														B							B	B			
Bird	*Buteo platypterus*	Broad-winged hawk	Extensive woodlands with roads or clearings	U			C							B	B	B	B							B	B	B	B					

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																							
								Wetland Habitats**																	Terrestrial Habitats							
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development
Bird	*Certhia americana*	Brown creeper	Woodland trees with sloughing or loose bark	C			Ci							Y	Y	Y	Y						Y	Y	Y	Y	Y			
Bird	*Toxostoma rufum*	Brown thrasher	Hardwood forest-field ecotone	U			O									Y	Y	Y						Y	Y	Y	Y	Y	Y	Y
Bird	*Molothrus ater*	Brown-headed cowbird		A			O							B	B	B	B	B		B			B	B	B	B	B	B	B	B
Bird	*Branta canadensis*	Canada goose		C			H	Y	B		B	Y	Y	B	B	B	B	B	B	B	B									Y	
Bird	*Wilsonia canadensis*	Canada warbler		U			Ci							B	B	B	B	B						B							
Bird	*Bombycilla cedrorum*	Cedar waxwing		C			O	B	B		B	Y	Y	Y	Y	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Dendroica cerulea*	Cerulean warbler	Tall deciduous trees near water	R			Ci								B	B	B									B				
Bird	*Dendroica pensylvanica*	Chestnut-sided warbler	Brush at wood margins, hardwood seedling stands	A			Ci							B	B	B	B	B				B			B	B	B	B		
Bird	*Chaetura pelagica*	Chimney swift	Chimneys, Feeds over water	C			Ci	B	B		B	B	B					B										B	B	B
Bird	*Spizella passerina*	Chipping sparrow		C			O					B		B	B	B	B	B		B								B	B	B
Bird	*Petrochelidon pyrrhonota*	Cliff swallow	Open areas, mud, vertical wall with an overhang	C			Ci	B	B		B	B	B					B	B	B									B	B
Bird	*Tyto alba*	Common barn owl	Barns, deserted buildings, tree cavities	R	SC		C																					B	B	B
Bird	*Bucephala clangula*	Common goldeneye		U			Ci	M				M	M																	
Bird	*Quiscalus quiscula*	Common grackle		A			O					B	B	B	B	B	B	B		B	B							B	B	
Bird	*Mergus merganser*	Common merganser	Wooded areas with cavity trees, clear fresh water	U			Cp	M	M		M	M	M																	
Bird	*Gallinula chloropus*	Common moorhen	Emergent vegetation in water 1-3 feet deep	U	SC		O	B	B		B							B	B	B										
Bird	*Chordeiles minor*	Common nighthawk	Feeds over water	C			Ci	B				B	B															B	B	B
Bird	*Corvus corax*	Common raven		U			O																Y	Y	Y	Y	Y	Y	Y	
Bird	*Carduelis flammea*	Common redpoll		R			O											W			W				W	W	W	W	W	W
Bird	*Gallinago gallinago*	Common snipe	Moist, organic soils, large open spaces	C			Ci					B	B					B		B	B							B		
Bird	*Geothlypis trichas*	Common yellowthroat		A			Ci					B		B	B	B	B	B		B	B							B	B	

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																							
								Wetland Habitats**																	Terrestrial Habitats							
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development
Bird	*Accipiter cooperii*	Cooper's hawk	Undisturbed forests	U	SC		C*							B	B	B	B				B		B	B	B	B	B		B	
Bird	*Junco hyemalis*	Dark-eyed junco		C			O							Y	Y	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	Y
Bird	*Phalacrocorax auritus*	Double-crested cormorant		U			Cp	M				M	M						M											
Bird	*Picoides pubescens*	Downy woodpecker	Trees, limbs with decay column >6" dbh	C			Ci							Y	Y	Y	Y						Y	Y	Y	Y	Y			Y
Bird	*Sialia sialis*	Eastern bluebird	Low cavities, open country	C			O					Y									B						B	B	
Bird	*Tyrannus tyrannus*	Eastern kingbird	Clearings, fields, edges. Fallen shoreline trees	C			Ci					B	B	B	B	B	B	B	B	B							B	B	
Bird	*Sturnella magna*	Eastern meadowlark		C			O														Y						Y	Y	
Bird	*Sayornis phoebe*	Eastern phoebe	Exposed perches in streamside clearings	C			Ci					B	B	B	B	B	B	B		B			B	B	B	B	B	B	B	B
Bird	*Otus asio*	Eastern screech owl	Cavity trees >12" dbh	R			C														Y							Y	Y
Bird	*Pipilo erythrophthalmus*	Eastern towhee	Dense brushy understory, well-drained soils	C			O											B			B		B	B			B	B	
Bird	*Contopus virens*	Eastern wood-pewee		C			Ci							B	B	B	B						B	B	B	B	B		
Bird	*Sturnus vulgaris*	European starling	Cavity trees >10" dbh	A			O					Y	Y	B	B	B	B										Y	Y	Y
Bird	*Coccothraustes vespertinus*	Evening grosbeak	Spruce and fir forest	R			O																W	W					W
Bird	*Spizella pusilla*	Field sparrow	Old fields	U			O														Y						Y	Y	
Bird	*Regulus satrapa*	Golden-crowned kinglet		C			Ci							W	W	W	W	W					Y	Y					W
Bird	*Vermivora chrysoptera*	Golden-winged warbler	Open areas with saplings in deciduous woodlands	R	E		Ci											B			B				B	B	B	B		
Bird	*Dumetella carolinensis*	Gray catbird	Shrubs, thickets in open country	C			O					B				B		B			B	B						B	B	B
Bird	*Ardea herodias*	Great blue heron	Tall trees for nesting	C			Cp		B		B	B	B	B	B	B	B	B	B	B	B	B								
Bird	*Myiarchus crinitus*	Great crested flycatcher	Mature cavity trees, deciduous forests, edges	C			Ci					B	B	B	B	B	B	B		B				B	B	B	B			
Bird	*Bubo virginianus*	Great horned owl	Large abandoned hawk nests, large tree cavities	C			C							Y	Y	Y	Y	Y			Y		Y	Y	Y	Y	Y	Y	Y	
Bird	*Butorides virescens*	Green heron	Shrub and forested wetlands	C			Cp		B		B	B	B	B	B	B	B	B	B	B	B									

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																							
								Wetland Habitats**																	Terrestrial Habitats							
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development
Bird	*Anas crecca*	Green-winged teal		C			O	M	M		M	M	M						M	M	M									
Bird	*Picoides villosus*	Hairy woodpecker	Trees, limbs with decay column >10" dbh	C			CI							Y	Y	Y	Y						Y	Y	Y	Y	Y			
Bird	*Ammodramus henslowii*	Henslow's sparrow	Damp, heavily overgrown fields	R	E		O														B							B		
Bird	*Catharus guttatus*	Hermit thrush	Coniferous woodlands with dense understory	C			O							B	B	B	B						B	B						
Bird	*Larus argentatus*	Herring gull		C			O	Y				Y	Y																Y	
Bird	*Lophodytes cucullatus*	Hooded merganser	Wooded areas with cavity trees, clear fresh water	C			Cp	B	B		B	B	B	B	B	B	B	B	B	B							B			
Bird	*Eremophila alpestris*	Horned lark	Bare, exposed soil	R			O														Y							Y	Y	
Bird	*Carpodacus mexicanus*	House finch	Open ground with low seed-producing plants	A			H							Y	Y	Y	Y							Y				Y	Y	Y
Bird	*Passer domesticus*	House sparrow		A			O																						Y	Y
Bird	*Troglodytes aedon*	House wren	Cavity trees, shrubs	C			Ci					B		B	B	B	B	B		B		B						B	B	B
Bird	*Passerina cyanea*	Indigo bunting	Forest-field ecotones	U			O										B											B	B	
Bird	*Charadrius vociferus*	Killdeer	Bare ground, sparse vegetation	C			Ci					B	B								B							B	B	B
Bird	*Rallus elegans*	King rail	Stable water levels	R	T		Ci											B	B	B										
Bird	*Calcarius lapponicus*	Lapland longspur		R			O													W	W							W	W	
Bird	*Ixobrychus exilis*	Least bittern	Deep marshes with emergent vegetation	R	E		Cp												B	B										
Bird	*Empidonax minimus*	Least flycatcher	Open deciduous or mixed forest, edges	C			Ci					B	B	B	B	B	B	B		B				B	B	B	B			
Bird	*Calidris minutilla*	Least sandpiper		U			Ci					M	M							M										
Bird	*Asio otus*	Long-eared owl	Dense conifer thickets in open country	R	SC		C							Y	Y	Y	Y						Y	Y	Y	Y	Y	Y		
Bird	*Seiurus motacilla*	Louisiana waterthrush	Woodlands with flowing water	R			Ci							B	B	B	B	B												
Bird	*Dendroica magnolia*	Magnolia warbler	Young stands of spruce or fir	C			Ci																B	B						
Bird	*Anas platyrhynchos*	Mallard		A			O	Y	Y		Y	Y	Y					Y	Y	Y	Y	B			Y		Y	Y	Y	

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications: Wetland Habitats** — ROW	ROW & PAB	ROW	LOW	SHO	SHO	PFO	PFO	PFO	PFO	PSS	PEM	PEM	WM	VP	Terrestrial Habitats — SW	MW	HW	HW	HW	OF	AGR	RES
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development
Bird	*Cistothorus palustris*	Marsh wren	Marshes	U			Ci												B	B	B									
Bird	*Zenaida macroura*	Mourning dove	Open land with bare ground	A			H							B	B	B	B			Y								Y	Y	Y
Bird	*Oporornis philadelphia*	Mourning warbler	Hardwood regeneration	R	SC		Ci							B	B	B	B	B										B		
Bird	*Vermivora ruficapilla*	Nashville warbler	Scattered trees interspersed with brush	C			Ci							B	B	B	B	B							B	B	B	B		
Bird	*Colinus virginianus*	Northern bobwhite	Brushy field edges, well-drained soils	R			H																					Y	Y	
Bird	*Cardinalis cardinalis*	Northern cardinal	Thickets, vines	C			O							Y	Y	Y	Y	Y							Y	Y	Y	Y	Y	Y
Bird	*Colaptes auratus*	Northern flicker	Open areas, trees with heartrot	C			Ci							B	B	B	B						B	B	B	B	B	B	B	
Bird	*Accipiter gentilis*	Northern goshawk	Extensive, mature mixed woods	U			C							Y	Y	Y	Y						Y	Y	Y	Y	Y			
Bird	*Circus cyaneus*	Northern harrier	Marshes or open country with low vegetation	U	T		C											B	B	B	B							B	B	
Bird	*Mimus polyglottos*	Northern mockingbird	Low thickets, high perches, persistent fruits	C			O														B							B	Y	Y
Bird	*Parula americana*	Northern parula		U	T		Ci									M							M							
Bird	*Stelgidopteryx serripennis*	Northern rough-winged swallow	Cut banks for nesting	U			Ci	B	B		B							B	B	B								B	B	
Bird	*Aegolius acadicus*	Northern saw-whet owl	Cavity trees >12" dbh	C			C							Y	Y	Y	Y						Y	Y	Y	Y	Y		Y	
Bird	*Lanius excubitor*	Northern shrike	Scattered trees or shrubs in open country	R			C											W										W	W	W
Bird	*Seiurus noveboracensis*	Northern waterthrush	Cool, shaded, wet ground with shallow pools	A			Ci							B	B	B	B	B				B								
Bird	*Contopus cooperi*	Olive-sided flycatcher	Tall perches adjacent to low, wet thickets	R			Ci							B	B	B	B						B							
Bird	*Pandion haliaetus*	Osprey	Clear lakes and rivers with fish	U			Cp	B	B		B	B	B																	
Bird	*Seiurus aurocapillus*	Ovenbird		C			Ci							B	B	B	B	B					B	B	B	B	B			
Bird	*Dendroica palmarum*	Palm warbler		U			Ci	M						M	M	M	M	M		M				M	M	M	M	M		
Bird	*Falco peregrinus*	Peregrine falcon	Open country, nests on cliffs	R	E	E	C														B							B	B	
Bird	*Podilymbus podiceps*	Pied-billed grebe	Marshes with water and emergent vegetation	R	E		Ci	B	B		B								B	B										

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																							
								Wetland Habitats**																	Terrestrial Habitats							
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development
Bird	*Dryocopus pileatus*	Pileated woodpecker	Mature trees >20" dbh with decay	C			Ci							Y	Y	Y	Y						Y	Y	Y	Y	Y			
Bird	*Pinicola enucleator*	Pine grosbeak	Northern coniferous forest	R			H																W	W						W
Bird	*Carduelis pinus*	Pine siskin	Conifers	R			H																W	W						W
Bird	*Dendroica pinus*	Pine warbler	Pine forests	U			Ci																B							
Bird	*Dendroica discolor*	Prairie warbler	Coniferous cover in old fields	U			Ci																					B	B	
Bird	*Carpodacus purpureus*	Purple finch	Coniferous forest	C			H										Y	Y					Y	Y						Y
Bird	*Progne subis*	Purple martin		U			Ci	B	B		B							B	B	B	B							B	B	B
Bird	*Melanerpes carolinus*	Red-bellied woodpecker	Mature woodlands with dead trees	U			O					B	B	B	B	B	B						B	B	B	B	B			
Bird	*Sitta canadensis*	Red-breasted nuthatch	Cavity trees in mixed or coniferous woods	C			Ci							Y	Y	Y	Y					Y	Y	Y						Y
Bird	*Vireo olivaceus*	Red-eyed vireo		C			Ci							B	B	B	B	B					B	B	B	B	B			
Bird	*Melanerpes erythrocephalus*	Red-headed woodpecker	Cavity trees in open country	R			O										B							B	B	B	B			
Bird	*Buteo lineatus*	Red-shouldered hawk	Cool, moist, mature forests	U			C							B	B	B	B				B		B	B	B	B	B			
Bird	*Buteo jamaicensis*	Red-tailed hawk	Mature forest-field ecotone	C			C					B	B	Y	Y	Y	Y				Y			Y	Y	Y	Y	Y	Y	
Bird	*Agelaius phoeniceus*	Red-winged blackbird		A			O					B	B	B	B	B	B	B	B	B	B							B	B	
Bird	*Larus delawarensis*	Ring-billed gull		C			O	Y				Y	Y															Y	Y	
Bird	*Aythya collaris*	Ring-necked duck		R			O	B	B		B	B	B																	
Bird	*Phasianus colchicus*	Ring-necked pheasant	Cultivated fields, farmland	C			O					Y	Y							Y	Y							Y	Y	
Bird	*Columba livia*	Rock dove		A			H																						Y	Y
Bird	*Pheucticus ludovicianus*	Rose-breasted grosbeak	Forest-field ecotones, thickets, sapling stands	C			O							B	B	B	B							B	B	B	B	B		B
Bird	*Buteo lagopus*	Rough-legged hawk	Open country	R			C													W	W							W	W	
Bird	*Regulus calendula*	Ruby-crowned kinglet		C			Ci							W	W	W	W						M	M						

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																								
								Wetland Habitats**																	Terrestrial Habitats								
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES			
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development			
Bird	*Archilochus colubris*	Ruby-throated hummingbird	Flowers, preferably red	C			H					B	B	B	B	B	B	B						B	B	B	B	B		B		
Bird	*Bonasa umbellus*	Ruffed grouse	Fallen logs amidst dense saplings	C			O							Y	Y	Y	Y						Y	Y	Y	Y	Y						
Bird	*Euphagus carolinus*	Rusty blackbird		C			O					B	B					B	B	B												
Bird	*Passerculus sandwichensis*	Savannah sparrow	Herbaceous cover of moderate height	R			O													B	B							B	B			
Bird	*Piranga olivacea*	Scarlet tanager		U			O							B	B	B	B	B						B	B	B	B					
Bird	*Cistothorus platensis*	Sedge wren	Sedge meadows	R	E		Ci												B	B	B											
Bird	*Calidris pusilla*	Semipalmated sandpiper	Beaches, mudflats	U			Ci					M	M							M												
Bird	*Accipiter striatus*	Sharp-shinned hawk	Extensive, undisturbed open mixed woodlands	U	SC		C*					Y	Y	Y	Y	Y	Y	Y					Y	Y	Y	Y	Y			Y		
Bird	*Plectrophenax nivalis*	Snow bunting		R			O													W	W							W	W			
Bird	*Chen caerulescens*	Snow goose		R			H		M		M																		M			
Bird	*Tringa solitaria*	Solitary sandpiper	Streamsides, wooded swamps, marshes	U			Ci					M	M							M												
Bird	*Melospiza melodia*	Song sparrow		A			O					Y		Y	Y	Y	Y	Y		Y	Y	Y						Y	Y	Y		
Bird	*Porzana carolina*	Sora		U			O											B	B	B	B											
Bird	*Actitis macularia*	Spotted sandpiper	Shorelines	C			Ci					B	B					B		B									B			
Bird	*Melospiza georgiana*	Swamp sparrow		A			O					B		B	B	B	B	B		B	B											
Bird	*Vermivora peregrina*	Tennessee warbler	Brushy, semi-open habitat	U			Ci											M							M	M	M	M				
Bird	*Tachycineta bicolor*	Tree swallow	Cavity trees >10" dbh, open areas	A			Ci	B	B		B							B			B							B	B	B		
Bird	*Baeolophus bicolor*	Tufted titmouse	Cavity trees >8" dbh	C			O							Y	Y	Y	Y	Y				Y	Y	Y	Y	Y	Y	Y	Y	Y		
Bird	*Cathartes aura*	Turkey vulture	Forest openings, fields, large dead tree trunks	C			C							B	B	B	B	B			B			B	B	B	B	B	B			
Bird	*Catharus fuscescens*	Veery	Moist woodlands with understory	A			O							B	B	B	B	B					B	B	B	B	B					
Bird	*Rallus limicola*	Virginia rail	Wetlands with sedge and cattails	C			Ci											B	B	B	B											

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																								
								Wetland Habitats**																		Terrestrial Habitats							
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development
Bird	*Vireo gilvus*	Warbling vireo	Scattered deciduous trees	C			Ci							B	B	B	B	B						B	B	B	B			
Bird	*Caprimulgus vociferus*	Whip-poor-will		U			Ci																	B	B	B	B			
Bird	*Sitta carolinensis*	White-breasted nuthatch	Cavity trees in hardwoods or mixed woods	C			Ci							Y	Y	Y	Y	Y						Y	Y	Y	Y			Y
Bird	*Zonotrichia albicollis*	White-throated sparrow		C			O											Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	
Bird	*Meleagris gallopavo*	Wild turkey	Open, mast-producing woodlands	A			O							Y	Y	Y	Y				B			Y	Y	Y	Y	Y	Y	
Bird	*Empidonax traillii*	Willow flycatcher	Low deciduous trees and shrubs with clearings	U			Ci					B	B	B	B	B	B	B		B				B	B		B			
Bird	*Troglodytes troglodytes*	Winter wren		U			Ci									B	B													
Bird	*Aix sponsa*	Wood duck	Trees >16" dbh with large cavities	C			O	Y	B		B	Y	Y	B	B	B	B	Y	Y	Y	B	B			B	Y	B			
Bird	*Hylocichla mustelina*	Wood thrush	Cool, moist, mature deciduous or mixed forests	C			O							B	B	B	B	B						B	B	B	B			
Bird	*Dendroica petechia*	Yellow warbler	Scattered small trees or dense brush	A			Ci					B		B	B	B	B	B		B	B				B			B	B	
Bird	*Sphyrapicus varius*	Yellow-bellied sapsucker	Trees with >10" dbh	C			O							B	B	B	B						B	B	B	B	B			
Bird	*Coccyzus americanus*	Yellow-billed cuckoo	Low, dense thickets	U			Ci									B												B		
Bird	*Icteria virens*	Yellow-breasted chat	Dense thickets with young trees, often near water	R			O											B										B		
Bird	*Dendroica coronata*	Yellow-rumped warbler	Coniferous trees, bayberry thickets	A			Ci							B	B	B	B	B					B	B		B				
Bird	*Vireo flavifrons*	Yellow-throated vireo	Mature deciduous forest	U			Ci									B								B	B	B	B			
Mammal	*Castor canadensis*	Beaver	Woodland streams, lack of disturbance	C			H	Y	Y	Y	Y	Y	Y		Y	Y		Y	Y	Y					Y		Y			
Mammal	*Eptesicus fuscus*	Big brown bat	Cold, dry areas of caves	C			Ci	B	B		B			Y	Y	Y	Y	B	B	B	B	B	Y	Y	Y	Y	Y	B	B	Y
Mammal	*Ursus americanus*	Black bear	Fallen trees, hollow logs, rock ledges, slash piles	U			O					B	B	Y	Y	Y	Y	B		B	B		Y	Y	Y	Y	Y			
Mammal	*Felis rufus*	Bobcat	Rock ledges, under windfalls, hollow logs	U			C							Y	Y	Y	Y	Y					Y	Y	Y	Y	Y			
Mammal	*Canis latrans*	Coyote		C			C					Y	Y	Y	Y	Y	Y	Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	
Mammal	*Peromyscus maniculatus*	Deer mouse	Northern hardwoods or coniferous forests	R			O							Y	Y	Y	Y						Y	Y	Y	Y	Y			Y

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

State/Federal Status
E - Endangered
T - Threatened

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																									
								Wetland Habitats**																		Terrestrial Habitats								
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES			
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development			
Mammal	*Tamias striatus*	Eastern chipmunk	Forest edge or shrub cover	A			O							Y	Y	Y	Y						Y	Y	Y	Y	Y	Y	Y	Y			
Mammal	*Sylvilagus floridanus*	Eastern cottontail	Brush piles, herbaceous and shrubby cover	A			H							Y	Y	Y	Y	Y			Y			Y	Y	Y	Y	Y	Y			
Mammal	*Scalopus aquaticus*	Eastern mole	Soft moist soil with earthworms	U			Ci							Y		Y							Y	Y	Y	Y	Y	Y	Y			
Mammal	*Pipistrellus subflavus*	Eastern pipistrelle	Warm, draft-free, damp sites for hibernation	U			Ci	B	B		B			Y	Y	Y	Y	B	B	B	B	B	Y	Y	Y	Y	Y	B	B	Y		
Mammal	*Martes pennanti*	Fisher		U			C								Y		Y				Y		Y	Y	Y	Y	Y					
Mammal	*Urocyon cinereoargenteus*	Gray fox	Hollow logs, tree cavities, rock crevices	U			C							Y	Y	Y	Y	Y		Y	Y			Y	Y	Y	Y	Y				
Mammal	*Sciurus carolinensis*	Gray squirrel	Tall trees for dens or leafnests	A			O							Y	Y	Y	Y	Y					Y	Y	Y	Y	Y		Y	Y		
Mammal	*Parascalops brewer*	Hairy-tailed mole	Loose, moist, well-drained soil	U			Ci																Y	Y	Y	Y	Y	Y	Y			
Mammal	*Lasiurus cinereus*	Hoary bat	Edges of coniferous forests	U			Ci	B	B		B			B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
Mammal	*Mus musculus*	House mouse	Buildings in winter	U			O																					Y	Y	Y		
Mammal	*Myotis sodalis*	Indiana myotis	Hollow trees or loose bark in summer	R	E	E	Ci	B	B		B			B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
Mammal	*Myotis lucifugus*	Little brown bat	Dark, warm sites for maternity colonies	A			Ci	B	B		B			B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	Y		
Mammal	*Mustela frenata*	Long-tailed weasel		U			C					Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y				
Mammal	*Sorex cinereus*	Masked shrew	Damp woodlands, ground cover	C			Ci						B	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Mammal	*Zapus hudsonius*	Meadow jumping mouse	Herbaceous groundcover, loose soils	C			O							Y		Y				Y	Y							Y	Y			
Mammal	*Microtis pennsylvanicus*	Meadow vole	Herbaceous vegetation, loose organic soils	A			O							Y	Y	Y	Y	Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y		
Mammal	*Mustela vison*	Mink	Hollow logs, natural crevices, riparian habitat	U			C	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y					
Mammal	*Ondatra zibethicus*	Muskrat	Wetlands with dense emergent vegetation	C			H	Y	Y		Y	B	B					Y	Y	Y	B											
Mammal	*Sylvilagus transitionalis*	New England cottontail	Young woodlands with thick cover	U			H							Y	Y	Y	Y	Y			Y			Y	Y	Y	Y		Y	Y		
Mammal	*Glaucomys sabrinus*	Northern flying squirrel	Mature trees with cavities, arboreal lichens	U			O																Y	Y	Y	Y	Y					
Mammal	*Myotis septentrionalis (keeni)*	Northern myotis	Caves with high humidity and calm air	U			Ci	B	B		B			Y	Y	Y	Y	B	B	B	B	B	B	B	B	B	B	B	B	Y		

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																							
								Wetland Habitats**																	Terrestrial Habitats							
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development
Mammal	*Blarina brevicauda*	Northern short-tailed shrew	Low vegetation, damp, loose leaf litter	C			Ci							Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Rattus norvegicus*	Norway rat	Buildings, dumps, loose soil for burrows	C			O							Y		Y														Y	Y
Mammal	*Microtis pinetorum*	Pine vole	Ground cover; moist well-drained soils	R			O							Y	Y	Y	Y	Y					Y	Y	Y	Y	Y	Y	Y	Y	
Mammal	*Erethizon dorsatum*	Porcupine	Rock ledges or tree dens	U			H							Y	Y	Y	Y						Y	Y	Y	Y	Y	Y			
Mammal	*Procyon lotor*	Raccoon	Hollow trees	C			O					B	B	Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Lasiurus borealis*	Red bat	Deciduous trees on forest edges for roosting	C			Ci	B	B		B			B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Mammal	*Vulpes vulpes*	Red fox		C			O					Y	Y	Y	Y	Y	Y	Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	
Mammal	*Tamiasciurus hudsonicus*	Red squirrel	Woodlands with mature trees	C			O									Y							Y	Y	Y	Y	Y				
Mammal	*Lontra canadensis*	River otter	Bodies of water, such as streams, ponds, lakes, rivers	R			Cp	Y	Y	Y	Y	Y	Y		Y	Y		Y	Y	Y	Y										
Mammal	*Mustela erminea*	Short-tailed weasel	Dense brushy cover	U			C					Y	Y			Y	Y	Y			Y	Y	Y	Y	Y	Y	Y	Y			
Mammal	*Lasionycteris noctivagans*	Silver-haired bat	Dead trees with loose bark; streams	C			Ci	B	B		B			B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Mammal	*Myotis leibii (subulatus)*	Small-footed myotis	Cold, dry hibernacula in winter	U	SC		Ci	B	B		B			Y	Y	Y	Y	B	B	B	B	B	Y					B	B	Y
Mammal	*Sorex fumeus*	Smokey shrew	Loose damp leaf litter	U			Ci							Y								Y	Y	Y	Y	Y	Y				
Mammal	*Lepus americanus*	Snowshoe hare	Dense brushy or softwood cover	R			H							Y	Y	Y	Y	Y					Y	Y	Y	Y	Y	Y			
Mammal	*Synaptomys cooperi*	Southern bog lemming	Moist soils	R	SC		O							Y	Y	Y	Y			Y	Y			Y	Y	Y	Y	Y			
Mammal	*Glaucomys volans*	Southern flying squirrel	Mature woodlands with cavity trees	U			O																Y	Y	Y	Y	Y				
Mammal	*Clethrionomys gapperi*	Southern red-backed vole	Springs, brooks, seeps, debris or slash cover	U			O							Y	Y	Y	Y	Y			Y	Y	Y								
Mammal	*Condylura cristata*	Star-nosed mole	Wet muck, humus	C			Ci							Y	Y	Y	Y	Y	Y	Y	Y	Y									
Mammal	*Mephitis mephitis*	Striped skunk		C			O					B	B				Y						Y	Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Didelphis virginiana*	Virginia opossum	Hollow logs or tree cavities	C			O					Y		Y	Y	Y	Y	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Sorex palustris*	Water shrew	Herbaceous cover, cold water, wetlands	R	SC		Ci	Y	Y	Y	Y	Y	B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y				

Attachment C - Species:Habitat Matrix

Housatonic River Ecological Characterization

** Color shading indicates that species was observed in 1998-2000 within that habitat type.

Wetland Habitats
ROW = Riverine Open Water
LOW = Lacustrine Open Water
SHO = Shorelines
PFO = Palustrine Forested
SS = Palustrine Scrub-Shrub
PEM = Palustrine Emergent
WM = Wet Meadow
PAB = Palustrine Aquatic Bed
VP = Vernal Pool

Terrestrial Habitats
SW = Softwood Forests
MW = Mixed Forests
HW = Hardwood Forests
OF = Open Fields
AGR = Agricultural Cropland
RES = Residential

Season of Use
B = Breeding
M = Migration
W = Wintering
Y = Year-round

State/Federal Status
E - Endangered
T - Threatened

Feeding Strategies
H - Herbivore
O - Omnivore
Ci - primarily insectivore
Cp - primarily piscivore
C – Carnivore

	Scientific Name	Common Name	Special Habitat Requirements	Relative Abundance	State Status	Federal Status	Feeding Strategy	1998 Habitat Codes and Inclusive 2000 Natural Community Classifications																							
								Wetland Habitats**																	Terrestrial Habitats							
								ROW	ROW & PAB	ROW	LOW	SHO		PFO				PSS	PEM		WM	VP	SW	MW	HW			OF	AGR	RES
								Medium-gradient stream	Low-gradient stream	High-gradient stream	Moderately alkaline lake/pond	Riverine pointbar and beach	Mud flat	Red maple swamp	Black ash-red maple-tamarack calcareous seepage swamp	Transitional floodplain forest	High-terrace floodplain forest	Shrub swamp	Deep emergent marsh	Shallow emergent marsh	Wet meadow	Woodland vernal pool	Spruce-fir-northern hardwood forest	Northern hardwoods-hemlock-white pine forest	Successional northern hardwood forest	Red oak-sugar maple transition forest	Rich, mesic forest	Cultural grassland	Agricultural cropland	Residential development
Mammal	*Peromyscus leucopus*	White-footed mouse		A			O							Y	Y	Y	Y	Y		Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Odocoileus virginianus*	White-tailed deer	Softwood yarding cover in winter	A			H					Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mammal	*Marmota monax*	Woodchuck	Open land	A			H																		Y	Y	Y	Y	Y	Y	Y
Mammal	*Napaeozapus insignis*	Woodland jumping mouse	Moist, cool woodland, loose soils	U			O							Y	Y	Y	Y	Y					Y	Y	Y	Y	Y	Y		

	fish	19	30	17	30																								
	reptiles	6	8	1	8	9	5	6	7	6	6	11	9	11	10	9	5	7	8	7	8	12	11	4					
	amphibians	9	10	5	10	5	4	14	13	9	13	14	12	13	10	16	11	14	17	14	18	4	4	0					
	birds	30	27	0	27	58	47	88	89	96	93	88	30	61	58	19	52	74	70	69	69	88	76	45					
	mammals	14	14	4	14	14	14	40	39	43	39	36	15	27	33	21	40	42	44	43	44	34	30	26					

R - Rare Species occurs in very low numbers or habitat is very limited in Study Area. May also occur as an occasional migrant or winter resident.
U - Uncommon Species occurs in low numbers due to low density or limited amounts of habitat in Study Area. Can include rare, threatened, and endangered species.
C - Common Species occurs in moderate numbers due to relatively high density or relatively large amounts of suitable habitat in Study Area.

A - Abundant Species occurs in relatively high numbers due to density or relatively large amounts of suitable habitat in Study Area. Abundant species are usually ones with highreproducyive rates and large amounts of suitable habitat.

AMENDMENT TO
SUPPLEMENTAL INVESTIGATION WORK PLAN
SECTION 5, FIELD INVESTIGATION TASKS

5.2.1 Sediment Sampling

In conjunction with the re-sampling of known locations of PCB contamination for congener analysis, sediment samples will be collected at depths of 0-1" and 1-6". Both depths will be analyzed for PCB congeners and Aroclors. Between 40-50 samples will be collected for each interval in Reach 5. Additional samples may be collected based on the results of the analysis.

A continuous qualitative survey of bed types in Reach 5 will be conducted. Observations on grain size (e.g., sand, silt) will be used to define the type of bed in this reach. Additional probe surveys for sediment depth will also be conducted to fill in data gaps (between other survey points) in Reach 5. Probe surveys approximately every 500 feet will be conducted to estimate bathymetry (water depth) and sediment depth. Data will be recorded in a field logbook and GPS readings will be collected at each location.

5.2.1.2.5 Temporary/Permanent Pools

Additional sediment samples will be collected from select pools in the Woods Pond area and from approximately 5 pools north of Woods Pond. These additional samples will be measured for PCBs, with 10% or one sample per pool analyzed for modified Appendix IX compounds. This data will be used to characterize the contaminant concentrations and assist in the selection of areas for collection of northern leopard frogs.

5.2.1.2.7 Run of River Cores

The fractionation study was eliminated from the Supplemental Investigation for the sediment cores. The cores will be cut into 6 inch sections and analyzed for PCBs (total and Aroclors), grain size and TOC.

For the sediment samples undergoing porewater analysis, both the porewater fraction and the remaining solids will be analyzed for PCBs (congeners and Aroclors).

Density measurements will be included in the analysis of the cores. One measurement per core biased toward the surface layers will be analyzed. A subset of cores will have measurements at the top, middle and bottom of the core to determine the variation in density with depth.

5.3.1 Surface Water

Particulate organic carbon (POC) will be analyzed in all surface water samples. POC will be calculated as the difference between total organic carbon and dissolved organic carbon.

5.3.2 STORM SAMPLING

During each storm event additional volumes of water will be collected at each of the secondary locations according to the following schedule: One 5-gallon water sample (e.g., using a carboy) will be collected at 9 to 12 hours after mobilization and rainfall (i.e., on rising limb of hydrograph); the second carboy will be collected 12 hours later (at hydrograph peak); and the third sample will be collected 12 hours later (on the descending limb of the hydrograph). Samples will be depth-integrated; at locations where the water is too shallow to depth integrate, an estimate of the depth at which the samples are collected will be recorded. Care will be taken to avoid disturbing the substrate during sample collection. A maximum of 3 samples will be collected for particle size laser analysis. Samples will be allowed to settle, the supernatant will be decanted, and the concentrated TSS will be submitted for laser analysis of particle size.

Subsequent to the initiation of remediation in the Source Reach, WESTON will continue to collect storm samples for TSS and flow if an adequate number of storms have not been sampled.

www.woodlotalt.com

Attachment E Natural Community Data Forms

leopard_frog_site_E-1_11oct2000.pdf	345 KB
leopard_frog_site_E-5_21sep2000.pdf	345 KB
leopard_frog_site_EW-3_27sep2000.pdf	312 KB
leopard_frog_site_muddy_pond_08sep2000.pdf	370 KB
leopard_frog_site_threemile_pond_07sep2000.pdf	412 KB
leopard_frog_site_W-1_27sep2000.pdf	350 KB
leopard_frog_site_W-4_27sep2000.pdf	328 KB
leopard_frog_site_W-6_22sep2000.pdf	312 KB
leopard_frog_site_W-8_21sep2000.pdf	370 KB
leopard_frog_site_W9a_06sep2000.pdf	337 KB
leopard_frog_site_WML_07sep2000.pdf	371 KB
reach_5b_3sept98.pdf	290 KB
reach_5c_2sept98.pdf	299 KB
reach_5c_3sept98.pdf	310 KB
small_mammal_site 13_25aug1999.pdf	341 KB
small_mammal_site14_5oct1999.pdf	348 KB
small_mammal_site15_2sept1998.pdf	314 KB
small_mammal_site1B_15oct1998.pdf	165 KB
small_mammal_site3_10sept1998.pdf	165 KB
small_mammal_site8_16sept1998.pdf	169 KB
vernal_pool_18vp2_31aug2000.pdf	369 KB
vernal_pool_23bvp1_07jun2000.pdf	323 KB
vernal_pool_23bvp2_08jun2000.pdf	327 KB
vernal_pool_38vp1_01sep2000.pdf	399 KB
vernal_pool_38vp2_06sep2000.pdf	366 KB

vernal_pool_38vp2_17aug1999.pdf	336 KB
vernal_pool_46vp1_06sep2000.pdf	354 KB
vernal_pool_46vp5_05sep2000.pdf	316 KB
vernal_pool_46vp5_5oct1999.pdf	337 KB
vernal_pool_8vp1_17aug2000.pdf	337 KB
vernal_pool_8vp1_31aug1999.pdf	339 KB
vernal_pool_8vp2_24sept1999.pdf	343 KB
WML-1_08jun2000.pdf	416 KB
WML-2_10oct2000.pdf	364 KB
WML-3_09jun2000.pdf	374 KB

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: E-1

3. Quad name(s): East Lee (1:25,000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

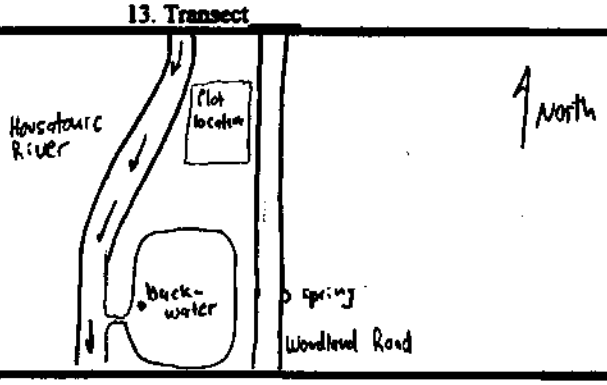
7. Town (LOCALJURIS): Lee 8. Directions: from the New Lenox Road in Lenox, drive south on the Woodland Road (east side of Housatonic River) for ca. 3.1 KM to a section of shrub swamp just upstream of a backwater pool where a spring emerges at Roadside. Site lies on west side of Woodland Road.

9. Sourcecode: FOOHAI01MAUS 10. Survey date 11 Oct 01 11. State: MA

12. Surveyors: Arthur Haines

B. Topography **13. Transect**

14. Reconnaissance diagram: **Scale:**



C. Vegetation / Habitat

15. Observation point 1 X	Observation point 2 ___	Observation point 3 ___
16. Community name: Shrub swamp 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form ___ form 3 ___	Community name: _____ Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Shrub dominate wetland with scattered trees. Acer rubrum and Acer saccharum are dominant trees. Shrubs common to area include Alnus incana, Cornus amomum, and Cornus sericea. Dominant herbs are Myosotis scorpioides, Ranunculus hispidus, Phalaris arundinacea, and Lythum Salicaria. Beaver lodges and trails occur at edge of community.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 11 October 2000 Today's Date: 10 January 2001
Type of Communtiy: Shrub swamp Code:
Town: Lee County: Berkshire Survey Site Name: E-1
Surveyor Name(s): Arthur Haines
Directions to site: see site survey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure): Shrub swamp with a very sparse canopy layer. Dominant trees include Acer saccharinum, Salix nigra, and Acer rubrum. Common shrubs are Cornus amomum var. amomum, Alnus incana, and Viburnum dentatum. Herb layer is dominated by graminoid plants such as Phalaris arundinacea, Leersia oryzoides, Cinna latifolia, and Carex lacustris. Other common herbs include Lythrum Salicaria, Myosotis scorpioides, Urtica dioica, Onoclea sensibilis, and Chrysoplenium americanum.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards): Site lies on the narrow, east-side floodplain of Housatonic River (floodplain narrow on east side due to proximity of river channel to base of October Mountain ridge line). East floodplain possesses numerous small to moderate sized backwater pools and channels, which break the somewhat continuous band of forested and shrub swamps. Backwaters allow good scenic views of river valley.

Surrounding Land Use (physical structures and land use practices in the surrounding area): Land to east was predominantly used for forestry. Local area used by hunters, anglers, and paddlers.

Are there any rare species at this site? Please specify: Ribes americanum (WL).

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley SWMA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): Changes to hydrology (impoundment - altering woods pond pool level).

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna): Non-native and/or invasive species are present in community (Lythrum Salicaria, Cardamine pratensis, Phalaris arundinacea). Beaver lodges occur on edge on community.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ____yes ____no ____unknown Protecting EO? ____yes ____no ____unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Community part of a large and diverse wetland complex

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Community is both polluted with PCBs and heavily invaded by exotics

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

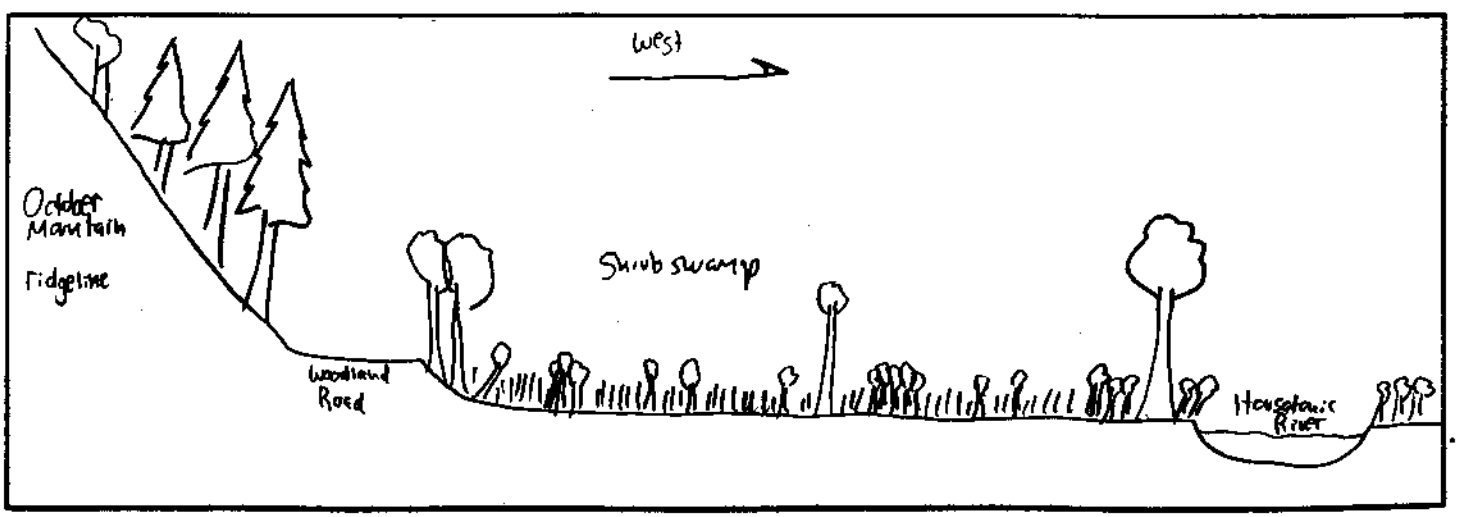
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership of property

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments:

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: E-1

5.Quad name(s): _____ 6.Quad code(s): _____ 7.County name(s): _____ 8.County code(s): _____

9.Town (LOCALJURIS): Lee 17.State: MA 10.Lat: N (UTM) 4691800 11.Long 0644940 W E

12. Directions: See Site survey summary

13.Sourcecode: FOOHA10 1MAUS 14.Survey date 11 October 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines

B. Environmental Description

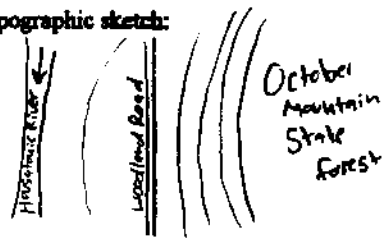
19.Transect / Observation point #

20.Image annotation #

21.Elevation: 290m

22.Topographic position:
- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- ___High level
- ___Lowslope
- ___Midslope
- ___Toeslope
- X Low level
- ___Channel wall
- ___Channel bed
- ___Basin floor
- ___Other

23.Topographic sketch:



24.Slope degrees: 0-1°

25.Slope aspect: west

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:
- ___Extremely dry
- X Somewhat wet
- ___Very dry
- ___Wet
- ___Dry
- X Very wet
- ___Somewhat moist
- ___Moist

- ___Permanently inundated
- X Periodically inundated

32.Stoniness:
- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

unknown

33.Soil drainage:
- ___Rapidly drained
- ___Well drained
- ___Moderately well drained
- ___Somewhat poorly drained
- ___Poorly drained
- ___Very poorly drained

34.Average texture:
- ___ sand
- ___clay loam
- ___sandy loam
- ___ clay
- ___loam
- ___ peat
- ___silt loam
- ___muck

other _____

35.Unvegetated surface:
- ___ % Bedrock
- ___ % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Sand (0.1-2 mm)
- 25 % Bare soil
- 64 % Litter, duff
- 1 % Wood (> 1 cm)
- 10 % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Landscape diverse due to juxta position of several community types (low gradient stream, emergent marsh, swamp).

37.Plot representativeness: Plot representative of community type in local area.

C. Vegetation 38.System: ___ Terrestrial X Palustrine ___ Estuarine 39.Plot number: 1 40.Plot dimensions: 20 x 20 m

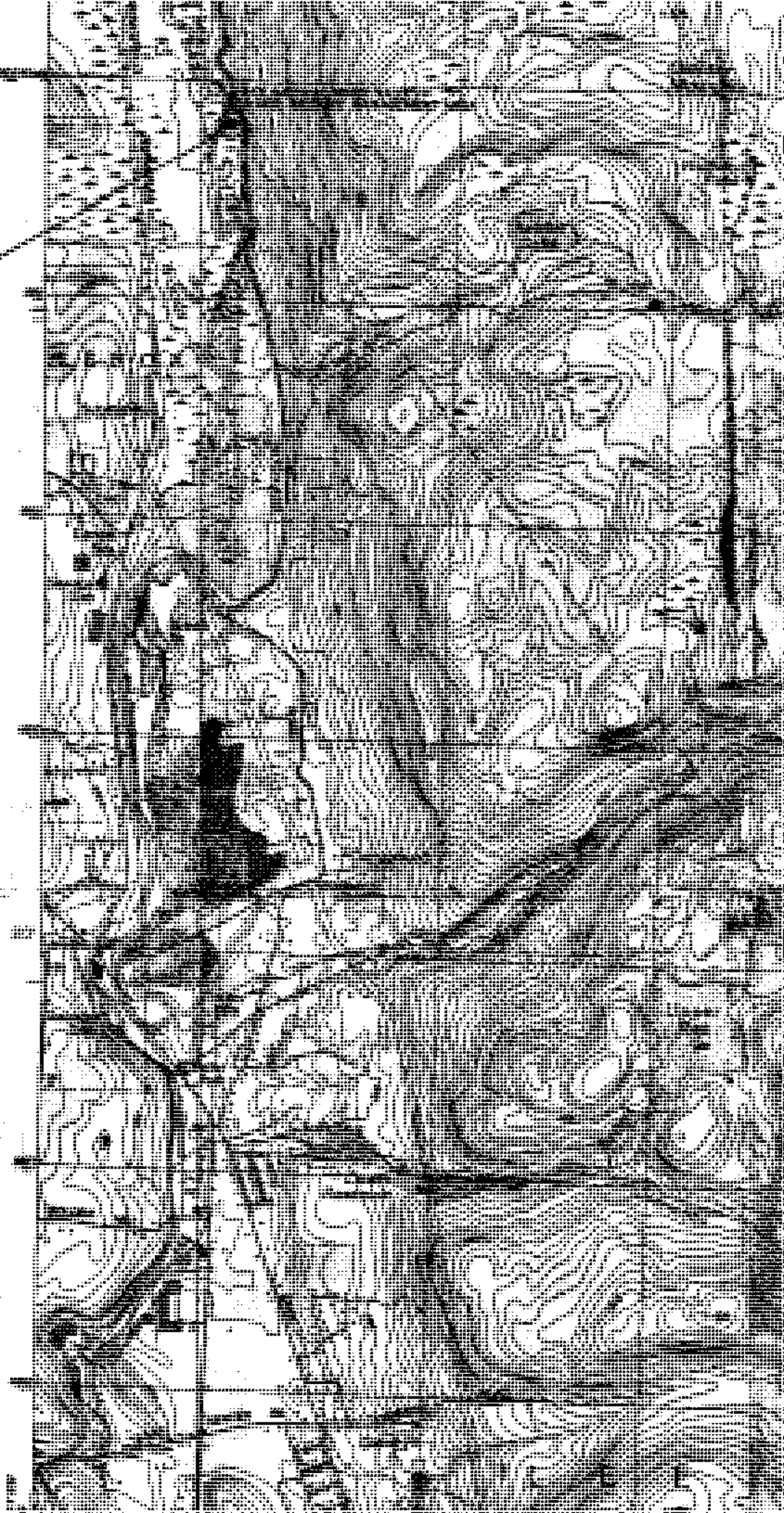
41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:	
X Broad-leaf	X Deciduous	___ Forest	___ Woodland
___ Semi-broad-leaf	___ Semi-deciduous	___ Sparse woodland	___ Scrub thicket
___ Semi-needle-leaf	___ Semi-Evergreen	X Shrubland	___ Sparse shrubland
___ Needle-leaf	___ Evergreen	___ Dwarf shrubland	___ Dwarf scrub thicket
___ Graminoid	___ Perennial	___ Sparse dwarf shrubland	
___ Broad-leaf herbaceous	___ Annual	___ Herbaceous	___ Non-vascular
___ Pteridophyte		___ Sparsely vegetated	

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	16 m	5
T3 Tree sub-canopy	10 m	2
S1 Tall shrub	3.5 m	25
S2 Short shrub	2 m	25
H Herbaceous	2 m	60
N Non-vascular	0.02 m	15
E Epiphyte	(vascular) absent	0
V Vine / liana	2 m	5

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D5r		Thalictrum pubescens	+.1	Callitriche palustris	+.2
Acer rubrum 7	r.1	Ribes americanum	r.1	Equisetum arvense	r.1
Salix nigra 8	r.1	Urtica dioica	+.1	Cardamine pratensis	+.2
Acer saccharinum 12	1.1	Onoclea sensibilis	1.2	Ranunculus recurvatus	+.1
		Rumex obtusifolius	r.1	Ludwigia palustris	+.2
D4i		Lysimachia ciliata	r.1	Lysimachia nummularia	r.1
Alnus incana	2+.3	Geum laciniatum	+.1	Symphyotrichum lateriflorum	r.1
Cornus sericea	+.2	Boehmeria cylindrica	+.1	Pilea pumila	r.1
Cornus amomum var. amomum	2+.3	Iris pseudacorus	+.2		
Lythrum salicaria	2-.2	Scutellaria lateriflora	r.1		
Sambucus canadensis	+.2	Athyrium felix-femina	+.1	C1-3r	
Lonicera morrowii	r.1	Bidens connata	r.1	Solanum dulcamara	+.1
Viburnum dentatum	+.2	Leersia oryzoides	+.2	Galium asprellum	+.2
Salix eriocephala	r.1			Galium trifidum	+.2
G3i				Clematis virginiana	+.2
Phalaris arundinacea	3.4	H1-2p			
Carex lacustris	1.2	Lycopus uniflorus	+.1		
Agrostis perennans	+.1	Myosotis scopioides	2-.3		
Peltandra virginica	+.1	Ranunculus hispidus	2-.2		
Cicuta latifolia	+.1	Chrysosplenium americanum	1.2		
Impatiens capensis	+.1	Symplocarpus foetidus	+.1		

E-1



COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: E-5

3. Quad name(s) Pittsfield East (1:25000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

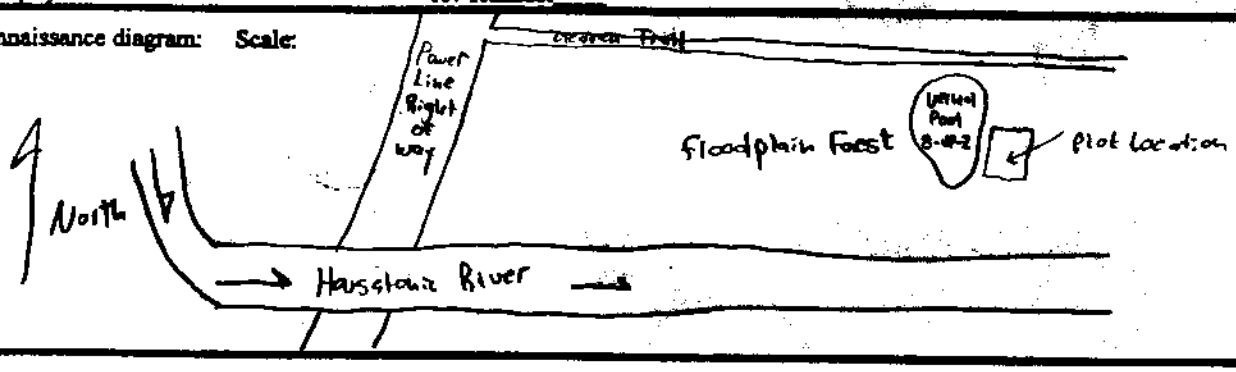
7. Town (LOCALJURIS): Pittsfield 8. Directions: From Pomeroy Avenue, turn onto Brunswick Road and drive to its end. Follow a trail Southwest to a Powerline Right-of-way, turn left (south) and walk down open right of way to a smaller trail on the left (west) before reaching Housatonic River. Follow trail for ca. 75 meters to a vernal pool on the right (south side of trail. Community occurs on South and east side of vernal pool).

9. Sourcecode: FOOHAIO)MAUS 10. Survey date 21 Sep 2006 11. State: MA

12. Surveyors: Arthur Haines and Chris Werner

B. Topography 13. Transect

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: Transitional Floodplain Forest 17. Additional data: Site form ___ form 3 ___	Community name: _____ Additional data: Site form ___ form 3 ___	Community name: _____ Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Floodplain forest dominated by Acer negundo, with limited Acer Saccharinum and Populus deltoides. Shrubs around vernal pools include Cornus amomum and Cornus sericea. Herbs associated with community include Matteuccia Struthiopteris, Zizea aurea, Laportea canadensis, and Hesperis Matronalis.	General description	General description:

Populus deltoides - 32 inch dbh

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 21 September 2000 Today's Date: 4 October 2000
Type of Communtiy: Transitional Floodplain forest Code:
Town: Pittsfield County: Berkshire Survey Site Name: E-5
Surveyor Name(s): Arthur Haines and Chris Werner
Directions to site: See Site Survey Summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Floodplain forest dominated by Acer negundo, with some Populus deltoides and Acer saccharinum. Shrub layer well developed but patchy, thickest near edges and into shallow portions of adjacent vernal pool. Mostly Cornus amomum, with some Cornus sericea and other introduced species. Herb layer dense, Lysimachia nummularia covering forest floor with Cinna latifolia, Laportea canadensis, Quercus sensilis and Hesperis matronalis.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Floodplain adjacent to river, set on low terrace above vertically cut bank into river. Area flooded frequently and provided with with many depressions that form vernal pools. Moderate amounts of flotsam (woody debris) in forest from high water events. Canopy is somewhat broken by vernal pool openings. A few, moderate sized snags (40-50 cm) are present in forest.

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Land primarily used for residential lots. Housing has encroached on floodplain forest in this vicinity. A powerline Right-of-way also bisects the forest.

Are there any rare species at this site? Please specify: Ribes glandulosum (WL)

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley SWMA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): Continued colonization by non-native plants. Several species (Rosa multiflora, Lonicera Morrowii, Hesperis matronalis, Alliaria petiolata, Ligustrum vulgare) are common components of the flora. Control of these species would increase EO rank tremendously.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Disturbance primarily in form of adjacent land clearing (for housing) and non-native species.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Small, but regionally important, corridor of forest adjacent to river

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Community heavily colonized by non-native plants in understory.

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

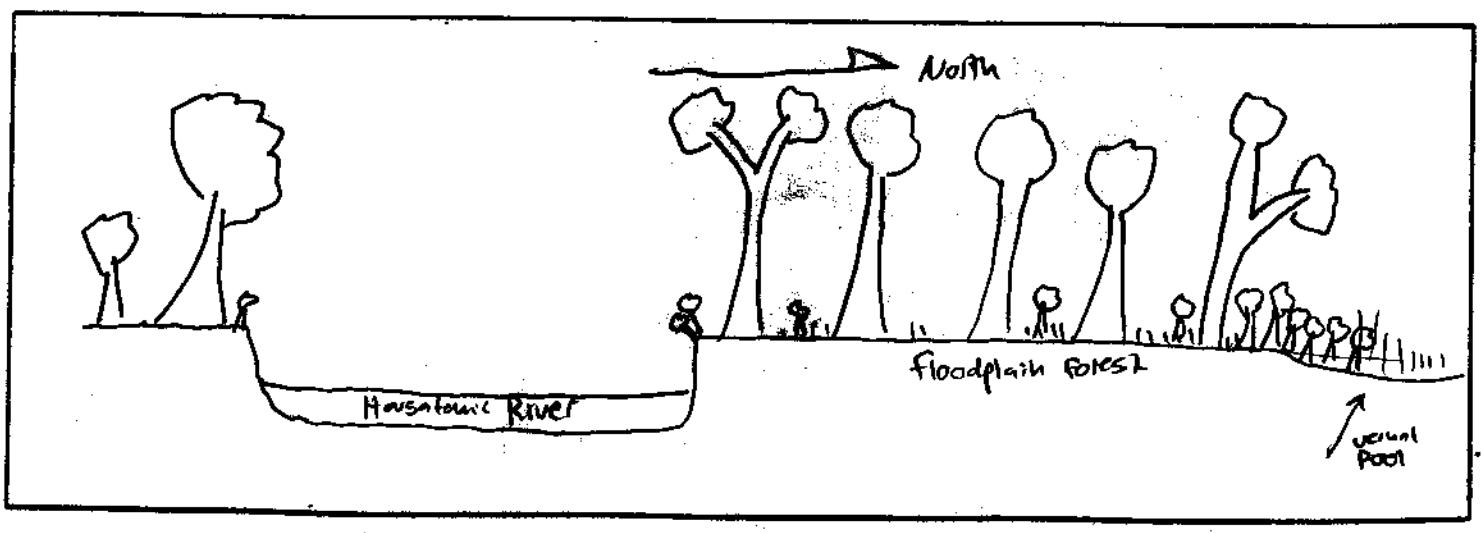
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership of land

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: Canopy largely intact, but flora in poor condition. Area heavily used by breeding herpetiles.

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: E-5

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Pittsfield 17.State: MA 10.Lat: UTM N 4698810 11.Long 0644230 W E

12. Directions: See site survey summary

13.Sourcecode: FOOHAIOIMAVS 14.Survey date 21 Sep 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Chris Werner

B. Environmental Description

19.Transect / Observation point #

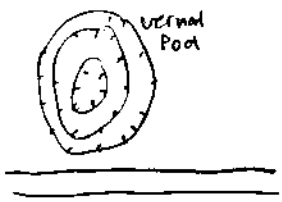
20.Image annotation #

21.Elevation: 295 m

22.Topographic position:

- ___Interfluve
- ___High slope
- ___High level
- ___Midslope
- X Low level
- ___Channel bed
- ___Backslope
- ___Step in slope
- ___Lowslope
- ___Toeslope
- ___Channel wall
- ___Basin floor
- ___Other

23.Topographic sketch:



24.Slope degrees: 0-2

25.Slope aspect: NW (toward vernal Pool)

26.Parent material:

Limestone Bedrock (Weatherbee 1996)

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:

- ___Extremely dry
- ___Very dry
- ___Dry
- ___Somewhat moist
- X Moist
- ___Permanently inundated
- X Periodically inundated
- X Somewhat wet
- ___Wet
- ___Very wet

32.Stoniness:

- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

Unknown

33.Soil drainage:

- ___Rapidly drained
- ___Well drained
- ___Moderately well drained
- X Somewhat poorly drained
- ___Poorly drained
- ___Very poorly drained

34.Average texture:

- ___ sand
- ___sandy loam
- ___loam
- ___silt loam
- ___clay loam
- ___ clay
- ___ peat
- ___muck

other: _____

35.Unvegetated surface:

- ___ % Bedrock
- ___ % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Sand (0.1-2 mm)
- 60 % Bare soil
- ___% Litter, duff
- 35 % Wood (> 1 cm)
- 5 % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Somewhat heterogeneous area with the numerous vernal pools and their associated shrub and herb communities mixed with floodplain forest. Area is inundated during each storm event.

37.Plot representativeness:

Plot is representative of relatively intact canopy, away from trails or other openings.

C. Vegetation 38 System: X Terrestrial ___ Palustrine ___ Estuarine 39.Plot number: 1 40.Plot dimensions: 20x20 M

41.Leaf type:
- X Broad-leaf
- ___ Semi-broad-leaf
- ___ Semi-needle-leaf
- ___ Needle-leaf
- ___ Graminoid
- ___ Broad-leaf herbaceous
- ___ Pteridophyte

42.Leaf phenology:
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

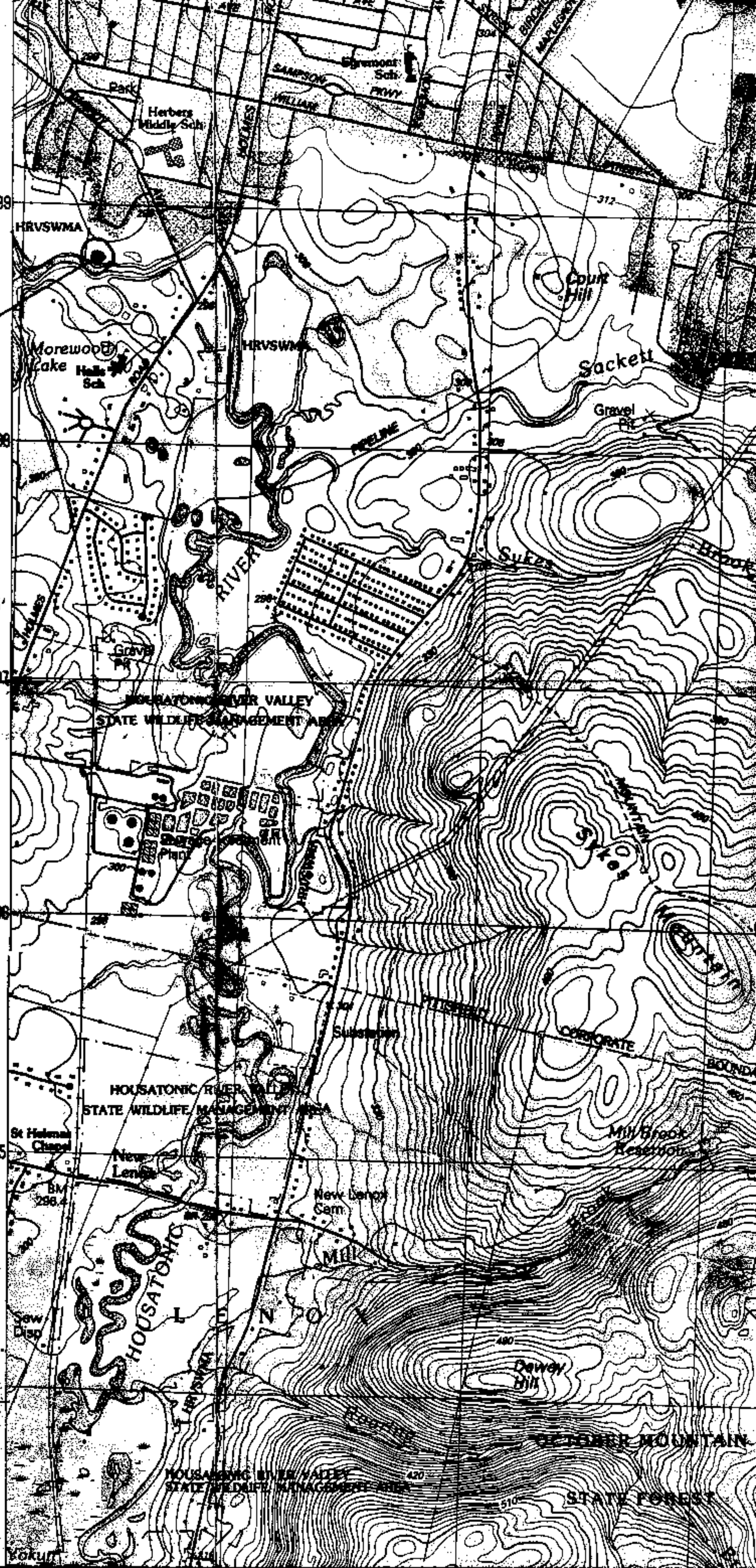
43.Physiognomic type:
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Sparsely vegetated
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	65	50
T3 Tree sub- canopy	35	20
S1 Tall shrub	5	1
S2 Short shrub	2	5
H Herbaceous	1	70
N Non-vascular	0.01	1
E Epiphyte	(vascular)/Absent	0
V Vine / liana	2	1

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D5-7i		Falictrum pubescens	r.1		
Acer negundo 10,11,7 14,13,9,16,10,11,13,14,11	3.1	Agecitina altisima	r.1		
Acer saccharum 17,	2-.1	Onoclea sensibalis	1.2		
Ulmus americana 9,	+.1	Carex grisea	+.1		
D4c		Solidago gilgante	+.1		
Cornus amomum	1.3	Geum leucinatum	+.1		
Acer negundo	r.1				
H2-3i		H1i			
Matteuccia struopeus	2-.3	Lysomachia nummularia	3.4		
Zizia aurea	3.4	Pilea pumila	1.1		
Laportea can.	2+4	Cardamide pretensis var. pretensis	2-.3		
Sypheotrichum lateriflorum	1.1	Galium trifidum	r.1		
Hesperis matronalis	2-.2	C2-3a			
Elumus virginicus	1.2	Echinocystis lobata	r.1		
Geum canadense	1.2				
Carex radiata	1.2				
Carex bromoides	1.2				
Viola sororia	+.1				
Allearia petiolata	2-.2				
Persicaria virginiana	1.2				
Rhamnus cathartia	r.1				

E-5



HRVSWMA
Park
Herberg Middle Sch
Egremont Sch
SAMPSON PKWY
WILLIAMS
HOLMES
312
Court Hill
Morewood Lake
Halls Sch
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes
Brook
25′
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Plant
300
Sykes
MOUNTAIN
Substation
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
Mill
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
STATE FOREST
Yokun

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: EW-3

3. Quad name(s) Pittsfield East (1:25000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

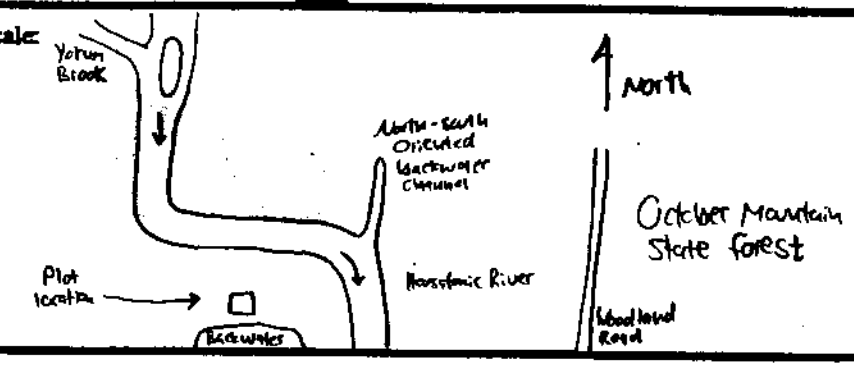
7. Town (LOCALJURIS): Lenox 8. Directions: Site best accessed by canoe. Lies on the south side of Housatonic River channel along a west → East flowing section, downstream of Yokum Brook confluence and just upstream of a small north-south oriented backwater channel at 90 degree bend in river.

9. Sourcecode: FOOHAIOIMAUS 10. Survey date 27 sep 2000 11. State: MA

12. Surveyors: Arthur Haines and Chris Werner

B. Topography 13. Transect 1

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: Transitional Floodplain forest 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form ___ form 3 ___	Community name: _____ Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Transitional floodplain forest that grades into a black ash – red maple – tamarack Calcareous seepage swamp to South. Dominant trees are Tilia americana, Quercus macrocarpa, and Acer saccharinum. Crataegus punctata and Carpinus caroliniana are dominant shrubs, Common herbs include Onoclea sensibilis, Matteuccia struthiopteris, and Boehmeria cylindrica.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 27 September 2000 Today's Date: 4 October 2000
Type of Communtiy: Transitional Floodplain forest Code:
Town: Lenox County: Berkshire Survey Site Name: EW-3
Surveyor Name(s): Arthur Haines and Chris Werner
Directions to site: See site survey Summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure): Low, hardwood swamp dominated by Acer saccharinum, Quercus Macrocarpa, and Tilia americana in overstory. Crataegus punctata and Carpinus caroliniana are dominant tall shrubs. Herb layer with Onoclea sensibilis, Matteuccia Struthiopteris, Boehmeria cylindrica, Geum laciniatum, and Persicaria Virginiana.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards): Low floodplain of Housatonic River with numerous flooded depressions, channels, and backwater pools in area. Topography is rolling, and elevated areas occur on which species more characteristic of high terrace floodplains occur (e.g., Tilia americana, Allium tricoccum).

Surrounding Land Use (physical structures and land use practices in the surrounding area): Land to west is part of a railroad line. Area primarily used by hunters, anglers, and recreationalists.

Are there any rare species at this site? Please specify: Quercus Macrocarpa

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley StmA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications, if applicable, discuss why the community may no longer exist here): None observed

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna): Non-native species present in flora.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ____yes ____no ____unknown Protecting EO? ____yes ____no ____unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Area part of large, wetland complex; site contains large overstory trees

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Immediate area in relatively good condition with some exotic species

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Non-native species likely to continue to colonize forest

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

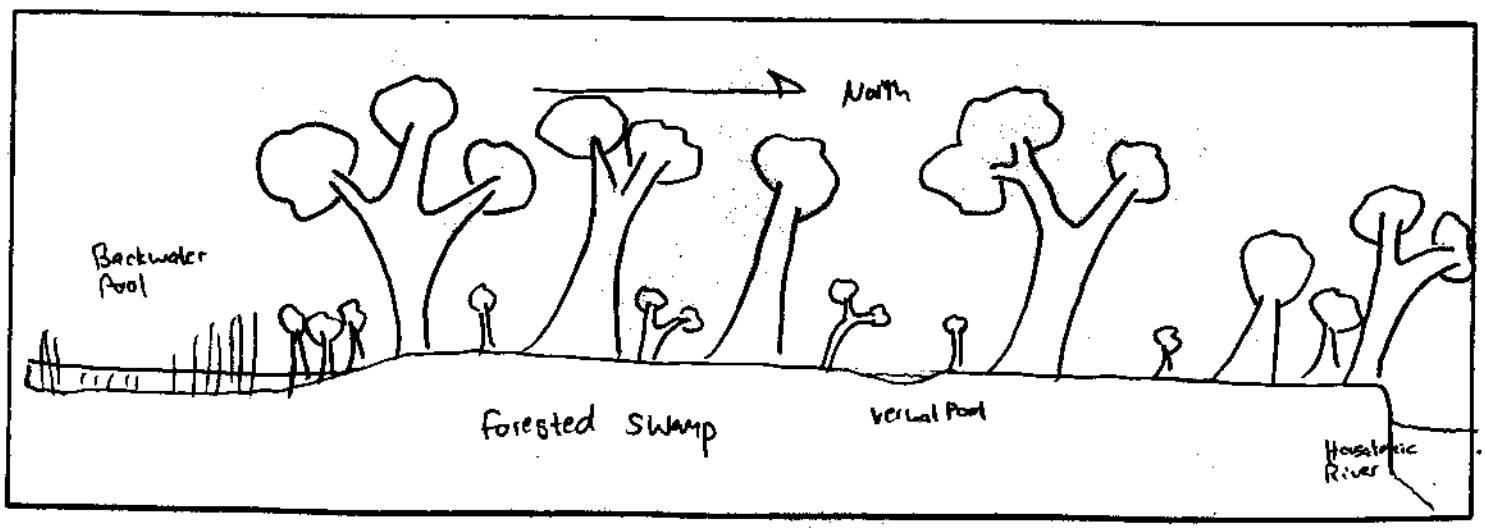
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership of land

EO Rank: (A summary of all factors listed above.) A - Excellent (B) - Good C - Marginal D - Poor

Comments: Rare species present adding to quality of site; non-native species become more prevalent as one moves toward aquatic systems.

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: EW-3

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Lenox 17.State: MA 10.Lat (UTM): N 4692900 11.Long 0644505 W E

12. Directions: see site survey summary

13.Sourcecode: FOOHAIOIMAUS 14.Survey date 27 sep 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Chris Werner

B. Environmental Description

19.Transect / Observation point #

20.Image annotation #

21.Elevation: 293M

22.Topographic position:
- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- ___High level
- ___Lowslope
- ___Midslope
- ___Toeslope
- X Low level
- ___Channel wall
- ___Channel bed
- ___Basin floor
- ___Other

23.Topographic sketch:

see included topographic map

24.Slope degrees: 0-5°

25.Slope aspect: South

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:
- ___Extremely dry
- X Somewhat wet (range)
- ___Very dry
- X Wet
- ___Dry
- ___Very wet
- ___Somewhat moist
- ___Moist
- ___Permanently inundated
- X Periodically inundated

32.Stoniness:
- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

unknown

33.Soil drainage:
- ___Rapidly drained
- X Somewhat poorly drained
- ___Well drained
- X Poorly drained
- ___Moderately well drained
- ___Very poorly drained

34.Average texture:
- ___sand
- ___clay loam
- ___sandy loam
- ___clay
- ___loam
- ___peat
- ___silt loam
- ___muck

other _____

35.Unvegetated surface:
- ___% Bedrock
- ___% Large rocks (cobbles, boulders > 10 cm)
- ___% Small rocks (gravel, 0.2-10 cm)
- ___% Sand (0.1-2 mm)
- 30 % Bare soil
- 55 % Litter, duff
- 5 % Wood (> 1 cm)
- 10 % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Diverse area with River, forested swamp, backwater areas (with marshes and shrub swamps), and vernal pools. Area is flooded during highwater events and siltation of litter and vegetation common.

37.Plot representativeness:

Plot representative of immediate area.

C. Vegetation 38 System: Terrestrial X Palustrine Estuarine 39. Plot number: 1 40. Plot dimensions: 20 X 20 m

41. Leaf type:
- X Broad-leaf
- Semi-broad-leaf
- Semi-needle-leaf
- Needle-leaf
- Graminoid
- Broad-leaf herbaceous
- Pteridophyte

42. Leaf phenology:
- X Deciduous
- Semi-deciduous
- Semi-Evergreen
- Evergreen
- Perennial
- Annual

43. Physiognomic type:
- X Forest
- Sparse woodland
- Shrubland
- Dwarf shrubland
- Sparse dwarf shrubland
- Herbaceous
- Sparsely vegetated
- Woodland
- Scrub thicket
- Sparse shrubland
- Dwarf scrub thicket
- Non-vascular

44.

	Height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	25m	40
T3 Tree sub-canopy	16m	20
S1 Tall shrub	5m	25
S2 Short shrub	1m	1
H Herbaceous	2m	65
N Non-vascular	0.01m	1
E Epiphyte	(vascular) absent	0
V Vine / liana	0.5m	1

45. Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

~~D6-7i~~		Hesperis matronalis	1,1	H1p	
Tilia americana 18,11,8,20,12	2+,2	Galium trifidum	+,1	Pilea pumila	+,1
		Lythrum salicaria	r,1	Lysimachia nummularia	2-,3
Fraxinus pensylvanica 12,11	1,1	Athyrium felix femina	+,1	Cardamine pratensis var. pratensis	1.2
Quercus macrocarpa 27,	2-,1	Solidago gigantea	+,1	Myosotis scorpioides	1,3
Acer saccharinum	+,1	Platanthera psycodes	r,1		
		Allium tricoccum	+,1		
D65p		Prunus virginiana	+,1		
Carpinus caroliniana 6,5,6,5,9,6 5,7,4	2+,2	Viola pubescens	+,1	C1-2b	
Cornus pumetata 5,5,4,4	1.2	Ranunculus hispidus	1,1	Toxicodendron radicans	+,2
		Ranunculus recurvatus	+,1	Echinocystis lobata	r,1
		Cirsium latifolia	+,1		
H2-3p		Impatiens capensis	+,1		
Elymus virginicus	+,2	Lapsana canadensis	+,1		
Lycopus uniflorus		Chelone glabra	r,1	Acer saccharinum DBHs	
Bochmeria cylindrica	1.2	Persicaria hydropiper	r,1	Not in Plot, for reference	
Matteuccia struthiopteris	2-,3	Ranunculus abortivus	r,1		
Onoclea sensibilis	2-,2	Symphyotrichum lateriflorum	r,1		
Geum laciniatum	+,1	Veratrum viride	+,1		
Geum canadense	1,1	Carex bromoides	+,1		
Persicaria virginiana	+,1				

EW-3

● INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—19

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1.Site name: _____ 2.Survey site name: Muddy Pond

3.Quad name(s) Pittsfield East 4.Quad code(s): _____ 5.County name(s): Berkshire 6.County code(s): _____

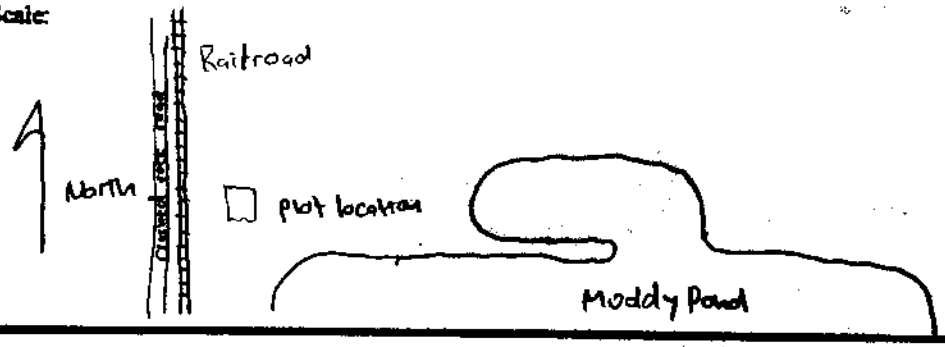
7.Town (LOCALJURIS): Hinsdale 8.Directions: Follow Route 8 south into Washington Township to a right (east) turn onto the Valley Road. from the Valley Road, a gravel/crushed rock road along the west side of the Railroad line can be accessed. follow road north to Muddy Pond. Plot lies in Deep Emergent marsh at NW end of pond.

9.Sourcecode: FOOHAIO1MAUS 10.Survey date: 8sep2009 11.State: MA

12.Surveyors: Arthur Haines, Eugenie Moore

B. Topography **13. Transect**

14.Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: Calcareous Seepage Marsh 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form ___ form 3 ___	Community name: _____ Additional data: Site form ___ form 3 ___
18.General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Emergent Marsh dominated by Carex lasiocarpa, Typha latifolia, Schoenoplectus acutus x tabernaemontani, Carex utriculata, with small patches of short shrubs (Salix bebbiana, Salix candida, and Salix lucida).	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 8 September 2000 Today's Date: 4 October 2000

Type of Communtiy: Calcareous Seepage Marsh Code:

Town: Hinsdale County: Berkshire Survey Site Name: Muddy Pond

Surveyor Name(s): Arthur Haines, Eugenie Moore

Directions to site: see site survey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Largely open sedge dominated lakeside Marsh. Two distinct associations — one dominated by Carex lasiocarpa and Typha latifolia, the other dominated by Schoenoplectus acutus (further from lake shore). Species such as Peltaphylloides floribunda and Myrica gale indicate somewhat higher pH (but not abyssic fen). Bryophyte cover frequent amongst stem bases of graminoides. A shrub border (Salix, Viburnum) occurs near upland edge.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Community lies in the Muddy Pond basin (headwaters of East Branch Housatonic River). Plants mostly occur in 10-20cm of standing water on a somewhat unstable organic soil mat. Railroad track (crushed stone raised embankment) passes through community and separates it from wetlands to west.

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Agriculture and gravel mining. Muddy Pond is used by sportmen.

Are there any rare species at this site? Please specify: Salix candida. also of note is Schoenoplectus acutus x tabernaemontani (in plot) and Schoenoplectus acutus further southon lake

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Hinsdale flats SWMA

Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): Changes to hydrology or pool level, invasion by non-native species.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Rail road embankment.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Small size of community

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Railroad embankment bisects wetlands and likely has altered hydrology.

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership of property, relatively free of non-native species.

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

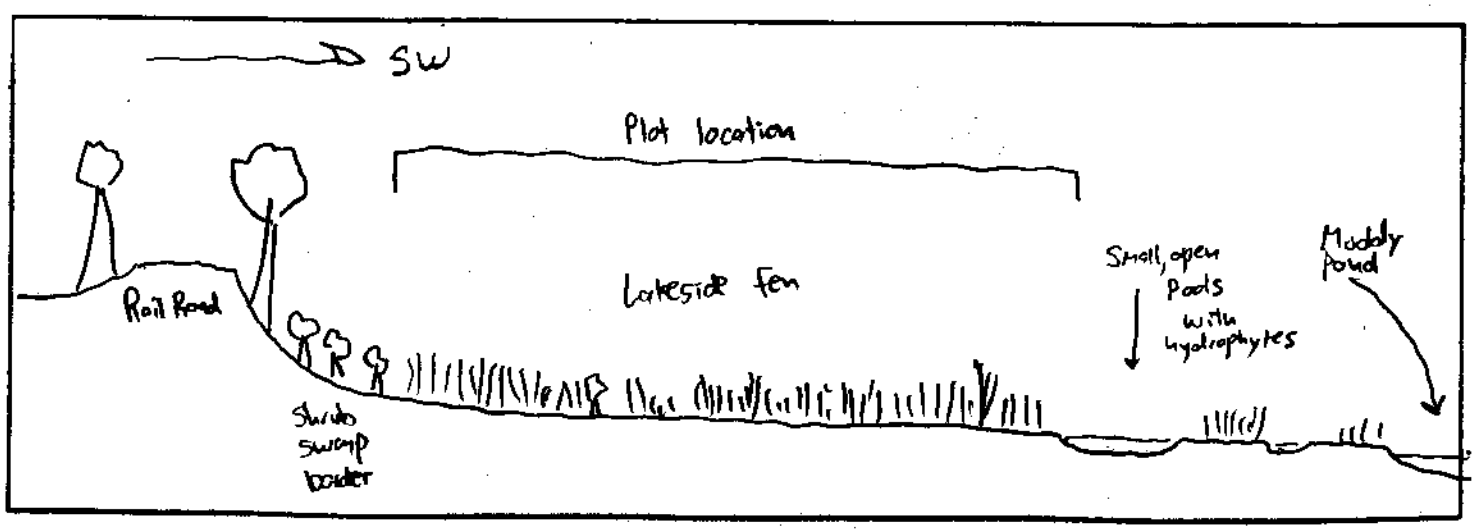
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments:

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: Muddy Pond

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Hinsdale 17.State: MA 10.Lat: (UTM) N 4694520 11.Long: 0655395 W E

12. Directions: _____

13.Sourcecode: FOOHAIOIMAUS 14.Survey date: 8 Sep 2000 15.Last obs: _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Eugenie Moore

B. Environmental Description

19.Transect / Observation point #

20.Image annotation #

21.Elevation: 1140 m

22.Topographic position:
- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- ___High level
- ___Lowslope
- ___Midslope
- ___Toeslope
- ___Low level
- ___Channel wall
- ___Channel bed
- X Basin floor
- ___Other

23.Topographic sketch:

See included topographic map

24.Slope degrees: 0-1°

25.Slope aspect: SE

26.Parent material:

Organic Soil

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:
- ___Extremely dry
- ___Somewhat wet
- ___Very dry
- ___Wet
- ___Dry
- X Very wet
- ___Somewhat moist
- ___Moist
- ___Permanently inundated
- X Periodically inundated

32.Stoniness:
- ___Stone free <0.1%
- ___Moderately stony 0.1-1%
- ___Stony 3-15%
- ___Very stony 15-50%
- ___Exceedingly stony 50-90%
- ___Stone piles >90%

unknown

33.Soil drainage:
- ___Rapidly drained
- ___Somewhat poorly drained
- ___Well drained
- ___Poorly drained
- ___Moderately well drained
- X Very poorly drained

34.Average texture: unknown
- ___sand
- ___clay loam
- ___sandy loam
- ___clay
- ___loam
- X peat
- ___silt loam
- ___muck

other: _____

35.Unvegetated surface:
- ___% Bedrock
- 10 % Litter, duff
- ___% Large rocks (cobbles, boulders > 10 cm)
- ___% Wood (> 1 cm)
- ___% Small rocks (gravel, 0.2-10 cm)
- 90 % Water
- ___% Sand (0.1-2 mm)
- ___% Bare soil
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Community is somewhat heterogeneous due to two different dominant species and small open pools interspersed in community.

37.Plot representativeness:

Representative captures both dominant species associations.

C. Vegetation 38.System: ___Terrestrial X Palustrine ___Estuarine 39.Plot number: 1 40.Plot dimensions: 20x20m

41.Leaf type:
- ___Broad-leaf
- ___Semi-broad-leaf
- ___Semi-needle-leaf
- ___Needle-leaf
- X Graminoid
- ___Broad-leaf herbaceous
- ___Pteridophyte

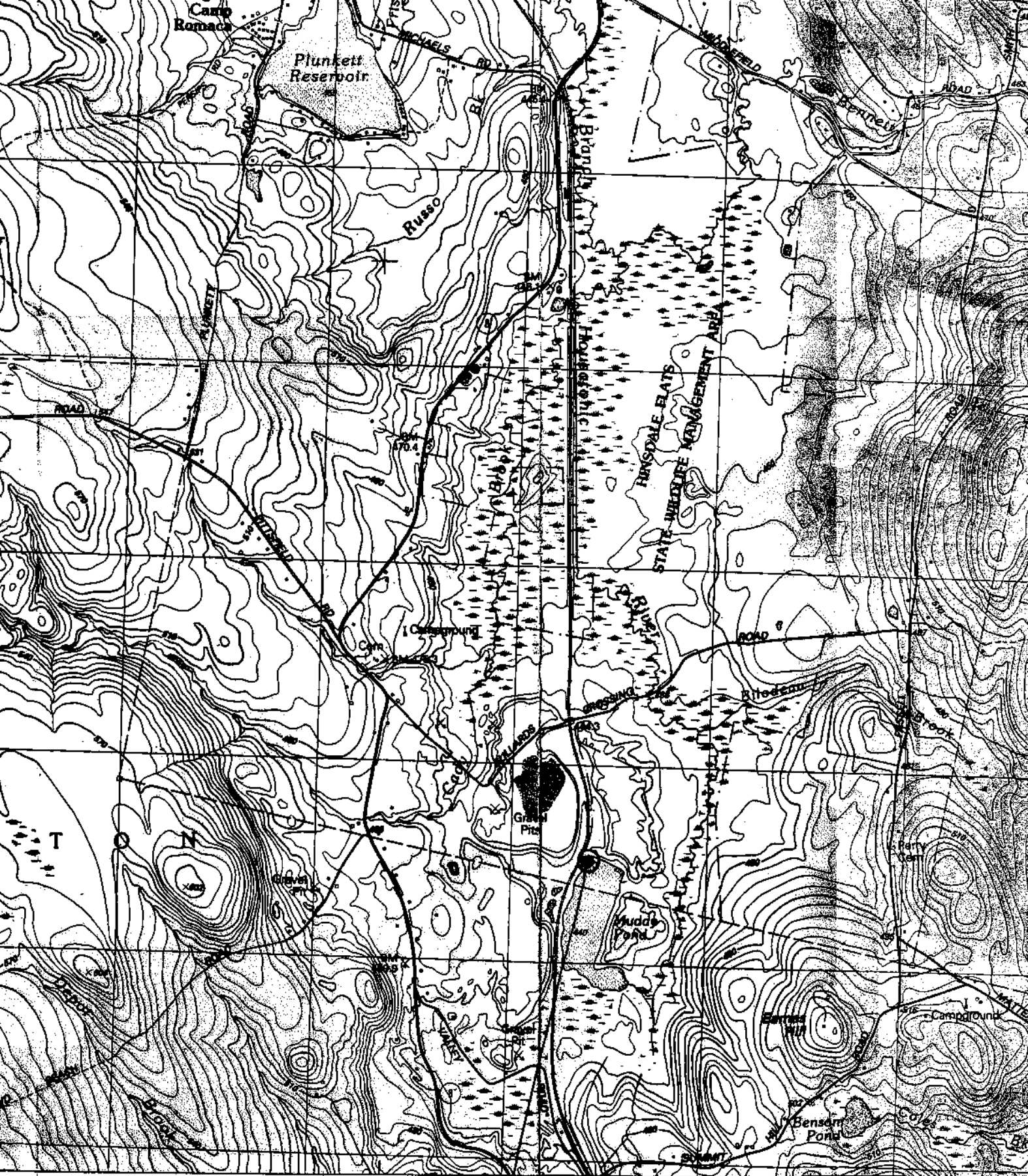
42.Leaf phenology:
- ___Deciduous
- ___Semi-deciduous
- ___Semi-Evergreen
- ___Evergreen
- X Perennial
- ___Annual

43.Physiognomic type:
- ___Forest
- ___Sparse woodland
- ___Shrubland
- ___Dwarf shrubland
- ___Sparse dwarf shrubland
- X Herbaceous
- ___Sparsely vegetated
- ___Woodland
- ___Scrub thicket
- ___Sparse shrubland
- ___Dwarf scrub thicket
- ___Non-vascular

44.	height	% cover	
T1 Emergent tree	Absent	0	
T2 Tree canopy	Absent	0	
T3 Tree sub-canopy	8m	1	
S1 Tall shrub	3m	3	
S2 Short shrub	1m	10	
H Herbaceous	2m	70	
N Non-vascular	0.05 m	50	a non-sphagnum bryophyte
E Epiphyte (vascular)	Absent	0	
V Vine / liana	Absent	0	

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D 5b		Spiraea alba var latifolia	r.1		
Acer rubrum	r.1	Spiraea tomentosa	+.1		
		Triadenum virginianum	+.1		
D 4r		Utricularia intermedia (pool + edges)	+.1		
Salix bebbiana	1.2	Nuphar variegatum	r.1		
Salix discolor	+.2	Sarracinia purpurea	r.2		
Salix sericea	+.2	Chamaedaphne calyculata	r.2		
Viburnum dentatum	+.3	Menyanthes trifolata	+.2		
		Cornus sericea	+.2		
G 1-3i		Juncus brevicaudatus	+.1		
Schoenoplectus x tabernaemontani (acutus)	3.4	Eleocharis elliptica	r.1		
Salix discolor	+.2	(Drosera rotundifolia)			
Carex lasiocarpa	2+.3				
Myrica gale	1.3				
Typha latifolia	2-.2				
Erythamia graminifolia	r.1				
Thelypteris palustris	+.2				
Comarum palustre	1.2				
Carex utriculata	1.2				
Salix candida	1.3				
Solidago rugosa	r.1				



Muddy Pond Community Survey Location

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: Threemile Pond

3. Quad name(s) Great Barrington 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

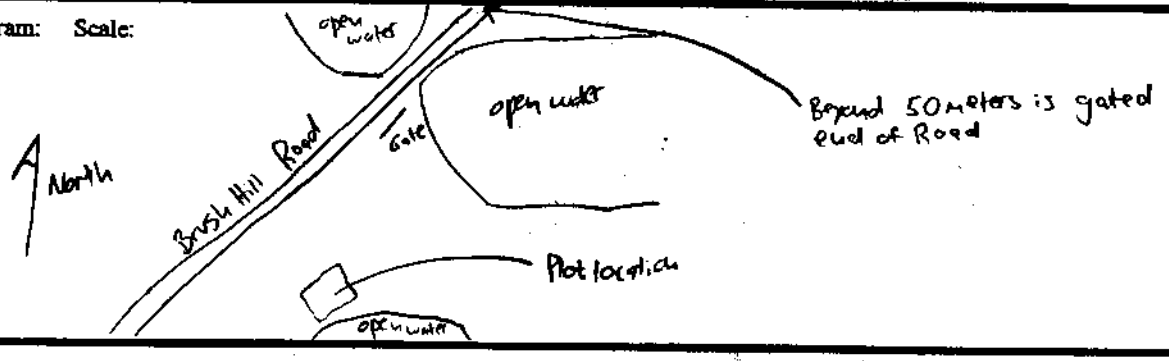
7. Town (LOCALJURIS): Sheffield 8. Directions: from Route 7, turn east onto the Brush Hill Road (south of the Great Barrington village). Follow this ca. 6.8 KM to a left (north) turn onto Brush Hill Road. follow this road ca. 2.6 km past a small cemetery on the left (north) and about 75 meters prior to open water on the right (south). The site lies south of the road (over a fence and stone wall) out into a shrub swamp ca. 100 meters from the road.

9. Sourcecode: FOOHAI01MAUS 10. Survey date 7 sep 00 11. State: MA

12. Surveyors: Arthur Haines, Eugenie Moore

B. Topography **13. Transect**

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1 X	Observation point 2 ___	Observation point 3 ___
16. Community name: Shrub Swamp 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form ___ form 3 ___	Community name: _____ Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Shrub swamp with sparse canopy layer. Trees include Acer rubrum and Betula populifolia. Shrubs are Cornus amomum, Salix sericea, spiraea alba, and Viburnum dentatum (among others). Common herbs are Onoclea sensibilis, Galium asprellum, Doellingeria umbellata, Senecio aureus, and Symphyotrichum puniceum. Adjacent to open shallow emergent marsh dominated by Leersia oryzoides.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 7 September 2000 Today's Date: 13 October 2000
Type of Communtiy: Shrub Swamp Code:
Town: Sheffield County: Berkshire Survey Site Name: Threemile Pond
Surveyor Name(s): Arthur Haines, Eugenie Moore
Directions to site: see site SuNey Summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Dense shrub swamp in ecotone between Forested Swamp and Emergent Marsh. Diverse assemblage of species without a widespread dominant species. Common species include Acer rubrum and Betula populifolia (in canopy), Cornus amomum, Salix sericea, spirea alba, and Viburnum dentatum (in shrub layer), and Onoclea sensibilis, Galium asprellum, Doellingeria umbellata, Senecio aureus, and Symphyotrichum puniceum (in herb layer).

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Gently sloped landscape leading South to drainage basin of Threemile Pond. Several small swamps, seepages, and pools are found here at Northwest end of Threemile Pond. A nearby meadow with several circumneutral indicator species. Adjacent Pool (Beaver formed) utilized by several species of amphibians for breeding (spotted salamander, American toad).

Surrounding Land Use (physical structures and land use practices in the surrounding area): Many open fields in local region indicate agricultural history. Fields are mowed, presumably for hay. Threemile Pond used extensively for fishing and hunting.

Are there any rare species at this site? Please specify: none observed

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Threemile Pond SWMA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications, if applicable, discuss why the community may no longer exist here): Site is being influenced by beaver activity, no other threats observed.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Stone walls and remaining open fields indicate land clearing history for Agriculture.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ____yes ____no ____unknown Protecting EO? ____yes ____no ____unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent (B) Good C - Marginal D - Poor

Comments: Extensive complex of shrub swamps

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Though relatively free of non-native species, area has been cleared in recent past.

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Area will likely succeed to forested swamp without additional disturbance.

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

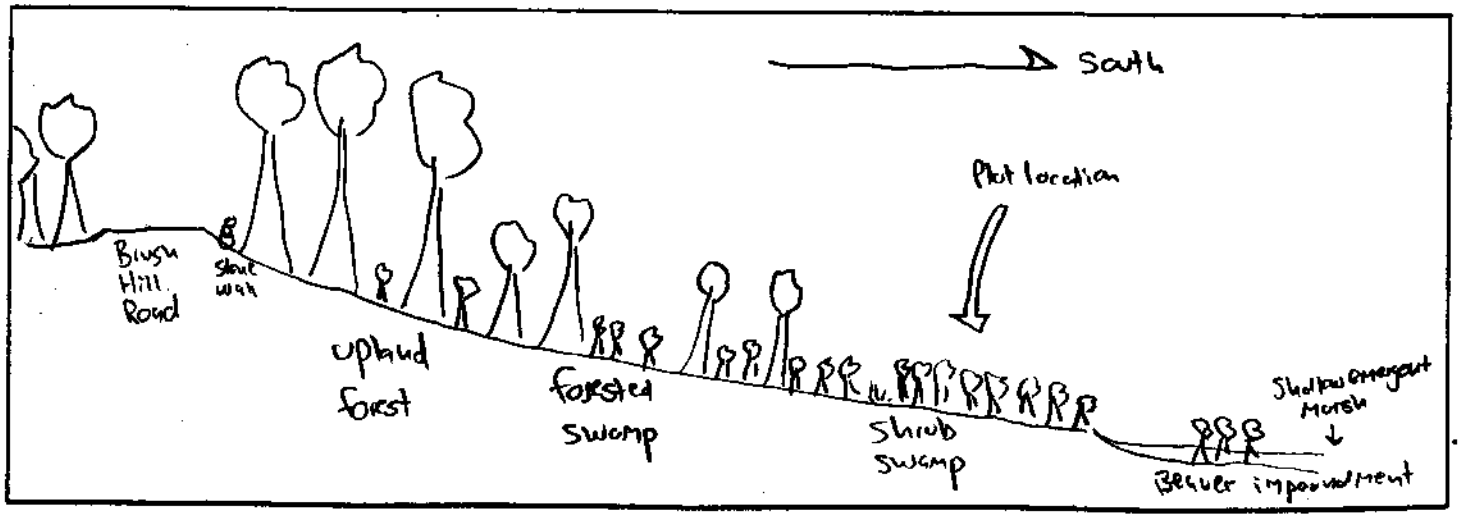
A - Excellent (B) Good C - Marginal D - Poor

Comments: Public ownership of property

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments:

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: Threemile Pond

5.Quad name(s): Great Barrington 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Sheffield 17.State: MA 10.Lat: UTM N 4667650 11.~~Long~~ 0639665 ~~W~~ E

12. Directions: See Site Survey Summary

13.Sourcecode: FOOHAIOIMMS 14.Survey date: 7 September 2000 15.Last obs: _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Eugenie Moore

B. Environmental Description

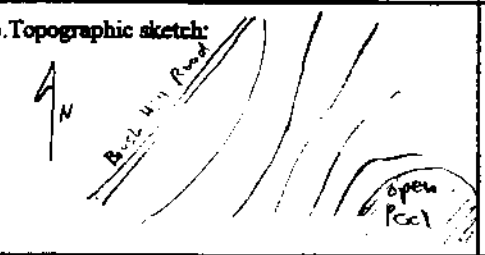
19.Transect / Observation point #

20.Image annotation #

21.Elevation:

22.Topographic position:
- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- ___High level
- ___Lowslope
- ___Midslope
- _X_Toeslope
- ___Low level
- ___Channel wall
- ___Channel bed
- ___Basin floor
- ___Other

23.Topographic sketch:



24.Slope degrees: 1-3°

25.Slope aspect: Southeast

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:
- ___Extremely dry
- ___Somewhat wet
- ___Very dry
- _X_Wet
- ___Dry
- ___Very wet
- ___Somewhat moist
- ___Moist
- ___Permanently inundated
- ___Periodically inundated

32.Stoniness:
- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

unknown

33.Soil drainage:
- ___Rapidly drained
- ___Somewhat poorly drained
- ___Well drained
- _X_Poorly drained
- ___Moderately well drained
- ___Very poorly drained

34.Average texture: unknown
- ___ sand
- ___clay loam
- ___sandy loam
- ___ clay
- ___loam
- ___ peat
- ___silt loam
- ___muck

other _____

35.Unvegetated surface:
- ___ % Bedrock
- ___ % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Sand (0.1-2 mm)
- 99 % Bare soil
- 40 % Litter, duff
- 1 % Wood (> 1 cm)
- 10 % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Heterogeneous community transitioning between forest swamp, shrub swamp, shallow Emergent Marsh, and open water.

37.Plot representativeness:

Plot located in mixture of shrub species.

C. Vegetation 38.System: ___ Terrestrial X Palustrine ___ Estuarine 39.Plot number: ___ 40.Plot dimensions: 20 x 20 metas

41.Leaf type:
- X Broad-leaf
- ___ Semi-broad-leaf
- ___ Semi-needle-leaf
- ___ Needle-leaf
- ___ Graminoid
- ___ Broad-leaf herbaceous
- ___ Pteridophyte

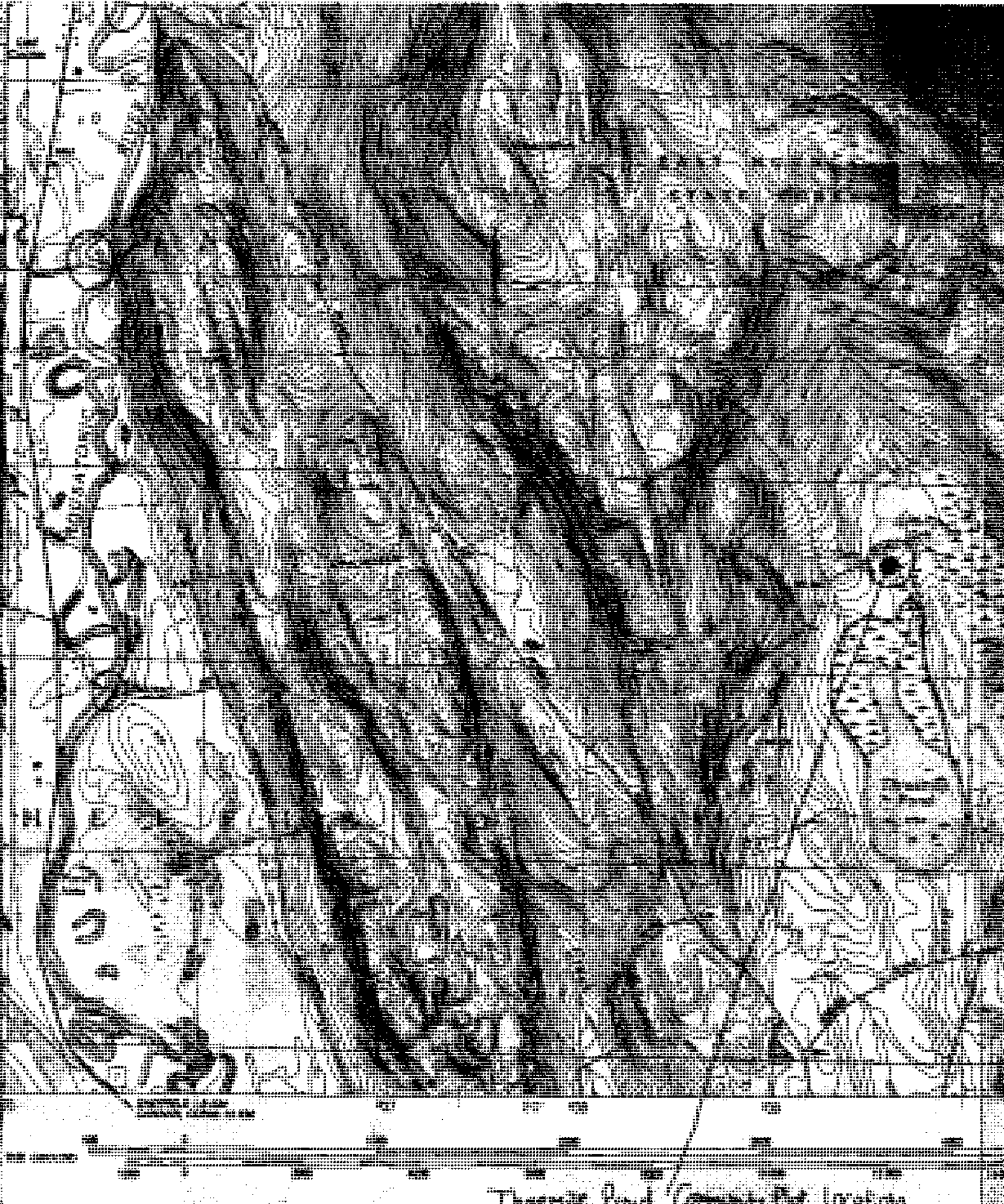
42.Leaf phenology:
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

43.Physiognomic type:
- ___ Forest
- ___ Sparse woodland
- X Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Sparsely vegetated
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	Absent	0
T3 Tree sub- canopy	18m	5
S1 Tall shrub	4m	50
S2 Short shrub	2m	25
H Herbaceous	1m	40
N Non-vascular	0.001m	5
E Epiphyte (vascular)	absent	0
V Vine / liana	6m	5

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

DS-6r		Doellingeria umbellata	1.1	Tiarella cordifolia	r.1
Betula populifolia 6,	+.1	Solidago rugosa	+.1	Chelone glabra	r.1
Acer rubrum 8,4,6	+.1	Symphyotrichum puniceum	+.1	Bromus ciliatus	r.1
Acer saccharum 6	r.1	Carex projecta	r.1	Lycopus uniflora	
Ulmus americana 7,	r.1	Carex stricta	1.2		
		Rubus idaeus	1.1	C 2-4 r	r.1
D4i		Solidgo patula	+.1	clematis virginiana	1.1
Alnus incana	1.2	Senicio aureus	+.1	Amphicarpaea bracteata	+.1
cornus amomum	2+.3	Symplocarpus foetidus	+.1		
salix sericea	2+.3	Dryopteris cristata	+.1		
Viburnum dentatum var lucidum	2-.3	Cornus amomom	+.1		
Ilex verticillata	+.2	Rubus pubescens	+.1		
salix bebbiana	+.1	Eupatorium maculatum	+.1		
Eupatorium maculatum	+.1	Osmunda cinnamomea	+.1		
Viburnum lentago	2-.1	Impatience capensis	+.2		
		Thalictrum pubescens	+.1		
		Equisetum arvense	r.1		
H 1-3p		Boehmeria cylindrica	r.1		
Spiraea alba var latifolia	1.2	Iris versicolor	+.1		
Galium asprellum	1.2	(Saxifragaa pensylvanica)			
Onoclea sensibilis	1.2	Photinia cx floribunda	r.1		



COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: 4199

3. Quad name(s) Pittsfield East (1:25000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

7. Town (LOCALJURIS): Pittsfield 8. Directions: from the Holmes Road, pass through a yellow gate on the west side of the river and follow a grassy, single lane road south for 400 meters. Then turn right (west) and head into forest/thicket away from river for 50 meters.

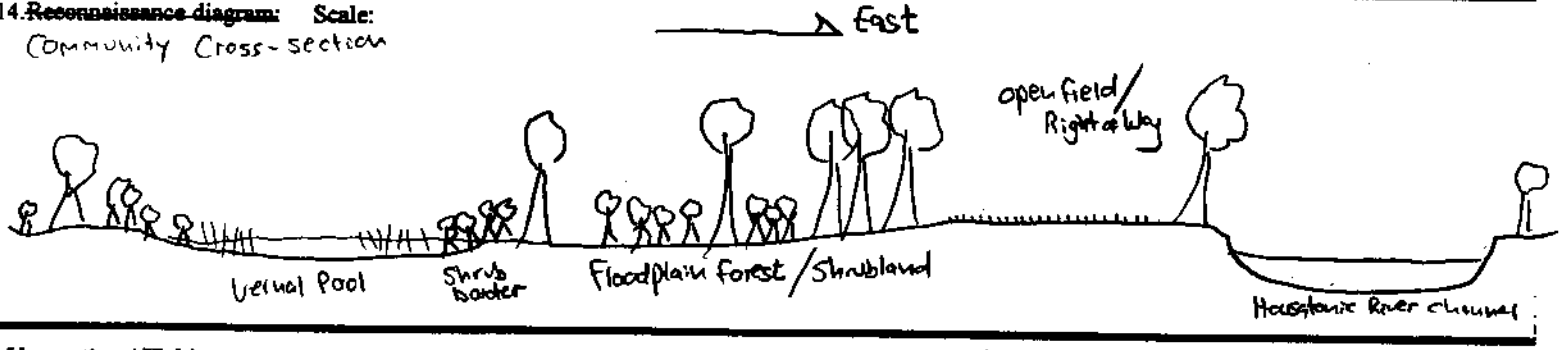
9. Sourcecode: FOOHAIO\MAUS 10. Survey date 6 Sep 2000 11. State: MA

12. Surveyors: Arthur Haines, Eugenie Moore

B. Topography 13. Transect

14. ~~Reconnaissance diagram~~: Scale:

Community Cross-section



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: Floodplain Forest (Transitional)	Community name:	Community name:
17. Additional data: Site form X form 3 X	Additional data: Site form ___ form 3 ___	Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers)	General description	General description:
Floodplain forest remnant with Acer saccharinum in the upper canopy and Rhamnus cathartica, Acer negundo, and Ulmus americana in subcanopy. Cornus amomum (near vernal pool) and Lonicera morrowii are dominant shrubs. Common herbs include Cardamine pratensis var. pratensis, Onoclea sensibilis, and Athyrium felix-femina. Vitis riparia is an abundant liana.		

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 6 September 2000 Today's Date: 16 October 2000
Type of Communtiy: ~~Transitional~~ floodplain forest Code:
Town: Pittsfield County: Berkshire Survey Site Name: WQA
Surveyor Name(s): Arthur Haines, Eugenie Moore
Directions to site: See site suivey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Vegetation is remnant floodplain forest with a few remnant Acer saccharinum overstory trees. Acer negundo and Rhamnus cathartica are dominant subcanopy trees. Dense shrub thickets of Cornus amomum (in more hydric soil) or Lonicera morrowii are frequent in site. There is little vertical structure in community. Areas tend to be dominated by a single stratum (subcanopy trees and shrubs grow very dense and exclude each other.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
low, relatively flat floodplain of Housatonic River. A number of depressions occur in landscape that form somewhat permanent pools (depending on year) that are utilized by breeding amphibians (Rana pipiens, Rana sylvatica).

Surrounding Land Use (physical structures and land use practices in the surrounding area): Agriculture has been cause of land clearing here and across river on east side. This site is also close to residential areas of Pittsfield and several homes are near to the community.

Are there any rare species at this site? Please specify: None observed

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley SWMA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here):
Clearing of remaining overstory trees; continued invasion of non-native species.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Past clearing has altered community structure and composition

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ____yes ____no ____unknown Protecting EO? ____yes ____no ____unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good C - Marginal (D) Poor

Comments: Small size and Poor composition

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good C - Marginal (D) Poor

Comments: non-native species are dominant community members

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Close to urban center but on publicly owned land

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

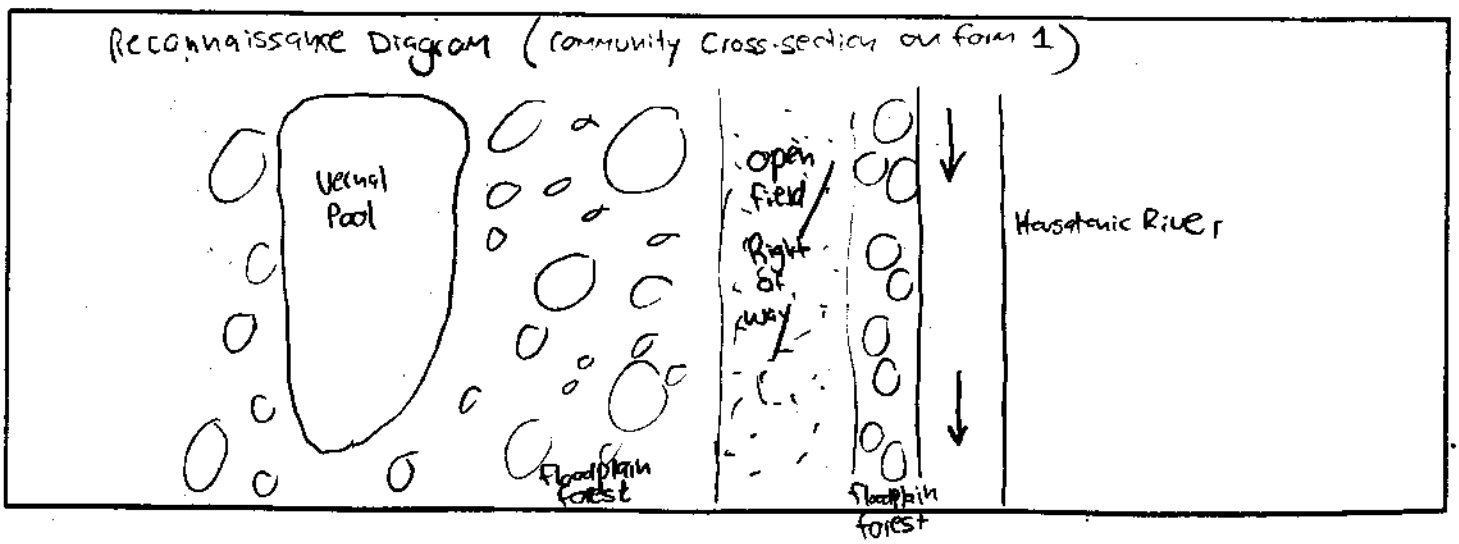
A - Excellent (B) Good C - Marginal D - Poor

Comments:

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments: Though of low quality in terms of a pristine forest, the site provides important wildlife habitat for local fauna.

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: W9a

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Pittsfield 17.State: MA 10.~~Lat~~ UTM N 4698350 11.Long 0644875 W E

12. Directions: See site Survey summary

13.Sourcecode: FOOHAI OIMAS 14.Survey date 6 Sep 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Eugenie Moore

B. Environmental Description

19.Transect / Observation point #

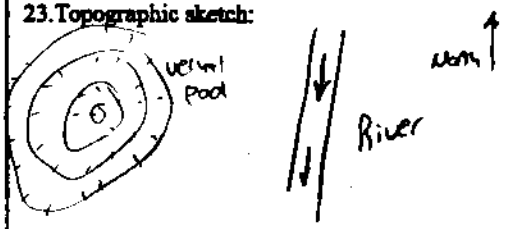
20.Image annotation #

21.Elevation: 295 M

22.Topographic position:

___Interfluve ___Backslope
___High slope ___Step in slope
___High level ___Lowslope
___Midslope ___Toeslope
X Low level ___Channel wall
___Channel bed ___Basin floor
___Other

23.Topographic sketch:



24.Slope degrees: 0-3

25.Slope aspect: West (toward vernal pool)

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:

___Extremely dry X Somewhat wet
___Very dry ___Wet
___Dry ___Very wet
___Somewhat moist
X Moist

varies in plot

___Permanently inundated
X Periodically inundated

32.Stoniness:

_____Stone free <0.1%
_____Moderately stony 0.1-1%
_____Stony 3-15%
_____Very stony 15-50%
_____Exceedingly stony 50-90%
_____Stone piles >90%

unknown

33.Soil drainage:

___Rapidly drained ___Somewhat poorly drained
___Well drained ___Poorly drained
___Moderately well drained ___Very poorly drained

34.Average texture:

___sand ___clay loam
___sandy loam ___clay
___loam ___peat
___silt loam ___muck

other _____

35.Unvegetated surface:

___% Bedrock
___% Large rocks (cobbles, boulders > 10 cm)
___% Small rocks (gravel, 0.2-10 cm)
___% Sand (0.1-2 mm)
25 % Bare soil
65 % Litter, duff
5 % Wood (> 1 cm)
5 % Water
___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Vegetation in local area is heterogeneous, in grades between floodplain forest, shrub swamp, and vernal pools.

37.Plot representativeness:

Representative of regenerating floodplain forests in area, of which there are many between Holmes Road and below New Lenox Road in Pittsfield and Lenox, MA.

W9a

C. Vegetation 38.System: ___ Terrestrial X Palustrine ___ Estuarine 39.Plot number: ___ 40.Plot dimensions: 20 x 20 meters

41.Leaf type:
- X Broad-leaf
- ___ Semi-broad-leaf
- ___ Semi-needle-leaf
- ___ Needle-leaf
- ___ Graminoid
- ___ Broad-leaf herbaceous
- ___ Pteridophyte

42.Leaf phenology:
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

43.Physiognomic type:
- X Forest (mix)
- ___ Sparse woodland
- X Shrubland (mix)
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Sparsely vegetated
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular

44.	height	% cover
T1 Emergent tree	absent	0
T2 Tree canopy	21 M	10
T3 Tree sub- canopy	8 M	50
S1 Tall shrub	3 M	50
S2 Short shrub	1 M	5
H Herbaceous	1 M	30
N Non-vascular	0.001 M	1
E Epiphyte	(Vascular) absent	0
V Vine / liana	6 M	5

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D7p		Solidago rugosa	+.1		
Acer saccharum	2-.2	Cinna latifolia	1.1		
		Prunus virginiana	r.1		
D5-6p		Persicaria sagitata	+.1		
Rhamnus cathartica 4	2-.1	Matteuccia Strethiopteris	+.1		
Ulmus americana 4, 7,	1.1				
Acer negundo 4, 7, 5, 6, 4, 4, 5, 9, 4	2+.1	H 1-2r			
Juglans Cineria 6,	r.1	Carex projecta	+.1		
		Impatience capensis	+.1		
D4p		Cardamine pratensis	2-.3		
Lonicera Morrowii	2+.3	Geum canadense	+.1		
Cornus amomum	2+.4	Boehmaria Cyclindrica	+.1		
		C 2-5r			
		Vitis riparia	2-.3		
		Calastegia Cepium	+.1		
D3p		Parthenocissus vitacea			
Lonicera Morrowii	2-.2	Celastrus orbiculata	+.1		
Rubus idaeus	1.2				
Cornus amomum	2-.3				
Rubus occidentalis	+.1				
Athyrium Felix-femina	1.1				
Onoclea sensibilis	1.1				

W-9a


PITTSFIELD
Goodrich Pond
BRATTLE BROOK PARK
St Lukes Hospital
Deming Park
Substation
4700
Herberg Middle Sch
Egremont Sch
Williams Sch
4699
HRVSWMA
Court Hill
Morewood Lake
Sackett
Sackett Brook
Gravel Pit
4698
PIPELINE
Sukes Brook
RIVER
25′
4697
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
4696
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helena Chapel
4695
New Lenox
New Lenox Cem
Mill Brook Reservoir
HOUSATONIC
Farnham Reservoir

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

MA Natural Heritage & Endangered Species Program

rev. May, 1998

A. Identifiers

1. Site name: _____ 2. Survey site name: W-1

3. Quad name(s): East Lee (1:25,000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

7. Town (LOCALJURIS): Lenox 8. Directions: From Route 7 and 20, Drive east on Housatonic Street and turn left (north) onto Willow Creek Road. Drive to end (rock lined parking lot, the continue north on single lane road past intersection and over bridge of Willow Creek. Plot lies of old RR embankment on east side +/- 150 meters north of bridge over Willow Creek.

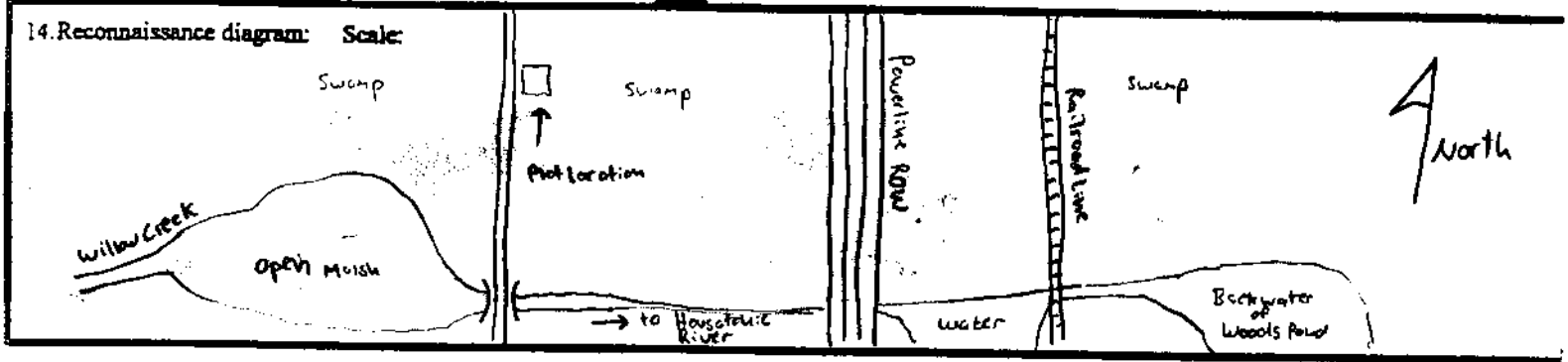
9. Sourcecode: FOOHAIOIMAUS 10. Survey date: 26 Sep 2000 11. State: MA

12. Surveyors: Arthur Haines and Chris Werner

B. Topography

13. Transect 1

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1 →	Observation point 2 ___	Observation point 3 ___
16. Community name: Shrub Swamp 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form ___ form 3 ___	Community name: _____ Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Shrub swamp that is transitional to a hardwood swamp (open, sparse canopy present). Shrubs include Ilex verticillata, Viburnum dentatum, and spiraea alba, with Acer rubrum and Ulmus americana overhead. Herbs include Carex stricta, Osmunda regalis, and Calamagrostis canadensis.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 26 September 2000 Today's Date: 3 October 2000
Type of Communtiy: Circumneutral Shrub Swamp Code:
Town: Lenox County: Berkshire Survey Site Name: W-1
Surveyor Name(s): Arthur Haines and Chris Weiner
Directions to site: See site survey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure): Community is transitional between a circumneutral shrub swamp and circumneutral hardwood swamp. A dense understory of shrubs (Ilex verticillata, Viburnum dentatum, Spiraea alba) is overtopped by a sparse, broken canopy of Acer rubrum with some Ulmus americana. Herb layer dominated by wetland species such as Carex stricta, Osmunda regalis, Glyceria striata, and Calamagrostis canadensis.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards): Level, broad floodplain of Housatonic River. Normally wet in spring with declining water table and saturated soil in summer season. Beaver impoundment has flooded community and 10-30 cm of standing water exists. To south several open, ponded areas occur which are backwaters of Housatonic River.

Surrounding Land Use (physical structures and land use practices in the surrounding area): Land has been used for agriculture to west and several large fields still occur. Open right-of-ways for 2 railroad lines and a powerline. Hunters and anglers use area as well.

Are there any rare species at this site? Please specify: Quercus Macrocarpa saplings along railroad embankment

Management / Ownership

Is this area part of a managed conservationa area: _____ Managed Area Name: _____
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): Broadening of Powerline or railroad right-of-ways and further clearing of community.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna): Three right of ways are maintained through community – 2 railroad lines (one still used, the other without tracks) and a large powerline ROW. Each right-of-way bisects community. The two railroad lines may alter hydrology by their embankments and ditchings.

Owner Information

Owner's Name: Likely owned by Springfield Terminal Rail Line Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Community is part of a large Swamp complex that includes many rare element occurrences.

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Heavily invaded by non-native species and bisected by 3 right-of-ways

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

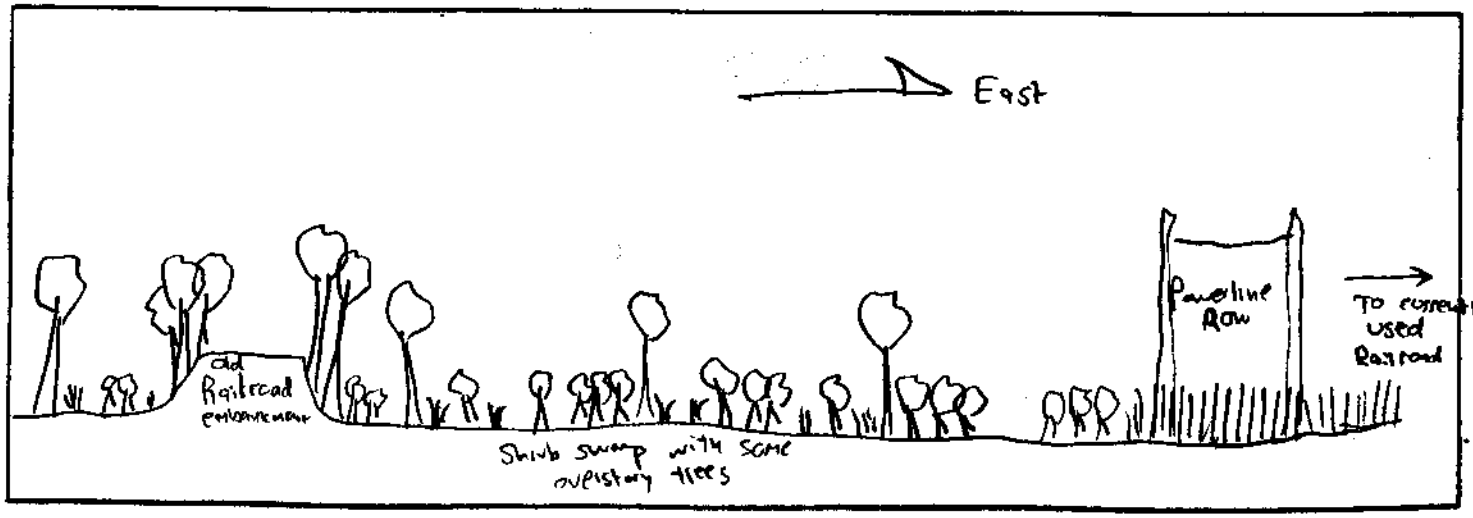
A - Excellent B - Good (C) - Marginal D - Poor

Comments: Community has already been impacted by transportation and energy industries

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: Area important in local region for wildlife corridor along river

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: W-1

5.Quad name(s): East Lee 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Lenox 17.State: MA 10.~~Lat~~ UTM N 4691600 11.~~Long~~ 0644450 W G

12. Directions: See Site Survey Summary

13.Sourcecode: FOOHATOMAUS 14.Survey date: 26 Sep 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Chris Wemer

B. Environmental Description

19.Transect / Observation point #

20.Image annotation #

21.Elevation: 293 m

22.Topographic position:

___Interfluve ___Backslope
___High slope ___Step in slope
___High level ___Lowslope
___Midslope ___Toeslope
_X_Low level ___Channel wall
___Channel bed ___Basin floor
___Other

23.Topographic sketch:

see included topographic map

24.Slope degrees: 0-1

25.Slope aspect: East

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:

___Extremely dry ___Somewhat wet
___Very dry _X_Wet
___Dry ___Very wet
___Somewhat moist
___Moist
_X_Permanently inundated → Due to beaver flooding (current)
___Periodically inundated (in previous years)

32.Stoniness:

_____Stone free <0.1%
_____Moderately stony 0.1-1%
_____Stony 3-15%
_____Very stony 15-50%
_____Exceedingly stony 50-90%
_____Stone piles >90%

unknown

33.Soil drainage:

___Rapidly drained ___Somewhat poorly drained
___Well drained ___Poorly drained
___Moderately well drained _X_Very poorly drained

34.Average texture:

___sand ___clay loam
___sandy loam ___clay
___loam ___peat
___silt loam ___muck

other: _____

35.Unvegetated surface:

___% Bedrock
___% Large rocks (cobbles, boulders > 10 cm)
___% Small rocks (gravel, 0.2-10 cm)
___% Sand (0.1-2 mm)
___% Bare soil
10 % Litter, duff
10 % Wood (> 1 cm)
80 % Water (normally bare soil, litter, and wood with water only in low areas)
___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Area uniform near plot but grades to various types of forested swamps as one approaches the Housatonic River (to east)

37.Plot representativeness:

relatively representative.

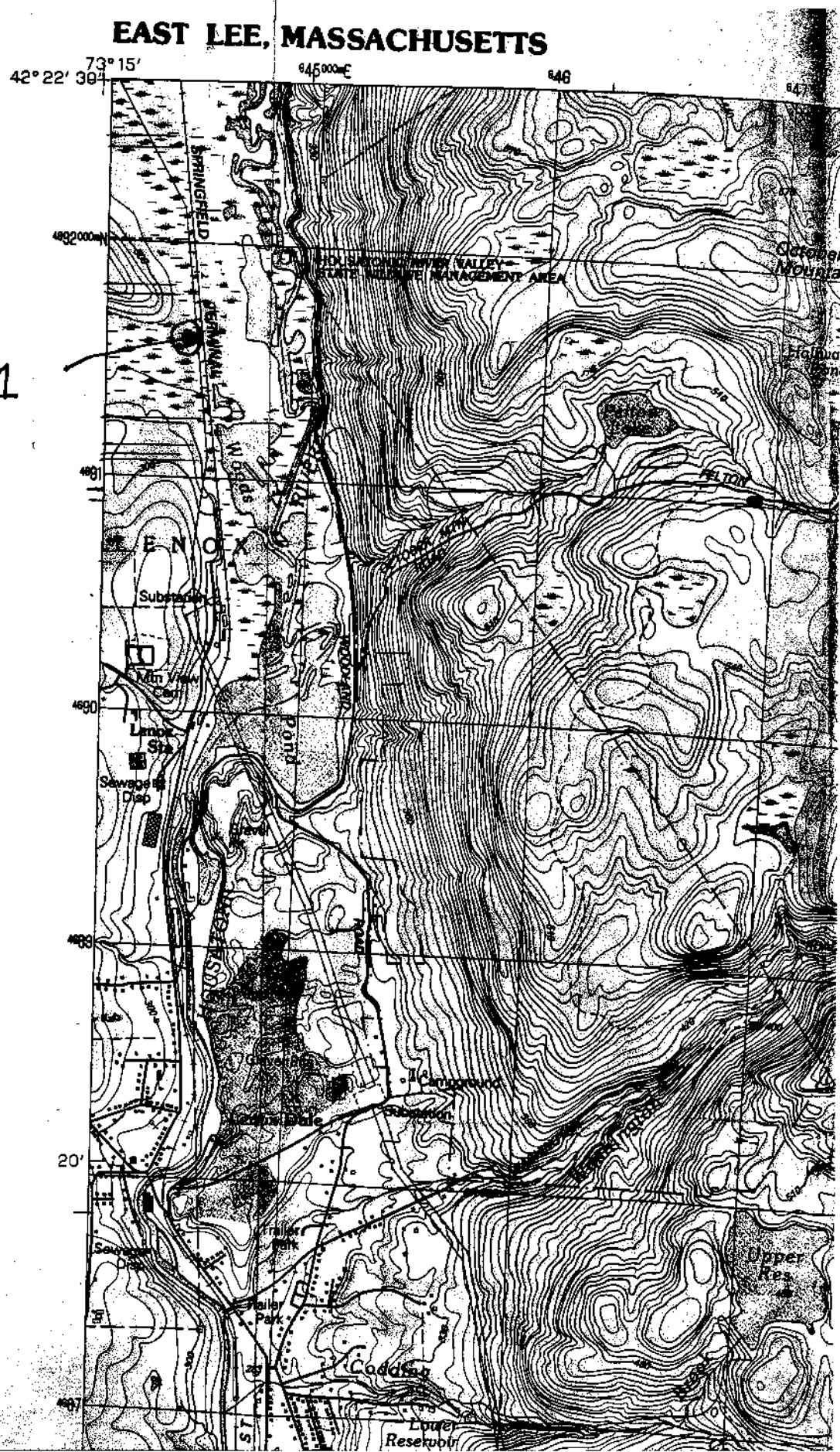
C. Vegetation 38.System: __ Terrestrial X Palustrine __ Estuarine 39.Plot number: 1 40.Plot dimensions: 20 X 20 m

41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:		44.	height	% cover
X Broad-leaf	X Deciduous	__ Forest	__ Woodland	T1 Emergent tree	Absent	0
__ Semi-broad-leaf	__ Semi-deciduous	__ Sparse woodland	X Scrub thicket	T2 Tree canopy	11 m	25
__ Semi-needle-leaf	__ Semi-Evergreen	__ Shrubland	__ Sparse shrubland	T3 Tree sub-canopy	3.5 m	5
__ Needle-leaf	__ Evergreen	__ Dwarf shrubland	__ Dwarf scrub thicket	S1 Tall shrub	3 m	65
__ Graminoid	__ Perennial	__ Sparse dwarf shrubland		S2 Short shrub	1 m	10
__ Broad-leaf herbaceous	__ Annual	__ Herbaceous	__ Non-vascular	H Herbaceous	2.5 m	50
__ Pteridophyte		__ Sparsely vegetated		N Non-vascular	underwater	0
				E Epiphyte	(vascular) absent	0
				V Vine / liana	absent	0

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D5-6r (DBH measurements)				
Acer rubrum 5,5,5,6,6,6,6,6,7,7,7,8	2+.1	Onoclea sensibalis	+.1	
Ulmus americana 9,5	1.1	Thelypteris palustris	+.1	
		Glyceria striata	1.2	
D4i		Lythrum salicaria	+.1	
Carpinus caroliniana	r.1	Sympiotricum lateriflorum	r.1	
Ilex verticulata	3.4	Rubus pubesens	r.1	
Ulmus incana	+.1	Athyrium felix-femina	+.1	
Viburnum dentatum	1.2	Potenilla norwigica	r.1	
Spirea alba	1.2	Triopteris strictate	+.1	
Acer rubrum	2-.2	Lyonia ligustrina	+.1	
Vaccinium corymbosum	1.2	Lycopus uniflorus	r.1	
Lythrum salicaria	2-.2	Juncus effusus	+.1	
~~Iteya latifolia~~ Cornus ammommum var. amm.	1.2	Carex projecta	r.1	
Salix discolor	+.1	Carex gynanthera	r.1	
D1-3i		Fraxinus pen.	+.1	
Calamagrostis canadensis	1.3	Symplocarpus foetutus	+.1	
Carex stricta	2-.3	Ranuculus hispidus	+.1	
Osmunda regalis	1.2			
Galium tinctorium	r.1			
Scutellaria lateriflora	r.1			

EAST LEE, MASSACHUSETTS



W-1

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: WI-4

3. Quad name(s): Eastlee (1:25,000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

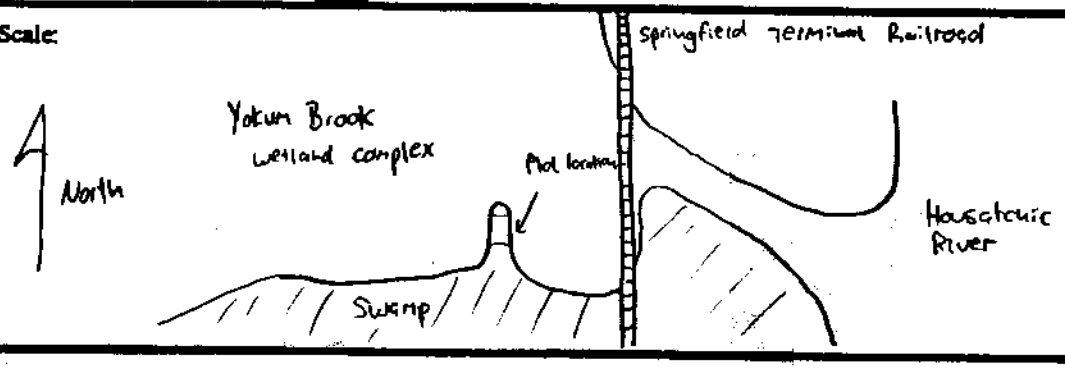
7. Town (LOCALJURIS): Lenox 8. Directions: Acces, the springfield terminal railroad tracks from the New Lenox Road, follow the tracks South until reaching the Yokum Brook wetland complex. Plot location on south side of Brook ca. 70 meters west of RR tracks.

9. Sourcecode: FOOHAIOIMAUS 10. Survey date 27sep2001 11. State: MA

12. Surveyors: Arthur Haines and Chris Wemer

B. Topography 13. Transect 1

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: Red Maple Swamp 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form ___ form 3 ___	Community name: _____ Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Red Maple swamp currently with extensive flooding from Beaver dam at RR tracks. Dominant species include Acer rubrum, Viburnum dentatum, Spirea alba var. latifolia, Ilex verticillata, Athyrium felix-femina, Thelypteris noveboracensis, Osmunda claytoniana, and Carex gracillima.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 27 September 2000 Today's Date: 4 October 2000
Type of Communtiy: Red Maple Swamp Code:
Town: Lenox County: Berkshire Survey Site Name: W-4
Surveyor Name(s): Arthur Haines and Chris Werner
Directions to site: See Site Survey Summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Periodically flooded riparian swamp adjacent to Yokum Brook. Canopy dominated by Acer rubrum. Patchy shrubs include Viburnum dentatum, spirea alba, Ilex verticillata, and Lonicera Morrowii, Herb layer is fern dominated in areas, Species include Athyrium felix femina, Thelypteris hexaboracensis, and Osmunda Claytoniana, Other species of herb stratum include Carex gracillima, Solidago rugosa, Rubus hispidus, and Carex cristatella.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Site lies of South shore of Yokum Brook prior to its confluence with the Housatonic River. Brook has expanded to form a moderate-sized shrub, herb, and open water wetland complex. Wetland likely very important for floodflow control and is closely linked to Housatonic River hydrologically. Scenic views of wetland are available on east side from railroad embankment. Beaver flooding is currently an issue.

Surrounding Land Use (physical structures and land use practices in the surrounding area):
To west and north, land has been traditionally used for agriculture. A railroad (active) passes to east. Wetland is frequented by amateur ornithologists due to presence of wading birds, waterfowl, and rusty blackbirds (local breeding colony).

Are there any rare species at this site? Please specify: Quercus macrocarpa can be be found near site to southeast on floodplain of Housatonic River.

Management / Ownership

Is this area part of a managed conservationa area: NO Managed Area Name:
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications, if applicable, discuss why the community may no longer exist here): Alterations to hydrology. Beaver are damming the culvert that passes under the railroad. This has caused a significant raise in water level and extensive flooding of adjacent swamp.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Railroad passes through east end of wetland complex; non-native plants are part of flora

Owner Information

Owner's Name: Unknown Telephone: ( )

Address:

Is Owner: Aware of EO? ____yes ____no ____unknown Protecting EO? ____yes ____no ____unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Area is part of a large wetland complex that includes Housatonic River

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: non-native species present; community bisected by railroad

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

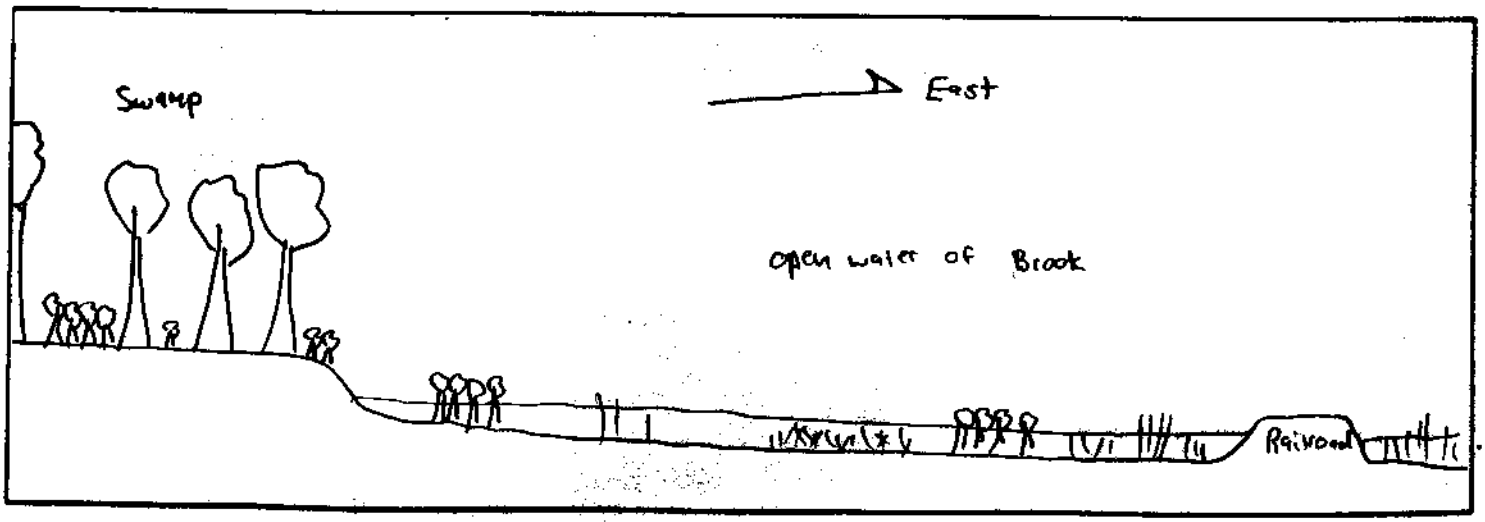
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership of property

EO Rank: (A summary of all factors listed above.) A - Excellent (B) - Good C - Marginal D - Poor

Comments:

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: W-4

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Lenox 17.State: MA 10.~~Lat~~ YTM N 4693095 11.~~Long~~ 0644260 WE

12. Directions: See Site Survey Summary

13.Sourcecode: FOOHAIOIMAUS 14.Survey date 27 Sep 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Chris Werner

B. Environmental Description

19.Transect / Observation point #

20.Image annotation #

21.Elevation: 293 m

22.Topographic position:
- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- ___High level
- ___Lowslope
- ___Midslope
- ___Toeslope
- X Low level
- ___Channel wall
- ___Channel bed
- ___Basin floor
- ___Other

23.Topographic sketch:

See included topographic Map

24.Slope degrees: 0-2

25.Slope aspect: North east

26.Parent material:

Unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:
- ___Extremely dry
- X Somewhat wet
- ___Very dry
- X Wet
- ___Dry
- ___Very wet
- ___Somewhat moist
- ___Moist

(zones)

- ___Permanently inundated
- X Periodically inundated

32.Stoniness:
- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

unknown

33.Soil drainage:
- ___Rapidly drained
- ___Well drained
- ___Moderately well drained
- X Somewhat poorly drained
- X Poorly drained
- ___Very poorly drained

34.Average texture:
- ___ sand
- ___sandy loam
- ___loam
- ___silt loam
- ___clay loam
- ___ clay
- ___ peat
- ___muck

other _____

35.Unvegetated surface:
- ___ % Bedrock
- ___ % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Sand (0.1-2 mm)
- 1 % Bare soil
- 84 % Litter, duff
- 5 % Wood (> 1 cm)
- 10 % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Red Maple swamps are relatively homogeneous, diverse mainly in shrub layer (as to density) and herbs (depending on elevation). Local region very diverse.

37.Plot representativeness:

Representative of forested swamps south of Yokum Brook.

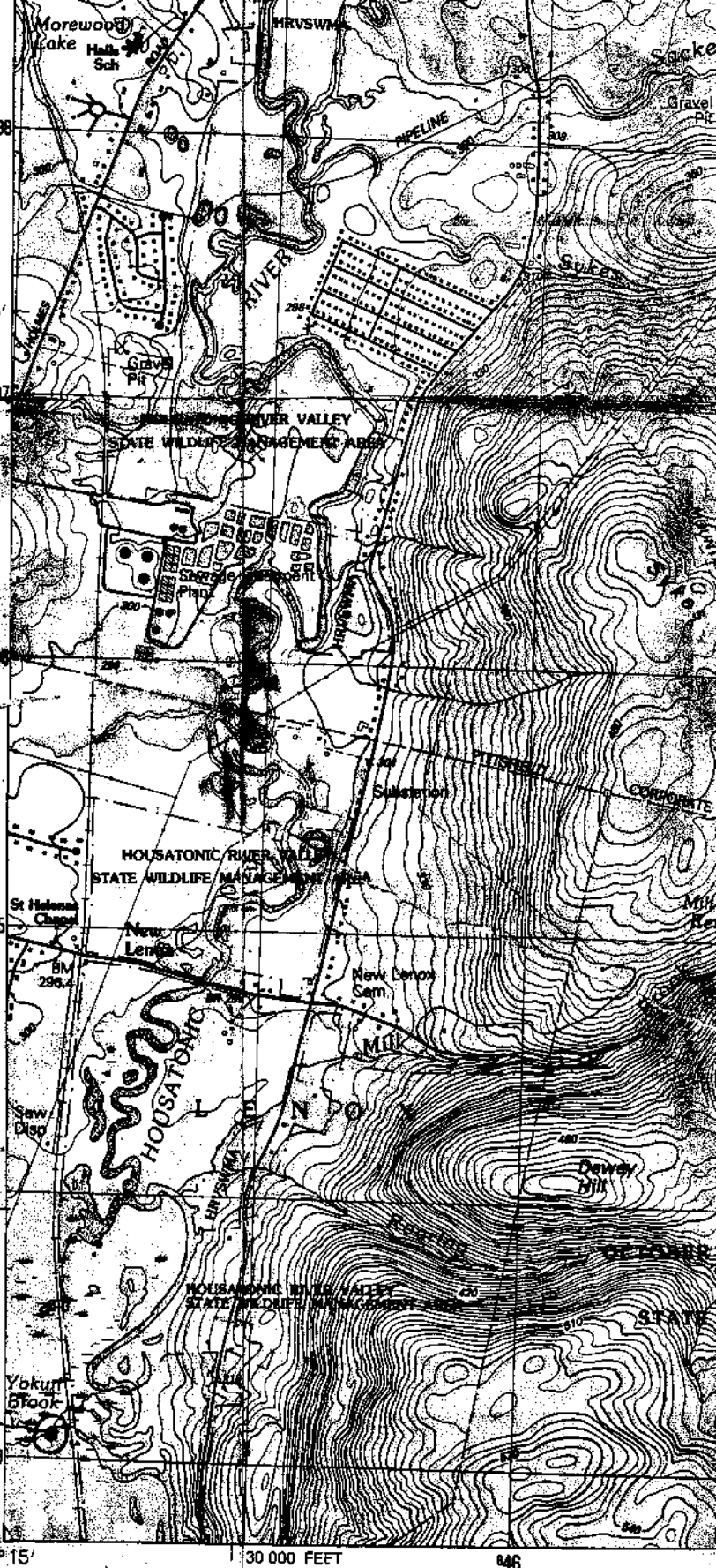
C. Vegetation 38.System: ___ Terrestrial X Palustrine ___ Estuarine 39.Plot number: 1 40.Plot dimensions: 20 X 10 M

41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:	
X Broad-leaf	X Deciduous	X Forest	___ Woodland
___ Semi-broad-leaf	___ Semi-deciduous	___ Sparse woodland	___ Scrub thicket
___ Semi-needle-leaf	___ Semi-Evergreen	___ Shrubland	___ Sparse shrubland
___ Needle-leaf	___ Evergreen	___ Dwarf shrubland	___ Dwarf scrub thicket
___ Graminoid	___ Perennial	___ Sparse dwarf shrubland	___ Non-vascular
___ Broad-leaf herbaceous	___ Annual	___ Herbaceous	
___ Pteridophyte		___ Sparsely vegetated	

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	16 m	50
T3 Tree sub-canopy	10 m	10
S1 Tall shrub	3 m	25
S2 Short shrub	1 M	5
H Herbaceous	1.5 m	50
N Non-vascular	0.01 m	1
E Epiphyte (vascular)	Absent	0
V Vine / liana	0.2 m	1

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D5-6i		Osmunda regalis	1.2	Berberis thunbergii	+.2
Acer rubrum 7,4,5,8,20,17,8,15,11,9,9,	4.1	Lysimachia terrestris	r.1	(Maianthemum canadense)	
Prunus serotina 11	r.1	Osmunda claytoniana	1.3	Mitchela repens	r.2
		Viburnum dentatum	r.1	Viola balanda	r.1
D4p		Persicaria sagittata	+.1	Panicum acuminatum	r.1
Viburnum dentatum	2+.3	Osmunda cinnamomea	+.1	Carex intumescens	r.1
Viburnum nudum	1.2	Thelypteris palustris	+.2	Pinus strobus	r.1
Lonicer morrowii	1.2	Fraxinus pensilvantica	r.1	C1-2b	
Spiraea alba,	1.2	Uvularia sessilifolia	r.1	Smilax herbacea	r.1
Amelanchier laevis	r.1	Symphotricum cordifolium	r.1		
Ilex verticillata	2-.3	Symphotricum lateriflorum	r.1		
Rhamnus cathartica	r.1	Thalictrum pubescens	r.1		
Viburnum opulus var. americanum	+.2	Lysimachia ciliata	r.1		
H1-3i		Ageratina altisima	+.1		
Rubus allaghenisis	+.2	Iris versicolor	+.1		
Galium asperellum	+.1	Carex grasilima	+.2		
Solidago rugosa	+.1	Rubus hispidus	1.2		
Athyrium felix-femina	2-.2	Carex crisitatela	+.2		
Onoclea sensibalis	1.1	Botrichium dissectum	r.1		
Viburnum nudum	+.1	Lobilia flata	r.1		
Thelictrus noveboracensis	2-.3	Aster divaricatus	+.1		



W-4

● INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1966

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: W-6

3. Quad name(s) Pittsfield East (1:25,000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

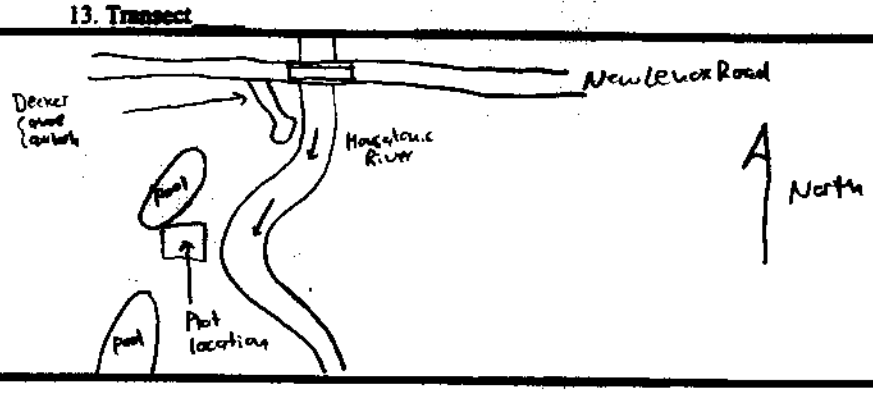
7. Town (LOCALJURIS): Lenox 8. Directions: From the New Lenox Road, park at the Decker Canoe launch on the west side of the Housatonic River and follow the river channel south to the south end of the second pool, approximately 150 meters.

9. Sourcecode: FOOHAIOIMAUS 10. Survey date 22 sep 2000 11. State: MA

12. Surveyors: Arthur Haines and Chris Werner

B. Topography **13. Transect**

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1___	Observation point 2___	Observation point 3___
16. Community name: Wet meadow 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form___ form 3___	Community name: _____ Additional data: Site form___ form 3___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Open community which was formally agricultural land. Area is best classified as a wet meadow (dominated by Phalaris arundinacea and Impatiens capensis (in plot) and Calamagrostis canadensis and Carex lacustris (out of plot)) with interspersed deep emergent marshes in the frequent pools (dominated by Lythrum salicaria, Lemna minor, and Persicaria punctata). Very few trees occur in the community and are largely restricted to the edge of the Channel. Dense shrub patches are scattered throughout.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 22 September 2000 Today's Date: 4 October 2000
Type of Communtiy: Wet Meadow Code:
Town: Lenox County: Berkshire Survey Site Name: W-6 wetland
Surveyor Name(s): Arthur Haines and Chris Weiner
Directions to site: See Site Survey Summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Relatively open community growing on floodplain adjacent to Housatonic River. Site dominated by graminoids (Phalaris arundinacea and Calamagrostis canadensis) with intermixed forbs (Impatiens capensis, Urtica dioica, and Eupatorium maculatum) and dense patches of shrubs (Cornus amomum with some Cornus sericea and Salix discolor). Trees (a broken corridor) are largely confined to edge of river channel (Salix nigra, Acer rubrum, Acer negundo, and Acer saccharinum).

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Area is a broad, level floodplain with numerous low areas that form vernal or permanent pools (depending on season) utilized by various herpetiles (especially Rana pipiens). Stream channel has vertically cut banks with significant bank erosion occuring.

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Land is primarily used for agriculture and is the reason why this open community exists (cleared land). A hunting club as well as paddlers and anglers also use this site or nearby land.

Are there any rare species at this site? Please specify: Eleocharis intermedia occurs on a silt accretion bar close to this site and American bitterns have been seen on multiple occasions in pools.

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley SWMA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): Community will eventually succeed to shrub swamp and eventually, forested floodplain. Mowing would be needed periodically to maintain community (if desired). Non-native species control is also required.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Land was formally cleared for agriculture; non-native species.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ____yes ____no ____unknown Protecting EO? ____yes ____no ____unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Site has been artificially created through clearing of canopy

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Exotic species common near/in vernal pools,

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Community will succeed without intervention

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

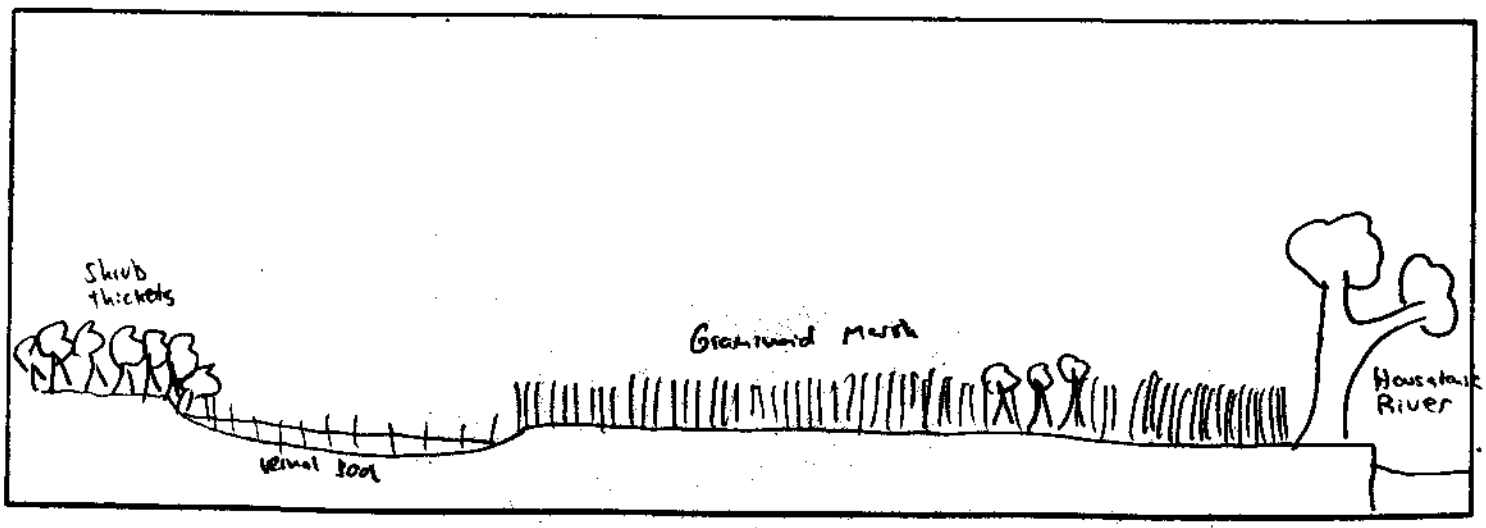
A - Excellent (B) Good C - Marginal D - Poor

Comments: Public ownership of property

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments: Community is utilized by many riparian species and it links to other communities to form a wildlife corridor along the Housatonic River.

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1996

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: W-6

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Lenox 17.State: MA 10.~~Lat~~ UTM N 4694650 11.~~Long~~ 0644515 ~~W~~ E

12. Directions: See Site Survey Summary

13.Sourcecode: FOOHAIG1MAV514.Survey date 22 Sep 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: _____

B. Environmental Description

19.Transect / Observation point #

20.Image annotation #

21.Elevation: 293 m

22.Topographic position:

___Interfluve ___Backslope
___High slope ___Step in slope
___High level ___Lowslope
___Midslope ___Toeslope
_X_Low level ___Channel wall
___Channel bed ___Basin floor
___Other

23.Topographic sketch:

see included topographic map

24.Slope degrees: 0-3°

25.Slope aspect: west (toward pool)

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

A plow layer undoubtedly exists.

31.Soil moisture regime:

___Extremely dry _X_Somewhat wet
___Very dry ___Wet
___Dry ___Very wet
___Somewhat moist
_X_Moist

___Permanently inundated
_X_Periodically inundated

32.Stoniness:

_____Stone free <0.1%
_____Moderately stony 0.1-1%
_____Stony 3-15%
_____Very stony 15-50%
_____Exceedingly stony 50-90%
_____Stone piles >90%

unknown

33.Soil drainage: (rough)

___Rapidly drained _X_Somewhat poorly drained
___Well drained ___drained
___Moderately well drained _X_Poorly drained
___Very poorly drained

34.Average texture:

___sand ___clay loam
___sandy loam ___clay
___loam ___peat
___silt loam ___muck

other _____

35.Unvegetated surface:

___% Bedrock
___% Large rocks (cobbles, boulders > 10 cm)
___% Small rocks (gravel, 0.2-10 cm)
___% Sand (0.1-2 mm)
___% Bare soil

95% Litter, duff
5% Wood (> 1 cm)
5% Water

___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Heterogeneous environment (vernal pools, open marsh/field, shrub patches, trees along stream channel). Erosion prominent at bank edge.

37.Plot representativeness:

Representative of open areas of graminoid marsh.

C. Vegetation 38 System: ___ Terrestrial X Palustrine ___ Estuarine 39. Plot number: 1 40. Plot dimensions: 20 x 20 M

41. Leaf type:	42. Leaf phenology:	43. Physiognomic type:	
___ Broad-leaf	___ Deciduous	___ Forest	___ Woodland
___ Semi-broad-leaf	___ Semi-deciduous	___ Sparse woodland	___ Scrub thicket
___ Semi-needle-leaf	___ Semi-Evergreen	___ Shrubland	___ Sparse shrubland
___ Needle-leaf	___ Evergreen	___ Dwarf shrubland	___ Dwarf scrub thicket
X Graminoid	X Perennial	___ Sparse dwarf shrubland	___ Non-vascular
___ Broad-leaf herbaceous	___ Annual	X Herbaceous	
___ Pteridophyte		___ Sparsely vegetated	

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	18 M	1
T3 Tree sub-canopy	Absent	0
S1 Tall shrub	Absent	0
S2 Short shrub	Absent	0
H Herbaceous	2 M	95
N Non-vascular	Absent	0
E Epiphyte (vascular)	Absent	0
V Vine / liana	2 M	2

45. Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

~~D6~~		Epilobium ciliatum ssp. glandulosum (Elymus virginicus var. virginicus)			
Salix nigra 7 stems	r. 2	(Galium mollugo, Geum laciniatum, Festuca			
(Acer negundo)		rubra, Poa palustris, Verbena hastata)			
(Acer saccharinum)		C1-3r			
(Acer rubrum)		Calystegia sepium	1.2		
		Echinocystis lobata	r.1		
G1-3c		Solanum dulcamara	r.1		
Phalaris arundinacea	4.5	(Fallopia scandens)			
Impatiens capensis	2-.2				
Persicaria sagittata	1. 2				
Lythrum salicaria	2-.3				
Urtica dioica	+.1	D4 (absent from plot)			
Solidago gigantea	+. 1	(Cornus amomum)			
Symphyotrichum lanceolatum	+.1	(Cornus sericea)			
Asclepias syriaca	+.1	(Salix discolor)			
(Solidago altissima)		(Rubus idaeus)			
(Brassica nigra Symphyotrichum novi-belgii)					
(Eupatorium maculatum					
(Asclepias incarnata)					
(Calamagrostis canadensis)					
(Carex lacustris)					

W-6

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1968

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: W-8

3. Quad name(s) Pittsfield East (1:25,000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

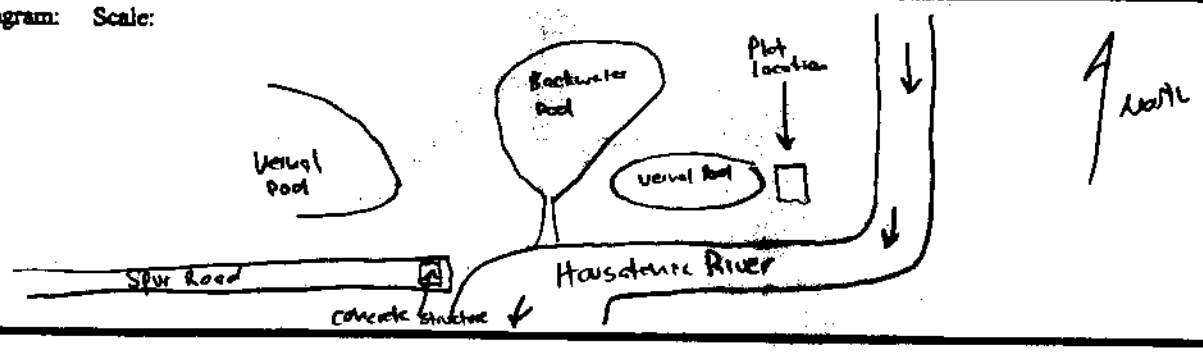
7. Town (LOCALJURIS): Pittsfield 8. Directions: From Holmes Road, Pass through yellow gate on southwest side of the river and follow single lane road south for ca. One km to a left (east) turn onto a dead end spur road that terminates at a concrete structure. Travel east on the north side of the river channel to a rich, floodplain forest.

9. Sourcecode: FOOHAIQIMAUS 10. Survey date 21 Sep 2009 11. State: MA

12. Surveyors: Arthur Haines and Chris Werner

B. Topography 13. Transect

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: Transitional floodplain forest	Community name:	Community name:
17. Additional data: Site form X form 3 X	Additional data: Site form ___ form 3 ___	Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers)	General description	General description:
Floodplain forest dominated by Acer saccharinum with some Ulmus americana. Shrub layer absent over large areas. Herb layer dominated by robust plants including Lapatea canadensis and Matteuccia struthiopteris. Smaller herbs such as Lysimachia nummularia and Cardamine pratensis also common. Many non-native plants in community.		

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 21 September 2000 Today's Date: 4 October 2000
Type of Communtiy: Transitional Floodplain forest Code: W-8
Town: Pittsfield County: Berkshire Survey Site Name: W-8
Surveyor Name(s): Arthur Haines and Chris Wemer
Directions to site: See site survey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Floodplain forest dominated by Acer saccharinum and some Ulmus americana. Shrubs sparse, but often in dense patches near vernal pools. Herb layer dominated by robust herbs such as Lycopus canadensis and Matteuccia canadensis. Alliaria petiolata and Deschampsia cespitosa ("paviflora form") are also community dominants. Plants like Cardamine pratensis and Lysimachia nummularia often dominant in low, floodwater channels.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Level floodplain of Housatonic River, low depressions and vernal pools, including some relatively large and permanent pools are found in area. Several small channels, filled during high water events, also meander through community.

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Agricultural fields and residential lots bound landward side of community. A maintained single-lane road with spur trails exist for Sewer Plant right of ways (Pittsfield waste water Treatment Plant).

Are there any rare species at this site? Please specify: Eleocharis intermedia is located on a muddy accretion bar on bank of River very near the plot.

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley SWMA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications, if applicable, discuss why the community may no longer exist here): Continued colonization of community by non-native plants. Control of these species will be important for maintaing character of understory. Lythrum salicaria and Cardamine pratensis (in wet areas), Alliaria petiolata, Deschampsia cespitosa (introduced form), and some non-native shrubs found in community

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Single-lane right-of ways maintained through community. Portions of community also maintained as fields other portions in various stages of succession. Non-native plants abundant.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Area of community relatively large for surrounding area

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Non-native species a dominant part of understory

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Areal coverage of non-native species is increasing (over 3 years of visitation to this site)

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

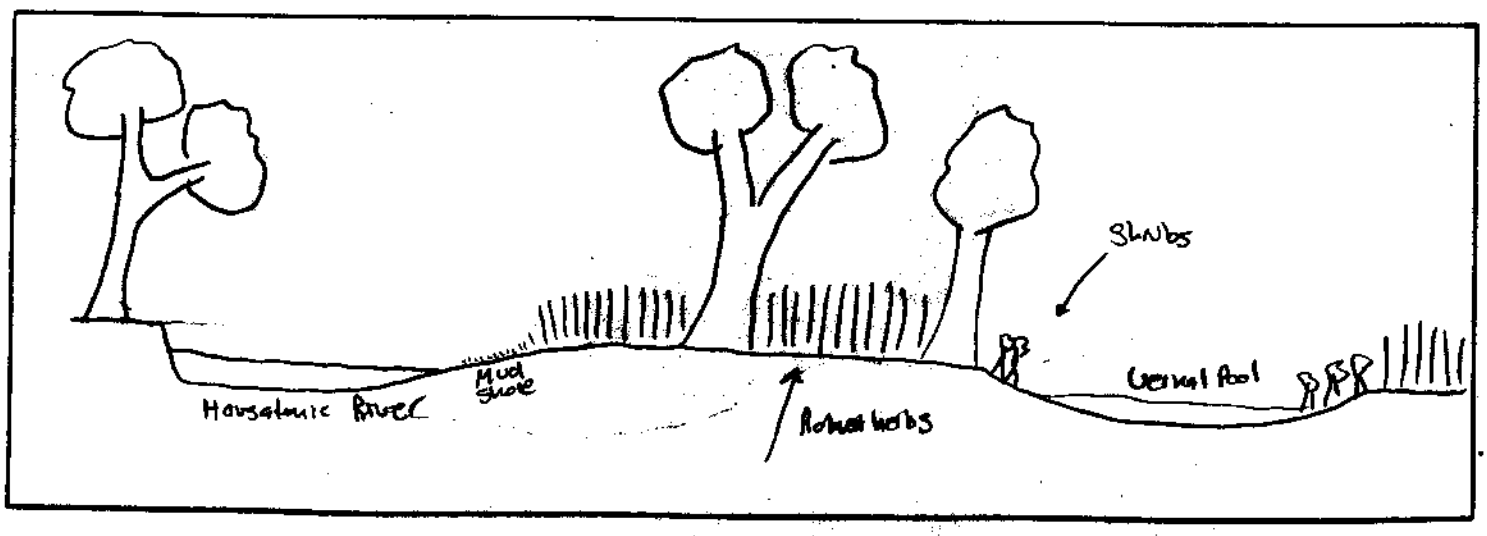
A - Excellent (B) Good C - Marginal D - Poor

Comments: Public ownership of property

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments:

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: W-8

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): _____ 8.County code(s): _____

9.Town (LOCALJURIS): Pittsfield 17.State: MA 10.~~Lat~~ UTM N 4697680 11.~~Long~~ 0645050 W E

12. Directions: _____

13.Sourcecode: FOOHATOIMAUS 14.Survey date 21 sep 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Chris Wernet

B. Environmental Description

19.Transect / Observation point #

20.Image annotation #

21.Elevation: 294 m

22.Topographic position:

___Interfluve ___Backslope
___High slope ___Step in slope
___High level ___Lowslope
___Midslope ___Toeslope
X Low level ___Channel wall
___Channel bed ___Basin floor
___Other

23.Topographic sketch:

See included topographic map

24.Slope degrees: 0-2

25.Slope aspect: West (toward vernal pool)

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:

___Extremely dry ___Somewhat wet
___Very dry ___Wet
___Dry ___Very wet
___Somewhat moist
X Moist

___Permanently inundated
X Periodically inundated

32.Stoniness:

_____Stone free <0.1%
_____Moderately stony 0.1-1%
_____Stony 3-15%
_____Very stony 15-50%
_____Exceedingly stony 50-90%
_____Stone piles >90%

unknown

33.Soil drainage:

___Rapidly drained
___Well drained
X Moderately well drained
X Somewhat poorly drained
___Poorly drained
___Very poorly drained

34.Average texture:

___sand ___clay loam
___sandy loam ___clay
___loam ___peat
___silt loam ___muck
other _____

35.Unvegetated surface:

___% Bedrock
___% Large rocks (cobbles, boulders > 10 cm)
___% Small rocks (gravel, 0.2-10 cm)
___% Sand (0.1-2 mm)
60 % Bare soil
___% Litter, duff
35 % Wood (> 1 cm)
5 % Water
___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Relatively heterogeneous. Canopy is closed in some areas, open in others with meadows between trees of broadleaved forbs and ferns. Vernal pools and associated flora also add diversity to floodplain. Much of vegetation silt-covered after high-water events.

37.Plot representativeness:

Representative of forested areas.

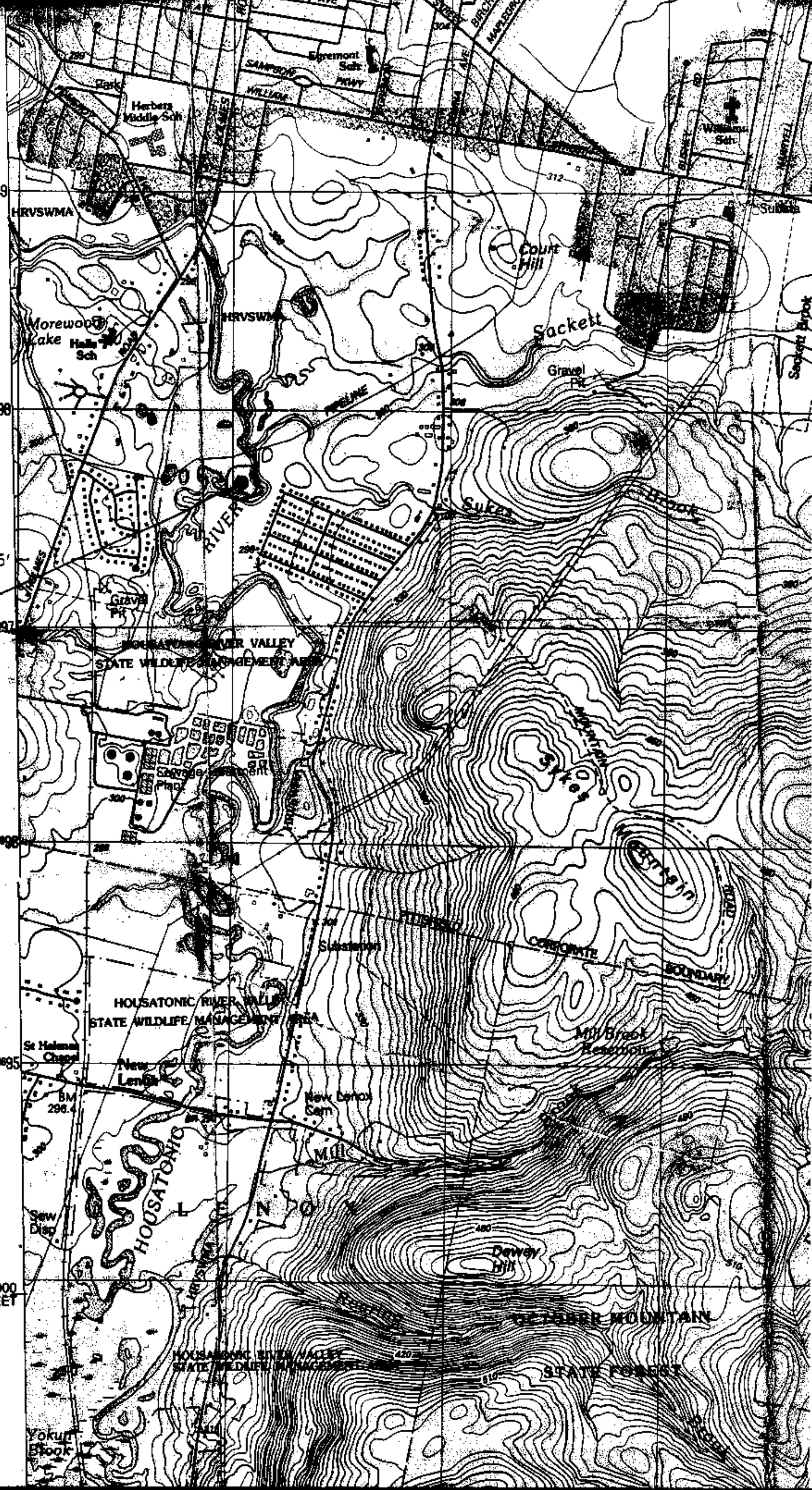
C. Vegetation 38 System: X Terrestrial ___ Palustrine ___ Estuarine 39. Plot number: 1 40. Plot dimensions: 20 X 20 m

41. Leaf type:	42. Leaf phenology:	43. Physiognomic type:	
X Broad-leaf	X Deciduous	X Forest	___ Woodland
___ Semi-broad-leaf	___ Semi-deciduous	___ Sparse woodland	___ Scrub thicket
___ Semi-needle-leaf	___ Semi-Evergreen	___ Shrubland	___ Sparse shrubland
___ Needle-leaf	___ Evergreen	___ Dwarf shrubland	___ Dwarf scrub thicket
___ Graminoid	___ Perennial	___ Sparse dwarf shrubland	___ Non-vascular
___ Broad-leaf herbaceous	___ Annual	___ Herbaceous	
___ Pteridophyte		___ Sparsely vegetated	

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	25 m	50 (up to 75 in nearby areas)
T3 Tree sub-canopy	12 m	10
S1 Tall shrub	5 m	1
S2 Short shrub	2 m	5
H Herbaceous	1.5 m	70
N Non-vascular	0.01 m	1
E Epiphyte (vascular)	Absent	0
V Vine / liana	5 m	1

45. Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

~~D6-7p~~ 32, 11, 17, 18, 23				C1-4b	
Acer saccarinum 11, 25, 32, 31, 29,	3.3	Symphiotrichum lateriflorum	+.1	Vitis riparia	+.1
Ulmus americana 7, 10, 17	2+.1	Cirsium latifolia	+.2	Solanium dolcamera	+.1
		Cardamide pretensis	2-.3	Parthenocissus vitacia	r.1
		Allearia petiolata	2-.3	(Echinocytis lobata)	
D5r		Myosotis scorpioides	1.3	(Sicyous angulatus)	
Acer negundo 8	r.1	Ellemus virginicus var. virginicus	+.1		
		Pilea pumela	+.1		
		Mathuchia struth.	2-3		
D4b		Persicaria punctata	r.1		
Acer negundo	r.1	Oxalis corniculata	r.1		
Cornus sericea	+.2	Hesperus matronalis	1.1		
(Crataegus punctata)		Rubeckia laciniata	+.1		
		(Ranunculus hispidus)			
H1-2i		(Onoclea sensibilis)			
Leppardia canadensis	3.4	(Lythrum salicaria)			
Deschampsia cespitosa	3.4	(Boehmeria cylindrica)			
Geum canadense	1.2	Solidago gigantica			
Geum laciniatum	+.1				
Berberis thunbergii	r.2				
Impatiens pantensis	2-3				



Egremont Sch
Herberg Middle Sch
HRVSWMA
Morewood Lake
Court Hill
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes
Brook
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Substation
CORPORATE
BOUNDARY
Mill Brook Reservoir
St Helena Chapel
New Lenox
BM 296.4
New Lenox Cem
HOUSATONIC
Sew Disp
Dewey Hill
OCTOBER MOUNTAIN
STATE FOREST
Yokun Brook
510 000 FEET
4899
4898
4897
4896
4895
25′

W-8

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: Washington Mountain Lake

3. Quad name(s) East Lee 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

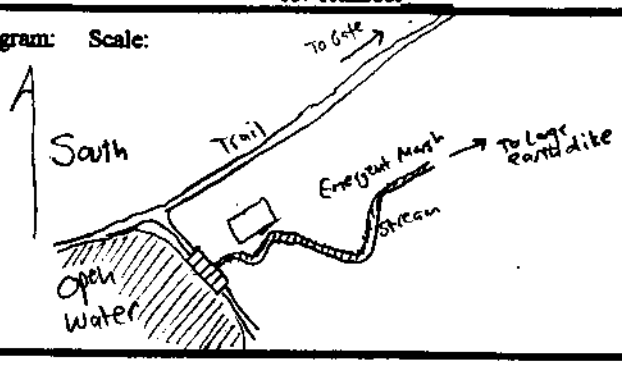
7. Town (LOCALJURIS): Washington 8. Directions: from the Woodland Road (north-south gravel road along west side of Housatonic River), turn east onto October Mountain Road and drive east (becomes Felton Pond Road, then County Road). Turn left (SW) at four corners with field ahead on right. Drive downhill and continue straight through open gate across former dike. Turn right at fork in road and drive to end at closed gate, follow trail along South edge of pond shore to marsh west of boardwalk bridge over former lake.

9. Sourcecode: FOOHAI01MAUS 10. Survey date 7 Sep 2000 11. State: MA

12. Surveyors: Arthur Haines, Eugenie Mohr

B. Topography **13. Transect**

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1___	Observation point 2___	Observation point 3___
16. Community name: Deep Emergent Marsh 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form___ form 3___	Community name: _____ Additional data: Site form___ form 3___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Area is a deep emergent marsh in an old lake basin that has a significant, though less dominant, shrub component. Species include Scirpus cyperinus, Glyceria canadensis, Solidago rugosa, Dulichium arundinaceum, Spiraea alba var. latifolia, Spiraea tomentosa, Rubus idaeus, and Rubus hispidus.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 7 September 2000 Today's Date: 4 October 2000
Type of Communtiy: Deep emergent marsh transitional to shrub swamp Code:
Town: Washington County: Berkshire Survey Site Name: Washington Mountain Lake
Surveyor Name(s):
Directions to site: see Site Survey Summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Large expanse of emergent graminoid marsh and shrub swamp (up-slope) in old basin of impounded lake. Common herbaceous species include Scirpus cyperinus, Glyceria canadensis, Solidago rugosa, and Dulicheum arundinaceum. Shrub species become more common upslope and include Spiraea alba, Spiraea tomentosa, Rubus idaeus, and Rubus hispidus. Plot lies on ecotone between marsh and swamp communities.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Large basin of formally impounded lake. Basin sits near high point of land within October Mountain State Forest. Presently, a small beaver impoundment exists near the former lake center and a narrow stream drains through basin to a large earth dike. A boardwalk trail passes through SW end of basin.

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Forestry (based on Picea abies tree plantations) and Agriculture (based on fields) were past uses of land. Now, area is used for recreation (ATVs, hunting, fishing, hiking).

Are there any rare species at this site? Please specify:

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: October Mountain State forest
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): This community would be threatened by inundation due to increase in water level.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Community is the result of drop in water level when Reservoir was released.

Owner Information

Owner's Name: _____ Telephone: (__)_____

Address: _____

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments: _____

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Community the result of past inundation of landscape.

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent (B) Good C - Marginal D - Poor

Comments: Relatively free of exotics or disturbances

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Betula papulifolia colonizing upslope of community; succession may claim portions of community.

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

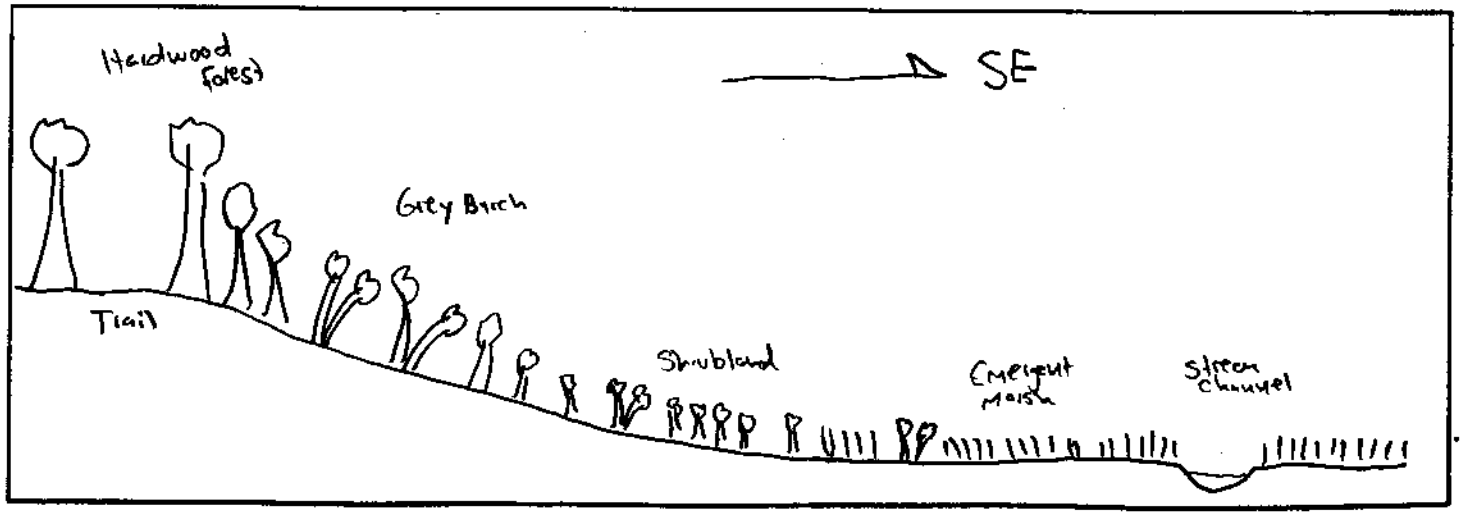
A - Excellent (B) Good C - Marginal D - Poor

Comments: Public ownership of property — could be threatened in water supply needed again in future.

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments: _____

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: Washington Mountain Lake

5.Quad name(s): East Lee 6.Quad code(s): _____ 7.County name(s): _____ 8.County code(s): _____

9.Town (LOCALJURIS): Washington 17.State: MA 10.Lat: UTM N 4690855 11.~~Long~~ 0648390 W E

12. Directions: See site survey summary

13.Sourcecode: FOOHAIOLMAUS 14.Survey date 7 Sep 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Eugenie Moore

B. Environmental Description

19.Transect / Observation point #

20.Image annotation #

21.Elevation: 548M

22.Topographic position:

- ___Interfluve
- ___High slope
- ___High level
- ___Midslope
- ___Low level
- ___Channel bed
- ___Other
- ___Backslope
- ___Step in slope
- ___Lowslope
- ___Toeslope
- ___Channel wall
- X Basin floor

23.Topographic sketch:

see included topographic map

24.Slope degrees: 5-6°

25.Slope aspect: SE

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

Soil possesses a shallow organic layer which overlays a stony mineral soil.

31.Soil moisture regime:

- ___Extremely dry
- ___Very dry
- ___Dry
- ___Somewhat moist
- ___Moist
- X Somewhat wet
- X Wet
- X Very wet

(range)

- ___Permanently inundated
- ___Periodically inundated

32.Stoniness:

- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

unknown

33.Soil drainage:

- ___Rapidly drained
- ___Well drained
- ___Moderately well drained
- ___Somewhat poorly drained
- X Poorly drained
- X Very poorly drained

34.Average texture:

- ___ sand
- ___sandy loam
- ___loam
- ___silt loam
- ___clay loam
- ___clay
- ___peat
- ___muck

other _____

35.Unvegetated surface:

- ___ % Bedrock
- ___ % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Sand (0.1-2 mm)
- ___ % Bare soil
- 50 % Litter, duff
- ___ % Wood (> 1 cm)
- 50 % Water
- ___ % Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Relatively homogeneous at a given elevation or contour.

37.Plot representativeness:

Representative of that elevation above stream channel.

C. Vegetation 38.System: ___ Terrestrial X Palustrine ___ Estuarine 39.Plot number: 1 40.Plot dimensions: 20 x 20 m

41.Leaf type:
- ___ Broad-leaf
- ___ Semi-broad-leaf
- ___ Semi-needle-leaf
- ___ Needle-leaf
- X Graminoid
- ___ Broad-leaf herbaceous
- ___ Pteridophyte

42.Leaf phenology:
- ___ Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- X Perennial
- ___ Annual

43.Physiognomic type:
- ___ Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- X Herbaceous
- ___ Sparsely vegetated
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular

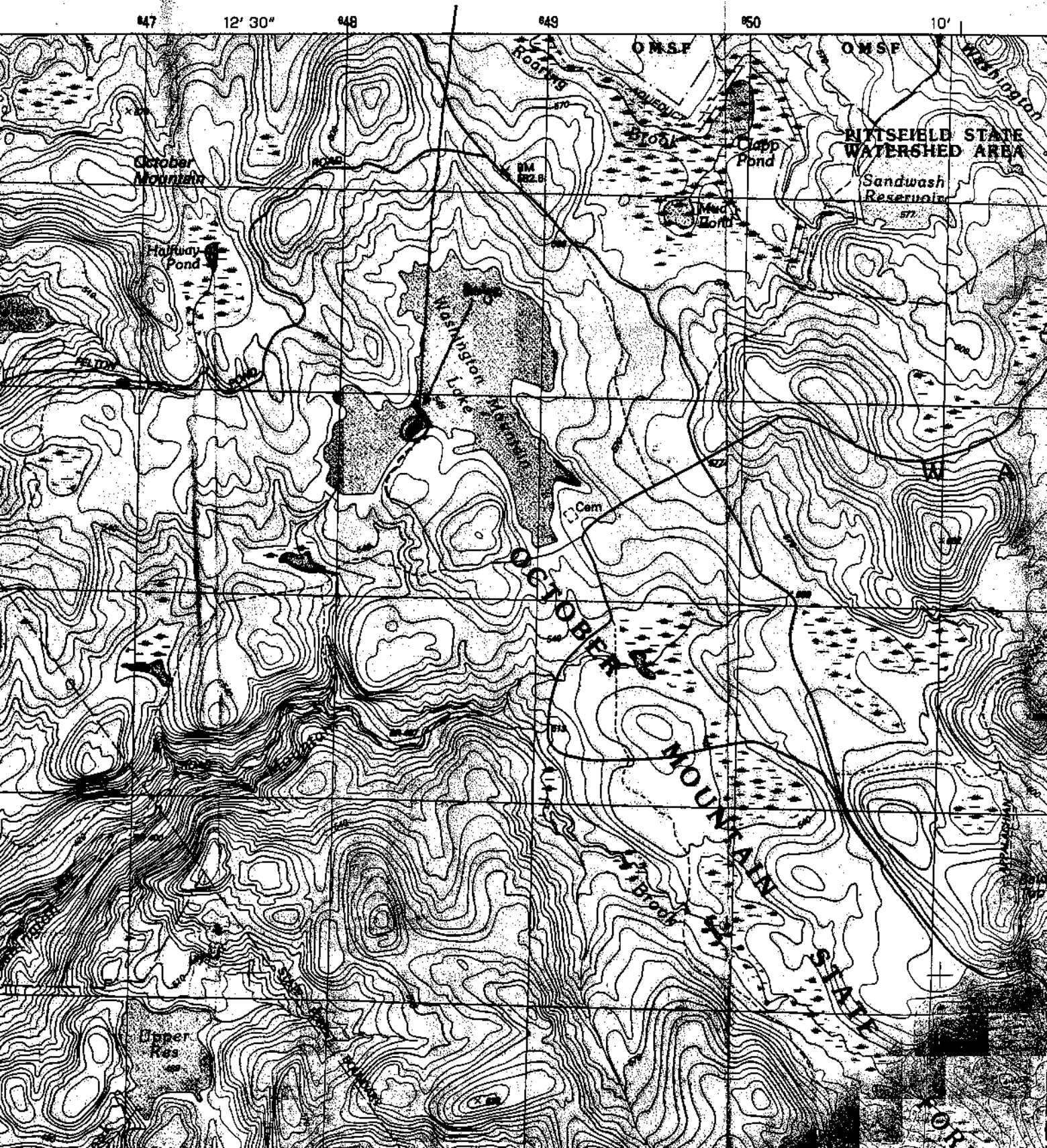
44.

	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	Absent	0
T3 Tree sub- canopy	Absent	0
S1 Tall shrub	2.5 m	25
S2 Short shrub	0.25m	5
H Herbaceous	1 m	70
N Non-vascular	0.05m	15 — mostly Sphagnum
E Epiphyte (Vascular)	absent	0
V Vine / liana	absent	0

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D4r		B2r			
Salix discolor	+.3	Rubus hispidus	2.4		
		Lysimachia terrestris	+.1		
G2i		Thelypteris palustris	+.2		
Solidago rugosa	2.3				
Spiraea alba var latifolia	2.2				
Spiraea tomentosa	1.2				
Rubus idaeus	1.4				
Rubus elagantulus	+.2				
Glyceria canadensis	2.2				
Scirpus cyperinus	3.3				
Dulichium arundinaceum	2.2	G2i (continued)			
Salix Sericea	+.3	Carex crinita	+.1		
Lythrum salicaria	r.2	Iris versicolor	r.1		
Euthamia graminifolia	r.1	(Myrica gale)			
Epilobium leptophylum	r.1				
Drosera sensibilis	r.1				
Scheonoplectus tabernae-Montani	+.1				
Carex lurida	+.2				
Galium tinctorium	+.2				
Juncus brevicaudatus	r.1				

Washington Mountain Lake Community Plot Location



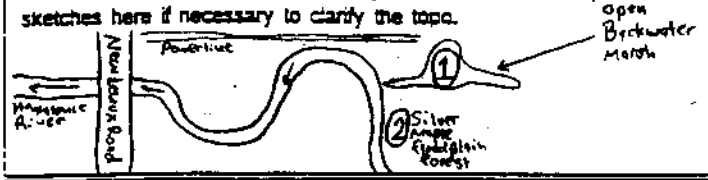
NATURAL COMMUNITY SURVEY — PART I: RECONNAISSANCE

Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: Housatonic River [B3]			Date: 3 September 1998
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: Arthur Haines	Town: Lenox County: Berkshire, MA (Biophysical Region:	USGS 7.5 Quad:	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.



Directions (if not obvious from topo or Maine Atlas):
From Bridge on New Lenox Road, head upstream on west side to prominent bend in river (to west facing upstream) below a large EMR Tower. Backwater area on NW bank of River, into floodplain forest.

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: Robust Emergent Marsh	Community type: floodplain forest — silver maple - false nettle - sensitive fern association	Community type:
Soil: wet silt	Soil: Alluvial	Soil:
Slope, aspect, topography: flat to gently sloped toward channel center	Slope, aspect, topography: Flat, or sloped at drainages, relatively flat ground	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 20 Acer saccharinum Salix nigra	Tree layer: Total cover (%): 75 Acer Saccharinum Salix nigra (scarce)	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%): NA	Sapling / tall shrub layer: Total cover (%) 5 Crataegus punctata	Sapling / tall shrub layer: Total cover (%):
Shrub (1-2 m) layer: Total cover (%) 10 Cornus amomum Cephalanthus occidentalis	Shrub (1-2 m) layer: Total cover (%) 10 Cornus amomum	Shrub (1-2 m) layer: Total cover (%):
Herb layer: Total cover (%) 75 Persicaria hydropiperoides Eleocharis acicularis Sparganium americanum Dulichium arundinaceum	Herb layer: Total cover (%) 75 Onoclea sensibilis Boehmeria cylindrica Laportea canadensis Leersia virginica	Herb layer: Total cover (%):
Bryoid layer: Total cover (%): NA	Bryoid layer: Total cover (%): relatively absent	Bryoid layer: Total cover (%):
Other diagnostic or notable species: Sagittaria cuneata	Other diagnostic or notable species: Matteuccia struthiopteris forming homogeneous stands in areas in the floodplain.	Other diagnostic or notable species:
Condition / evidence of human use: none	Condition / evidence of human use: none	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? yes tree cores? photos? yes Seasonally flooded areas that are dominated by herbs growing in wet silt/mud after water level drops in late summer.	Additional data collected / COMMENTS plots (size)? yes tree cores? photos? yes	Additional data collected / COMMENTS plots (size)? tree cores? photos?

NATURAL COMMUNITY SURVEY PART II: DESCRIPTION

→ complete separate description forms for each notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): Housatonic River [B3]			Obs. Pt. # 1
Community type: Robust Emergent Marsh			Adjacent communities: - floodplain forest - open water (flooded) - circumneutral shrub swamp
Quad: (1:25,000) Pittsfield East	(Lat:) Northing 4695300	Size (acres) of community EO (not site):	BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	(Long:) Easting 0644750		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
forest	evergreen woody	broad-leaf woody
woodland	deciduous woody	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FORESTS

Tree canopy height	Core data: ring counts (– 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):	
60 feet (neighboring trees)	N/A	A few large branches have fallen into open areas.	
supercanopy trees? no			

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
no	no	no	no	no

comment: Disturbance is only through seasonal flooding during spring high water.

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

Scirpus cyperinus
Nuphar variegatum
Eleocharis obtusa
Potamogeton amplifolius
Peltandra virginica
Boehmeria cylindrica
Cornus amomum
Cephalanthus occidentalis
Pontederia cordata
Sium suave

Species list sketchy or basically complete? Comment:

relatively complete

VEGETATION PLOT DATA

Area: Housatonic River [B3] | Obs. pt. #:

Community type: Backwater Channel Emergent Marsh | (Regional alliance/community:)

LAYER	plot # 1A	1B	1C	1D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: inches QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	Salix nigra 16	NA	NA	Acer saccharinum 6, 8
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	NA	NA	NA	NA
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	NA	NA	NA	NA
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	Sagittaria latifolia 37 Dulichium arundi. 37 Alisma triviale 3 ② Persicaria hydropiperoides 37 Sagittaria latifolia 3 Alisma triviale 3 Sparganium americanum 9	① Sparganium amer. 19 Persicaria hydropiperoides 3 Alisma triviale 1 Eleocharis ocicularis 19 ② Boutelouea curtipendula 9 Sparganium americanum 9 Eleocharis ocicularis 37 Leersia virginica 3 Sagittaria cuneata 9 Peltandra sagittifolia 1	① Lythrum salicaria 19 Sparganium americanum 3 Persicaria hydropiperoides 37 Sagittaria latifolia 9 Dulichium arundi. 1 ② Scirpus cyperinus 19 Eleocharis ocicularis 19 Dulichium arundi. 37 Sagittaria cuneata 3 Ludwigia palustris 3	① Lythrum salicaria 3 Quadrula sens. 3 Persicaria hydropiperoides 37 Thelypteris palus. 3 Eleocharis ocicul. 9 ② Leersia virginica 9 Sagittaria cuneata 37 Lemna minor 1 Persicaria hydropiperoides 3 Eleocharis ocicularis 19
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): __"moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	NA	NA	NA	NA
REMARKS	Trees confined to edge of community. (other edge, if present, is open water)		Cornus amomum forming a shrub border at edge of plot.	Trees at edge of plot and shading the narrow channel

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials:

TOPOGRAPHY / SOILS

Area: Housatonic River [B3] | Obs. pt. #: 1

Community type: Robust Emergent Marsh | (Regional alliance/community:)

Elevation:	Aspect:	Slope:	Microtopography:
294 meters	Flat magnetic or true?	0-5° measured or estimated?	relatively flat

pH
(note kit or meter type)

Topographic position:
P low plain, level
T toe of slope
LS lower slope
MS middle slope
TB hillside terrace/bench
US upper slope
E cliff/ledge
C crest
M high plateau
N narrow valley
D drainage channel

Habitat patchiness (describe zones or patches if present):
Patchy - floodplain forest, shrub swamp, Emergent Marsh, and open water all present in close proximity.

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth: _____ cm OR > 1 m _____

vonPost decomposition: _____

ALL SOILS:

DEPTH TO WATER TABLE: _____

DEPTH to OBSTRUCTION: _____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:
bedrock
talus slope
glacial till
moraine
esker/outwash
glacial delta
lacustrine/fluvial
marine
aeolian
other:

Surface:
____% Bedrock
____% Boulders (>50 cm)
____% Cobbles/Gravel
10 % Bare mineral soil
____% Organic soil
1 % Litter (note type) Broadleaf
15 % Water
74 % Total vegetation
____ Other:

Average Texture:
gravel
sand
loamy sand / sandy loam
loam
silt loam
clay loams
sandy clay / clay
peat
muck

Bedrock type:
Igneous
granite
dioritic
gabbroic
other igneous
_____
Metamorphic
slate/phyllite
schist/gneiss
other metamorphic
_____
Sedimentary
limestone
other sedimentary
_____
details?

Soil stoniness:
v. little (< 1%)
moderate (2-25%)
very (25-100%)

Drainage & moisture regime (see MAPPSS key):
very poorly drained
poorly drained
somewhat poorly drained
moderately well drained
well drained
somewhat excessively drained
excessively drained

Hydrologic regime:
upland
nontidal wetland:
permanently flooded
semipermanently flooded
seasonally flooded
saturated
tidal - irregularly
tidal - regularly
saltwater
brackish
freshwater
unknown

ATURAL COMMUNITY SURVEY — PART II: DESCRIPTION

> complete separate description forms for each notable natural community on reconnaissance page.

)ENTIFIERS / LOCATION

Area (specific/general): Housatonic River [B3] | Obs. Pt. # 2

Community type: Silver Maple Floodplain Forest

Adjacent communities: Robust Emergent Marsh, Low Gradient Stream

Quad: Pittsfield East 1:25,000

(Quadcode:)

~~(Lat.:)~~ Northing: 4695290

~~(Long.:)~~ Easting: 064480

Size (acres) of community EO (not site):

BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.

LASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

DDITIONAL DATA FOR FORESTS

Tree canopy height: 80 feet

supercanopy trees? no

Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)

1. Acer saccharinum 26 inch dbh, 67 feet high, 45 ybp
2. Acer saccharinum 15 inch dbh, 34 ybp
3. Acer saccharinum 29 inch dbh, 81 feet tall, 75 years before present

Deadwood (describe distribution, abundance, degree of decay):

Very little deadwood, what is present is mostly large, fallen branches of Silver Maple.

ISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
no	no	no	On opposite side of River and downstream of Plot river is bordered by open fields (old farms in area)	no

comment:

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

Circaea lutetiana
Lysimachia nummularia
Geum aleppicum
Rudbeckia laciniata
Phalaris arundinacea
Argentina silvissima
Persicaria virginiana
Impatiens capensis
Echinocystis lobata
Cardamine pratensis
Urtica dioica
Matteuccia struthiopteris
Oxalis stricta
Cinna latifolia
Galium
Bidens frondosa
Persicaria pensylvanica

Species list sketchy or basically complete?
Comment:

VEGETATION PLOT DATA

Area: Housatonic River [LB3] | Obs. pt. #: 2

Community type: Silver maple Floodplain forest | (Regional alliance/community:)

LAYER	plot # 2A	2B	2C	2D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: inches QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	Acer saccharinum 9, 7, 12, 12, 5, 14, 9, 12, 8 (A single, bimodal clump) Crataegus punctata 6, 6	Acer saccharinum 14, 6, 9, 8, 15, 12, 39 (Bimodal/tree) Single tree - 15	Acer saccharinum 10, 10, 6, 5, 24, 8, 17	Acer saccharinum 27, 18, 10 Salix nigra 12, 7 Standing dead 7
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²		Crataegus punctata 3	NA	NA
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	NA	Cornus amomum 9	NA	Cornus amomum 9 Salix nigra 3
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① Pilea pumila 3 ② Pilea pumila 1	① Leersia virginica 3 Pilea pumila 3 Toxicodendron radicans 1 Lysimachia nummularia 1 Boehmeria cylindrica 1 ② Boehmeria c. 9 Laportea can. 3 Leersia virgin. 37 Lysimachia nummularia 9	① Onoclea sensibilis 9 Leersia virginica 9 Matteuccia Struth. 9 Carex lurida prat. 3 ② Laportea cana 9 Boehmeria cyl. 9 Pilea pumila 19 Matteuccia Struth. 3 Geum canadense 3 Lysimachia nummularia 3 Cicuta latifolia 1	① Boehmeria cyl. 9 Onoclea sens. 9 Lycopus amer. 3 ② Boehmeria cyl. 9 Lythrum Salicaria 37 Cicuta latifolia 1 Pilea pumila 3
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): X "moss" "liverwort" "lichen" only; __ identified to major group; __ identified to genus; __ identified to species.	① NA ② Moss 1	NA	NA	
REMARKS	This plot with a dried up vernal pool/backwater area and relatively devoid of herbs.	Most trees in plots are multistemmed clumps, with wide spaces (10-20 meters) between clumps.		

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials:

TOPOGRAPHY / SOILS

Area: Housatonic River [B3] | Obs. pt. #: 2

Community type: Silver Maple floodplain forest | (Regional alliance/community:)

Elevation:	Aspect: magnetic or true?	Slope: measured or estimated?	Microtopography:
294 meters	flat	0-10°	Flat, or sloped toward drainage channels.

pH (note kit or meter type)

Topographic position:
- P: low plain, level
- T: toe of slope
- LS: lower slope
- MS: middle slope
- TB: hillside terrace/bench
- US: upper slope
- E: cliff/ledge
- C: crest
- M: high plateau
- N: narrow valley
- D: drainage channel

Habitat patchiness (describe zones or patches if present): Relatively uniform - canopy with some breaks, understory largely herb dominated but occasionally replaced by shrub thickets.

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth: _____ cm OR > 1 m _____

vonPost decomposition: _____

ALL SOILS:

DEPTH TO WATER TABLE: _____

DEPTH to OBSTRUCTION: _____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:
- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- (lacustrine/fluvial)
- marine
- aeolian
- other:

Surface:
- ____% Bedrock
- ____% Boulders (>50 cm)
- ____% Cobbles/Gravel
- 10 % Bare mineral soil
- ____% Organic soil
- 10 % Litter (note type) Broadleaf
- ____% Water
- 80 % Total vegetation
- ____ Other:

Average Texture:
- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:
- Igneous
  - granite
  - dioritic
  - gabbroic
  - other igneous _____
- Metamorphic
  - slate/phyllite
  - schist/gneiss
  - other metamorphic _____
- Sedimentary
  - limestone
  - other sedimentary _____

details?

Soil stoniness:
- v. little (< 1%)
- moderate (2-25%)
- very (25-100%)

Drainage & moisture regime (see MAPPSS key):
- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:
- upland
- nontidal wetland:
  - permanently flooded
  - semipermly flooded
  - (seasonally flooded)
  - saturated
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown

NATURAL COMMUNITY SURVEY — PART I: RECONNAISSANCE

Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: Housatonic River [C3]			Date: 2 September 1998
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: Arthur Haines, Eugenie Moore	Town: Lenox County: Berkshire, MA (Biophysical Region:)	USGS 7.5' Quad: X15' 1:25,000 East Lee, MA	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.

Directions (if not obvious from topo or Maine Atlas): From parking lot, north of mill on Willow Creek Rd, walk to RR tracks and head north 1950 meters, turning right (east) and into forest 25 meters.

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: Circumneutral hardwood Swamp – Bur Oak Association	Community type: Floodplain Forest – Silver Maple – false nettle – Sensitive fern association	Community type:
Soil: Primarily mineral	Soil: Alluvial	Soil:
Slope, aspect, topography: Flat, plain	Slope, aspect, topography: Flat, small island shelves	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 65 Quercus macrocarpa Acer rubrum Fraxinus nigra	Tree layer: Total cover (%): 70 Acer saccharinum	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 35 Carpinus caroliniana	Sapling / tall shrub layer: Total cover (%) 5 Acer saccharinum	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) 10 Spiraea alba Lindera benzoin	Shrub (1-2 m) layer: Total cover (%) 40 Cornus amomum	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 80 Osmunda regalis Onoclea sensibilis	Herb layer: Total cover (%) 90 Laportea canadensis, Matteuccia struthiopteris Urtica dioica, Pilea pumila Impatiens capensis	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) virtually absent	Bryoid layer: Total cover (%) essentially absent	Bryoid layer: Total cover (%)
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: None	Condition / evidence of human use: none	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

NATURAL COMMUNITY SURVEY — PART II: DESCRIPTION

→ complete separate description forms for each notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): Housatonic River [C3]			Obs. Pt. #
Community type: Circumneutral Hardwood Swamp — Bur Oak Association		Adjacent communities: Circumneutral shrub swamp, Floodplain forest	
Quad: East Lee	(Utm:) Northing 4692700	Size (acres) of community EO (not site):	BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	(Utm:) Easting 0644400		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FORESTS

Tree canopy height:	Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):
85 feet	① Quercus macrocarpa 32 in dbh, >170 years before present	Some large downed wood
supercanopy trees? yes, a few Pinus strobus.		

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
NO	NO	NO	NO	Woods Pond has been impounded and flooded back into some areas that were forested.

Comment:

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.	Species list sketchy or basically complete? Comment:
A.H. field Book 8.27.98 pg. 7	Relatively complete

VEGETATION PLOT DATA

Area: Hoosick River EC37 | Obs. pt. #: 1

Community type: Bur oak association | (Regional alliance/community:)

LAYER	plot # 1A	1B	1C	1D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	Quercus macrocarpa 15 Standing Dead 7 Acer rubrum 18	Quercus macrocarpa 10, 6 Acer rubrum 5 Fraxinus nigra 7, 7, 10	Acer rubrum 27, 6 Tsuga canadensis 9, 10	Quercus macrocarpa 16 Acer rubrum 5, 8, 9, 10, 14
SAPLING / TALL SHRUB cover class by species of trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	Carpinus caroliniana 9	Carpinus c. 63	Acer rubrum 9 Carpinus c. 19	Carpinus caroli? 37 Ulmus americana 1
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	Lindera benzoin 1	NA	Fraxinus nigra 1 Ilex verticillata 3	NA
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① Onoclea s. 3 Equisetum sylvaticum 1 Smilax 1 Rubus pubescens 3 Elymus virginicus 1 Carex laxiculmis 1 ② Symplyotrichum lateriflorum 1 Onoclea sen. 9 Athyrium felix-f. 3 Toxicodendron radicans 3 Geum canadense 1	① Osmundastrum regalis 37 Onoclea sensibilis 1 ② Equisetum syl. 3 Fraxinus nigra 1 Osmunda cinn. 3 Onoclea sen. 1 Thalictrum pub 1	① Carex projecta 3 Onoclea sen. 3 Symplyotrichum lateriflorum 1 Chelone glabra 1 Equisetum syl. 3 Carex cf. bromoides 3 Athyrium felix-f. 3 ② Carex cf. brom. 3 Athyrium felix-f. 1 Onoclea sens. 3 Equisetum sylvat. 3	① Onoclea S. 9 Athyrium f.-f. 3 Osmunda reg. 9 Carex projecta 3 ② Osmunda reg. 63 Onoclea S. 1
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): X "moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	NA	NA	① moss 3 ② moss 0	① Moss 19 ② moss 1
REMARKS				

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials: p. 3 of 7

TOPOGRAPHY / SOILS

Area: Housatonic River [C3] | Obs. pt. #: 1

Community type: Bur Oak association | (Regional alliance/community:)

Elevation:	Aspect:	Slope:	Microtopography:
294 meters	NA magnetic or true?	0° measured or estimated?	Slightly uneven ground with shallow pits and low mounds.

pH	Topographic position:			Habitat patchiness (describe zones or patches if present):
(note kit or meter type)	(P) low plain, level T toe of slope LS lower slope MS middle slope	TB hillside terrace/bench US upper slope E cliff/ledge	C crest M high plateau N narrow valley D drainage channel	Relatively uniform

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth: _____ cm OR > 1 m _____

vonPost decomposition: _____

ALL SOILS:

DEPTH TO WATER TABLE: _____

DEPTH to OBSTRUCTION: _____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:

- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- (lacustrine/fluvial)
- marine
- aeolian
- other:

Surface:

- _____ % Bedrock
- _____ % Boulders (>50 cm)
- _____ % Cobbles/Gravel
- _____ % Bare mineral soil
- _____ % Organic soil
- 40 % Litter (note type)
- _____ % Water
- 60 % Total vegetation
- _____ Other:

Average Texture:

- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:

Igneous
- granite
- diorite
- gabbroic
- other igneous

_____

Metamorphic
- slate/phyllite
- schist/gneiss
- other metamorphic

_____

Sedimentary
- limestone
- other sedimentary

_____

details?

Soil stoniness:

- v. little (< 1%)
- moderate (2-25%)
- very (25-100%)

Drainage & moisture regime (see MAPPSS key):

- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:

- upland
- nontidal wetland:
  - permanently flooded
  - semiperm'ly flooded
  - (seasonally flooded)
  - saturated
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown

NATURAL COMMUNITY SURVEY — PART II: DESCRIPTION

> complete separate description forms for each notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): Housatonic River [C3]			Obs. Pt. # 2
Community type: Floodplain forest — Silver maple - false nettle - sensitive fern association		Adjacent communities: Circumneutral hardwood swamp, Robust Emergent Marsh, Low Gradient Stream	
Quad: East Lee, MA	~~(Lat.)~~ Northing 4692700	Size (acres) of community EO (not site):	BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	~~(Long.)~~ Easting 0644700		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest) — circled	evergreen woody	(broad-leaf woody) — circled
woodland	(deciduous woody) — circled	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FORESTS

Tree canopy height:	Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):	
70 feet	① Acer saccharinum 57 feet tall, 20 inch dbh, >60 ybp ② Acer saccharinum 21 inch dbh, 83 ft, 64 ybp ③ Acer saccharinum 18 inch dbh, 55 feet tall, 46 ybp	Little deadwood present, mostly few logs deposited by high water near channel edges.	
supercanopy trees? NO			

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
none	none	none	none	Woods Pond Impoundment may have affected water levels here.

comment:

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.	Species list sketchy or basically complete? Comment:
Eupatorium maculatum; Epilobium ciliatum ssp. glandulosum; Toxicodendron radicans; Galium cf. trifidum; Myosotis scorpioides; Bidens connata; Persicaria hydropiper; Sium suave; Lycopus uniflorus; Onoclea sensibilis; Leersia oryzoides; Galium; Cinna latifolia; Lythrum salicaria; Ulmus americana; Clematis virginiana; Cardamine pratensis; Solanum dulcamara; Persicaria sagittata; Lysimachia nummularia; Peltandra virginica; Viburnum dentatum; Rubus pubescens	Moderate survey

VEGETATION PLOT DATA

Area: Housatonic River [C37] | Obs. pt. #: 2

Community type: Silver Maple Floodplain Forest | (Regional alliance/community:)

LAYER	plot # 1A	1B	1C	1D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	Acer Saccharinum 7, 2, 8, 10, 11, 12, 14, 19, 24	Acer Saccharinum 28, 24	Acer Saccharinum 8, 11, 24, 8, 8, 12, 16, 6, 16, 18, 18	Acer Saccharinum 10, 12, 9, 6, 14, 12
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	NA	NA	NA	NA
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	NA	Cornus amomum 9	Cornus amomum 9	NA
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m² - 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① Lapsana communis 19 Boehmeria cylindrica 9 Pilea pumila 37 Matteuccia struthiopteris 3 ③ Eupatorium maculatum 19 Impatiens cap. 9 Boehmeria cyl. 9 Pilea pumila 37 Epilobium ciliatum 3 Geum canadense 3	① Lapsana com. 37 Pilea pumila 1 Matteuccia Stalk. 3 ② Lapsana com. 3 Matteuccia St. 37 Onoclea sen. 9 7	① Matteuccia St. 37 Lapsana com. 9 Pilea pumila 3 ② Matteuccia St. 37 Onoclea sen. 9 Boehmeria cylindrica 19 Glyceria striata 1	① Boehmeria cyl. 9 Impatiens cap. 3 Pilea pumila 63 Lapsana com. 19 Matteuccia st. 1 ② Lapsana com. 1 Pilea pumila 19 Galium 1 Myosotis scorp. 1 Boehmeria cyl. 9 Lycopus uniflo. 3 Matteuccia Struthiopteris 9
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): X "moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	NA	NA	NA	① NA ② Moss 9
REMARKS	Trees from a single, basally-branched clump	→	→	Trees single-stemmed

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials: p. 6 of 7

TOPOGRAPHY / SOILS

Area: Housatonic River [C3] | Obs. pt. #: 2

Community type: Silver Maple Floodplain Forest | (Regional alliance/community:)

Elevation:	Aspect:	Slope:	Microtopography:
294 meters	Flat magnetic or true?	0 measured or estimated?	Relatively level ground

pH (note kit or meter type)

Topographic position:

- (P) low plain, level
- T toe of slope
- LS lower slope
- MS middle slope
- TB hillside terrace/bench
- US upper slope
- E cliff/ledge
- C crest
- M high plateau
- N narrow valley
- D drainage channel

Habitat patchiness (describe zones or patches if present):
Uniform 95 to overstory. Understory comprised either of tall herbs or dense colonies of dogwood.

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth:_____cm OR > 1 m_____

vonPost decomposition:_____

ALL SOILS:

DEPTH TO WATER TABLE:_____

DEPTH to OBSTRUCTION:_____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:

- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- (lacustrine/fluvial) Alluvial
- marine
- aeolian
- other:

Surface:

- ____% Bedrock
- ____% Boulders (>50 cm)
- ____% Cobbles/Gravel
- 10 % Bare mineral soil
- ____% Organic soil
- 10 % Litter (note type) herb / broadleaf
- ____% Water
- 80 % Total vegetation
- ____ Other:

Average Texture:

- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:

Igneous
- granite
- dioritic
- gabbroic
- other igneous

_____

Metamorphic
- slate/phyllite
- schist/gneiss
- other metamorphic

_____

Sedimentary
- limestone
- other sedimentary

_____

details?

Soil stoniness:

- v. little (< 1%)
- moderate (2-25%)
- very (25-100%)

Drainage & moisture regime (see MAPPSS key):

- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:

- upland
- nontidal wetland:
  - permanently flooded
  - semipermly flooded
  - (seasonally flooded)
  - saturated
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown

NATURAL COMMUNITY SURVEY — PART I: RECONNAISSANCE

Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: Housatonic River [Area D1] = C5 →			Date: 2-3 September 1998
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: Arthur Haines, Eugenie Moore	Town: Lenox County: Berkshire, MA (Biophysical Region:)	USGS 7.5' Quad: 1:25,000 East Lee, MA	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.

Directions (if not obvious from topo or Maine Atlas):
from Parking Lot, north of Mill on Rd, walk north on RR tracks 1250 meters, and into swamp east for ca. 200 meters, until open areas of Housatonic backwaters are visable in distance.

VEGETATION / HABITAT

Observation Point 1 — 2 September	Observation Point 2 — 3 September	Observation Point 3
Community type: Circumneutral hardwood Swamp – bur oak association	Community type: Circumneutral hardwood Swamp	Community type:
Soil: Primarily Mineral	Soil: Mineral	Soil:
Slope, aspect, topography: Flat, uneven ground	Slope, aspect, topography: Flat, uneven ground	Slope, aspect, topography:
STRATA: cover & 1-2 dominant spp. for each	STRATA: cover & 1-2 dominant spp. for each	STRATA: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 60% Quercus macrocarpa Acer rubrum	Tree layer: Total cover (%): 70 Acer rubrum Fraxinus nigra Quercus Macrocarpa	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 40% Fraxinus nigra Carpinus caroliniana	Sapling / tall shrub layer: Total cover (%) 40 Carpinus Caroliniana Fraxinus nigra	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) 10 Ilex verticillata	Shrub (1-2 m) layer: Total cover (%) 20 Hamamelis virginiana	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 60 Carex bromoides Onoclea sensibilis Symphyotrichum lateriflorum	Herb layer: Total cover (%) 70 Carex bromoides Lysimachia nummularia Onoclea sensibilis	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) Very sparse	Bryoid layer: Total cover (%) 15 Mosses	Bryoid layer: Total cover (%)
Other diagnostic or notable species: Carex grayi	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: None	Condition / evidence of human use: none	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? yes tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

ATURAL COMMUNITY SURVEY — PART II: DESCRIPTION

> complete separate description forms for each notable natural community on reconnaissance page.

)ENTIFIERS / LOCATION

Area (specific/general): Housatonic River, D1 (northern part) | Obs. Pt. # 1

Community type: Bur Oak Association

Adjacent communities: Circumneutral hardwood swamp (Red maple - black Ash association); Circumneutral Shrub swamp

Quad: East Lee, Massachusetts 1:25,000

(Quadcode:)

~~(Lat:)~~ Northing: 4691800

~~(Long:)~~ Easting: 0644620

Size (acres) of community EO (not site):

BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.

LASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

DDITIONAL DATA FOR FORESTS

Tree canopy height: 75 feet

supercanopy trees? NO

Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)

Quercus macrocarpa

① 25 inch, 107 ybp

② 19 inch dbh, 112 ybp

Deadwood (describe distribution, abundance, degree of decay):

Occasional fallen logs, largely of small diameter (< 10 inches).

ISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
NO	no	no	no	adjacent areas have been flooded by woods Pond Impoundment.

comment: – Hydrologically intermediate between a swamp and floodplain forest

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

Athyrium felix-femina
Sium suave
Carex intumescens
Alnus incana ssp. rugosa
Persicaria sagittata
Linaera benzoin
Equisetum sylvaticum
Carex lacustris
Solidago rugosa
Pinus Strobus
Dryopteris cristata
Lyonia ligustrina
Symplocarpus foetidus
Spiraea alba var. latifolia
Boehmeria cylindrica
Carex stipata
Lycopus virginicus
Rubus pubescens
Geum cf. canadense
Eupatorium maculatum
Viburnum dentatum
Carex projecta
Ulmus americana
Boehmeria umbellata
Carpinus caroliniana
Cornus sericea
Lysimachia terrestris
Lythrum salicaria
Ilex verticillata
Symphyotrichum puniceum
Salix cf. alba
Lysimachia nummularia
Osmunda regalis
Toxicodendron radicans
Dryopteris cristata
Ludwigia palustris
Ranunculus flabellaris
Parthenocissus virginiana
Carex gracillima
Lonicera morrowii
Thelypteris palustris
Senecio aureus
Acer rubrum
Solidago patula

Species list sketchy or basically complete?

Comment: Basically complete

Helenium autumnale
Glyceria striata
Carex crinita

VEGETATION PLOT DATA

Area: Housatonic River — Obs. pt. #: 1

Community type: . Bur Oak Association — (Regional alliance/community:)

LAYER	plot # 1A	1B	1C	1D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: inches QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	Quercus Macrocarpa 25 Standing dead 6 inches Acer rubrum 14, 10	Quercus Macrocarpa 25 Acer rubrum 9, 11	Quercus Macrocarpa 7 Acer rubrum 11, 11, 36 Standing dead 10	Acer rubrum 14 Quercus Macrocarpa 8 Fraxinus nigra 6
SAPLING / TALL SHRUB cover class by species of trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	Carpinus caroliniana 19	Carpinus C. 37 Fraxinus nigra 3	Carpinus C. 37 Fraxinus n. 3	Rhamnus cathartica 9 Fraxinus nigra 3 Fraxinus americana 3 Carpinus c. 3
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	Carpinus caroliniana 9 Fraxinus nigra 1	Fraxinus nigra 1 Ilex verticillata 1	NA	Parthenocissus quinquefolius 1 Fraxinus nigra 1
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① Onoclea sensibilis 3 Carex bromoides 3 ③ Onoclea sensibilis 1 Carex bromoides 3 Carex grayi 1 Ranunculus cf. hispidus 3	① Onoclea S. 3 Symphyotrichum lateriflorum 3 Carex bromoides 9 ② Cinna latifolia 1 Onoclea S. 1 Carex brom. 37	① Osmunda cinnamomea 37 ② Onoclea sen. 9 Equisetum arvense 1 Toxicodendron radicans 1 fraxinus nigra 1 Carex cf. brom 1	① Onoclea S. 9 Carex brom. 3 ② Onoclea S. 3 Toxicodendron radicans 9 Carex bromoides 19 Lysimachia nummularia 9 Lysimachia quadrifolia 1
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): X "moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	① Moss 3 ② Moss 0	① NA ② NA	① Moss 3 ② Moss 0	① Moss 3
REMARKS				

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials: p. 3 of 7

TOPOGRAPHY / SOILS

Area: Housatonic River, D1 | Obs. pt. #: 1

Community type: bur oak association | (Regional alliance/community:)

Elevation: 294 meters | Aspect: NA (magnetic or true?) | Slope: 0° (measured or estimated?) | Microtopography: very uneven gravel with shallow pit and mound topography

pH (note kit or meter type):

Topographic position:
- (P) low plain, level
- T toe of slope
- LS lower slope
- MS middle slope
- TB hillside terrace/bench
- US upper slope
- E cliff/ledge
- C crest
- M high plateau
- N narrow valley
- D drainage channel

Habitat patchiness (describe zones or patches if present): relatively uniform

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth: _____ cm OR > 1 m _____

vonPost decomposition: _____

ALL SOILS:

DEPTH TO WATER TABLE: _____

DEPTH to OBSTRUCTION: _____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:
- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- (lacustrine/fluvial) (fill over 4)
- marine
- aeolian
- other:

Surface:
- ____% Bedrock
- ____% Boulders (>50 cm)
- ____% Cobbles/Gravel
- ____% Bare mineral soil
- ____% Organic soil
- 90 % Litter (note type)
- ____% Water
- 60 % Total vegetation
- ____ Other:

Average Texture:
- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:

Igneous
- granite
- dioritic
- gabbroic
- other igneous _____

Metamorphic
- slate/phyllite
- schist/gneiss
- other metamorphic _____

Sedimentary
- limestone
- other sedimentary _____

details?

Soil stoniness:
- v. little (< 1%)
- moderate (2-25%)
- very (25-100%)

Drainage & moisture regime (see MAPPSS key):
- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:
- upland
- nontidal wetland:
  - permanently flooded
  - semipermly flooded
  - (seasonally flooded)
  - saturated
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown

NATURAL COMMUNITY SURVEY PART II: DESCRIPTION

→ complete separate description forms for each notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): Housatonic River [D1]			Obs. Pt. # 2
Community type: Circumneutral Hardwood Swamp			Adjacent communities: Circumneutral Hardwood Swamp — burroak association
Quad: East Lee, MA	~~(Easting)~~ Northing: 4691800	Size (acres) of community EO (not site):	BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	~~(Long:)~~ Easting: 0644550		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FOREST

Tree canopy height: 60 feet	Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):
supercanopy trees? (70 feet) Occasional Pinus strobus or large Quercus Microcarpa	① Quercus macrocarpa 15 inches dbh, 71 feet tall, 114 ybp ② Fraxinus nigra 11 dbh, 67 feet, 122 years bp ③ Acer rubrum 17 inches dbh, 65 feet, 96 years before Present	Few dead, fallen logs, largely of +/- small diameter (< 10 inches), damp and bryophyte covered.

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
no	no	no	no	Woods Pond Impoundment nearby and may have effected hydrology here.

comment:

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

Alnus incana
Equisetum sylvaticum
Carex lacustris
Solidago rugosa
Lysimachia terrestris
Spiraea alba var. latifolia
Boehmeria cylindrica
Carex stipatata
Lycopus virginicus
Doellingeria umbellata
Cornus sericea
Lysimachia terrestris
Lythrum salicaria
Ilex verticillata
Symphyotrichum puniceum
Lysimachia nummularia
Osmunda regalis
Dryopteris cristata
Ludwigia palustris
Peltandra virginica
Carex gracillima
Lonicera morrowii
Thelypteris palustris
Prunus virginiana
Solidago patula

Species list sketchy or basically complete? Comment:

relatively complete

VEGETATION PLOT DATA

Area: Housatonic River [D1] | Obs. pt. #: 2

Community type: Circumneutral Hardwood Swamp | (Regional alliance/community:)

LAYER	plot # 2A	2B	2C	2D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	Acer rubrum 5,5,11 Fraxinus nigra 6 Quercus macrocarpa 10	Acer rubrum 5,7 Fraxinus nigra 5,7 Quercus macrocarpa 10	Fraxinus nigra 6,6,7,5,5 Acer rubrum 7,11	Fraxinus nigra 5 Quercus macrocarpa 6 Tsuga canadensis 6 Pinus strobus 5
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	Acer rubrum 9 Fraxinus nigra 3 Carpinus caroliniana 37	Ulmus americana 9 Carpinus caroliniana 19 Fraxinus nigra 9	Tsuga canadensis 3 Carpinus caroliniana 37	Carpinus caroliniana 9 Hamamelis virginiana 3 Pinus strobus 9
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	Cornus amomum 3	Cornus amomum 9	Carpinus caroliniana 3	Fraxinus nigra 3 Quercus macrocarpa 3 Cornus amomum 1 Lindera benzoin 3
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① Carex bromoides 19 Onoclea sensibilis 3 Thelypteris palust. 1 Galium cf. trifidum 1 ② Carex bromoides 19 Athyrium filix-f. 3 Senecio aureus 1 Tiarella cordifolia 3 Galium triflorum 1 Rubus pubescens 1 Toxicodendron rad. 3	① Carex bromoides 19 Onoclea sensibilis 9 Toxicodendron rad. 3 Lycopus uniflorus 3 Viola sororia 3 ② Lysimachia num. 3 Rubus pubescens 3 Athyrium f.-f. 3 Solidago patula 1 Carex gracillima 3 Carex bromoides 19	① Athyrium f.-f. 3 Onoclea sensibilis 9 Carex bromoides 9 Carex lurida 3 Osmunda cinnamomea 9 ② Carex bromoides 37 Rubus pubescens 3 Carex projecta 1 Toxicodendron radicans 3	① Boehmeria cyl. 9 Onoclea sensibilis 3 Carex bromoides 37 Lycopus uniflorus 19 Galium cf. trifidum 3 ② Senecio aureus 19 Solidago patula 3 Carex bromoides 19 Rubus pubescens 9 Doellingeria umbellata 1 Onoclea sens. 3 Symphyotrichum lateriflorum 3
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): X "moss"/"liverwort"/"lichen" only; __ identified to major group; __ identified to genus; __ identified to species.	① moss 9 ② moss 19	① moss 3 ② moss 19	① moss 3 ② moss 3	① N/A ② moss 3
REMARKS				

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials: p. 6 of 7

TOPOGRAPHY / SOILS

Area: Hawkabuic River [D1] | Obs. pt. #: 2

Community type: Circumneutral Hardwood Swamp | (Regional alliance/community:)

Elevation: 294 meters

Aspect: flat (magnetic or true?)

Slope: 0° (measured or estimated?)

Microtopography: Uneven, skellenpits and low mounds, sedges tussock-forming

pH (none kit or meter type): /

Topographic position:

- (low plain, level)
- T toe of slope
- LS lower slope
- MS middle slope
- TB hillside terrace/bench
- US upper slope
- E cliff/ledge
- C crest
- M high plateau
- N narrow valley
- D drainage channel

Habitat patchiness (describe zones or patches if present): relatively uniform, though wetter in some areas with open water vs. somewhat drier with damp depressions.

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth: _____ cm OR > 1 m _____

vonPost decomposition: _____

ALL SOILS:

DEPTH TO WATER TABLE: _____

DEPTH to OBSTRUCTION: _____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:

- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- lacustrine/fluvial
- marine
- aeolian
- other:

Surface:

- _____% Bedrock
- _____% Boulders (>50 cm)
- _____% Cobbles/Gravel
- 5 % Bare mineral soil
- _____% Organic soil
- 20 % Litter (note type)
- _____% Water
- 75 % Total vegetation
- _____ Other:

Average Texture:

- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:

Igneous
- granite
- dioritic
- gabbroic
- other igneous

_____

Metamorphic
- slate/phyllite
- schist/gneiss
- other metamorphic

_____

Sedimentary
- limestone
- other sedimentary

_____

details?

Soil stoniness:

- v. little (< 1%)
- moderate (2-25%)
- very (25-100%)

Drainage & moisture regime (see MAPPSS key):

- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:

- upland
- nontidal wetland:
  - permanently flooded
  - semipermanently flooded
  - (seasonally flooded)
  - (saturated)
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown

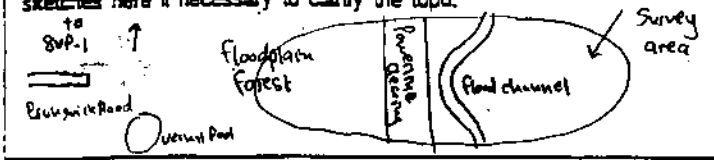
NATURAL COMMUNITY SURVEY — PART I: RECONNAISSANCE

Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: Housatonic River (Small Mammal Trap site 1B)			Date: 15 October 1998
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: Arthur Haines, Bob Ray	Town: Pittsfield County: Berkshire, MA (Biophysical Region:)	USGS 7.5 Quad: Pittsfield East (1:25,000)	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.



Directions (if not obvious from topo or Maine Atlas):
From the end of the Brunswick Road, Pass through low, wet forest in a South - Southwest direction for ca. 100 meters to enter a cleared Powerline right-of-way. Community lies mostly of Southside of right-of-way.

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: Floodplain forest	Community type:	Community type:
Soil: Alluvial	Soil:	Soil:
Slope, aspect, topography:	Slope, aspect, topography:	Slope, aspect, topography:
STRATA: cover & 1-2 dominant spp. for each	STRATA: cover & 1-2 dominant spp. for each	STRATA: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 70 Acer saccharinum Acer negundo Ulmus americana	Tree layer: Total cover (%):	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 10 Acer negundo	Sapling / tall shrub layer: Total cover (%)	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) 50 Lonicera Morrowii Fallopia Japonica	Shrub (1-2 m) layer: Total cover (%)	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 60 Zizea aurea Matteuccia Struthiopteris Argentina anserina	Herb layer: Total cover (%)	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) NA	Bryoid layer: Total cover (%)	Bryoid layer: Total cover (%)
Other diagnostic or notable species: Ribes americanum	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: Powerline clearing bisects community	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? yes, 5.6 m radius tree cores? yes photos? yes	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

NATURAL COMMUNITY SURVEY PART II: DESCRIPTION

-> complete separate description forms for each notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): Housatonic River (Small Mammal Trap site 1B)			Obs. Pt. # 1
Community type: Floodplain Forest			Adjacent communities:
Quad: for Pittsfield East 1:25,000	(Easting) Northing 4699100	Size (acres) of community EO (not site):	BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	(Easting) Easting 0643975		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FORESTS

Tree canopy height:	Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):
70 feet	① Acer negundo 19 in DBH, 51 feet tall +/- 29 ybp	Ample deadwood in floodplain, some guttelage (>15 inches), much has been cut with a saw at one end.
supercanopy trees? NO	② Acer saccharinum, 25in, 75 feet tall +/- 54 years before Present	
	③ Ulmus americana 27in, 69 feet tall 63 years before Present	

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
		-cleared strip for powerline right-of-way		

comment:

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

Xanthium strumarium
Digitaria sanguinalis
Bidens cernua
Echinocystis muricata
Panicum capillare
Lycopus uniflorus
Glechoma hederacea
Equisetum arvense
Lonicera morrowii
Salix alba
Symphyotrichum cordifolium
Symphyotrichum lateriflorum
Ribes americanum
Onoclea sensibilis
Poa pratensis
Vitis riparia
Hesperis matronalis
Toxicodendron radicans
Persicaria virginiana
Lysimachia ciliata
Ligustrum vulgare
Euonymus alatus
Boehmeria cylindrica
Cardamine pratensis
Cinna latifolia
Cornus amomum
Populus deltoides
Thalictrum pubescens

Species list sketchy or basically complete? Comment:

Moderate survey effort

VEGETATION PLOT DATA

Area: Housatonic River [Small Mammal Trapsite 18]	Obs. pt. #: 1
Community type: Floodplain forest	(Regional alliance/community:)

LAYER	plot # 1a	1b	1c	1D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used (5.64) m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	NA	Acer saccharinum 14, 31, 10, 16 Ulmus americana 22, Acer negundo 14, 18, 8	Acer negundo 18, 8 Acer saccharinum 8 Standing dead 5	Ulmus americana 9 Acer saccharinum 14, 12, 18, 16, 13, 13
SAPLING / TALL SHRUB cover class by species of trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	NA	Acer saccharinum 9	Acer negundo 3	Rhamnus cathartica 37
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	Ulmus americanus 1	Acer negundo 9 Euonymus europaea 3 Fallopia japonica 63	Lonicera morrowii 3	Lonicera morrowii 19
HERBS cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① Elymus riparius 9 Solidago gigantea 3 Argentina anserina 3 Muhlenbergia frondosa 3 Matteuccia struthiopteris 9 Zizea aurea 3 ② Persicaria punctata 19 Persicaria pensylv. 3 Lythrum salicaria 3 Muhlenbergia fron. 9 Solanum dulcamara 3	① Geum canadense 9 Alliaria petiolata 3 Euonymus europaea 3 Zizea aurea 1 ② Zizea aurea 19	① Zizea aurea 37 Matteuccia struth. 19 ② Solidago flexicaulis 9 Zizea aurea 37 Acer platanoides 1	① Zizea aurea 37 ② Zizea aurea 37 Matteuccia struth. 37
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): __"moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	NA	NA	NA	
REMARKS	Plot taken from a spring flood channel, now dry, sandy bed.			

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials:

TOPOGRAPHY / SOILS

Area: Housatonic River [small Mammal trap site (B)] | Obs. pt. #: 1

Community type: floodplain forest | (Regional alliance/community:)

Elevation:	Aspect:	Slope:	Microtopography:
296 meters	Flat magnetic or true?	0-5° measured or estimated? estimated	Flat plain cut by spring flood channels

pH (note kit or meter type)

Topographic position:
- (P) low plain, level
- T toe of slope
- LS lower slope
- MS middle slope
- TB hillside terrace/bench
- US upper slope
- E cliff/ledge
- C crest
- M high plateau
- N narrow valley
- D drainage channel

Habitat patchiness (describe zones or patches if present):
Relatively uniform, though sometimes altered near vernal pools from remainder of forest

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth: _____ cm OR > 1 m _____

vonPost decomposition: _____

ALL SOILS:

DEPTH TO WATER TABLE: _____

DEPTH to OBSTRUCTION: _____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:
- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- (lacustrine/fluvial) alluvial
- marine
- aeolian
- other:

Surface:
- ____% Bedrock
- ____% Boulders (>50 cm)
- ____% Cobbles/Gravel
- 10 % Bare mineral soil
- ____% Organic soil
- 90 % Litter (note type) Broadleaf
- ____% Water
- ____% Total vegetation
- ____ Other:

Average Texture:
- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:
- Igneous
  - granite
  - dioritic
  - gabbroic
  - other igneous
  - _____
- Metamorphic
  - slate/phyllite
  - schist/gneiss
  - other metamorphic
  - _____
- Sedimentary
  - limestone
  - other sedimentary
  - _____

details?

Soil stoniness:
- v. little (< 1%)
- moderate (2-25%)
- very (25-100%)

Drainage & moisture regime (see MAPPSS key):
- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

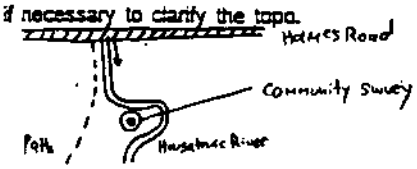
Hydrologic regime:
- upland
- nontidal wetland:
  - permanently flooded
  - semipermanently flooded
  - (seasonally flooded)
  - saturated
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown

NATURAL COMMUNITY SURVEY PART I: RECONNAISSANCE Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: Housatonic River [Small mammal trapping site 3]			Date: 10 September 1998
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: Arthur Haines, Eugenie Moore	Town: County: Berkshire, MA (Biophysical Region:)	USGS 7.5' Quad: 1:25,000 X15' Pittsfield East, MA	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.



Directions (if not obvious from topo or Maine Atlas):
From Holmes Road, follow field and mowed path (east side of river) downstream (from yellow gate at Road) until river diverges away from path. follow cut path +/- SE and E out to a lobe of land near bend in River.

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: floodplain forest — Silver maple-false nettle-sensitive fern association	Community type:	Community type:
Soil: Alluvial silt	Soil:	Soil:
Slope, aspect, topography: Flat, with occasional drainages	Slope, aspect, topography:	Slope, aspect, topography:
STRATA: cover & 1-2 dominant spp. for each	STRATA: cover & 1-2 dominant spp. for each	STRATA: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 65 Acer Saccharinum Acer negundo	Tree layer: Total cover (%):	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 10 Acer negundo	Sapling / tall shrub layer: Total cover (%)	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) 15 Prunus pensylvanica	Shrub (1-2 m) layer: Total cover (%)	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 70 Laportea canadensis Matteuccia struthiopteris Pilea pumila	Herb layer: Total cover (%)	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) essentially absent	Bryoid layer: Total cover (%)	Bryoid layer: Total cover (%)
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: None	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? yes, 5.64 m tree cores? yes photos? yes	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

URAL COMMUNITY SURVEY PART II: DESCRIPTION

complete separate description forms for each notable natural community on reconnaissance page.

2 of 4

IDENTIFIERS / LOCATION

Area (specific/general): Housatonic River [small mammal trapping site 3]			Obs. Pt. # 1
Community type: Silver Maple Floodplain Forest			Adjacent communities: River, early successional forest
Quad: Pittsfield East MA	(Lat:) Northing 4698100	Size (acres) of community EO (not site):	BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	(Long:) Easting 0645050		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FORESTS

Tree canopy height:	Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):	
80 feet	(1) Acer negundo DBH - 16 inches, +/- 25 ybp (2) Acer saccharinum DBH - 23, 37 ybp (3) Acer saccharinum DBH - 19, 38 years before present	Few, large (>15 inches) logs with some bryophyte cover on them (essentially the only substrate with bryophytes in survey).	
supercanopy trees? NO			

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
NO	NO	NO	yes, adjacent to continuously cleared areas of open field and early successional forest	no

comment:

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

Alliaria petiolata
Oxalis Stricta
Cardamine pratensis
Urtica dioica
Chelidonium majus
Echinocystis lobata
Lysimachia nummularia
Pilea pumila
Rudbeckia laciniata
cf. Helianthus tuberosus
Vicia
Poa nemoralis
Euonymus
Symphyotrichum lateriflorum
Persicaria hydropiper
Lythrum Salicaria
Myosotis Scorpioides
Pedicularis Sedoides
Cirsium latifolia
Bidens vulgata

Species list sketchy or basically complete?
Comment:
Brief survey

VEGETATION PLOT DATA

Area: Housatonic River [Small Mammal Trapping site 3] | Obs. pt. #: 1

Community type: floodplain forest — silver maple-false nettle-sensitive fern association | (Regional alliance/community:)

LAYER	plot # 1A	1B	1C	1D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: inches QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	Acer negundo 6, 6, 7, 5	Acer negundo 13, 6, 7, 18, 10 Acer Saccharinum 15	Acer negundo 7 Acer Saccharinum 11, 8, 7, 14, 19, 9 Standing dead 6	Populus deltoides 51 Acer negundo 9, 7
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	NA	NA	Acer saccharinum 19	NA
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	Prunus virginiana 1	Acer Saccharinum 3	NA	NA
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① Matteuccia Struth. 63 Geum 9 Agrostis alba/stolonifera 3 Alliaria petiolata 1 ② Matteuccia S. 87	① Matteuccia S. 37 Onoclea sensibilis 9 Laportea canadensis 3 Boehmeria cylindrica 3 ② Matteuccia S. 19 Laportea canadensis 37	① Matteuccia S. 37 Laportea canadensis 9 Geum 1 ② Matteuccia S. 19 Laportea can. 37 Alliaria petiolata 9	① Matteuccia S. 19 Laportea can. 9 ② Laportea can. 37 Matteuccia S. 37
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): __"moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	NA	NA	NA	NA
REMARKS	Open area dominated by Matteuccia Struthiopteris between the canopy trees.		Forest is open under canopy and is largely Matteuccia and Laportea dominated	This plot with areas of deposited silt that is bare of vegetation.

in box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials: p. 3 of 4

TOPOGRAPHY / SOILS

Area: Housatonic River [Small mammal Trapping site 3] | Obs. pt. #:

Community type: Silver Maple floodplain forest | (Regional alliance/community:)

Elevation:	Aspect:	Slope:	Microtopography:
288 meters	Flat magnetic or true?	0-3° measured or (estimated)	Somewhat flat toe of land with occasional dips and bumps and infrequent drainage ditches.

pH	Topographic position:			Habitat patchiness (describe zones or patches if present):
(note kit or meter type)	(P low plain, level) T toe of slope LS lower slope MS middle slope	TB hillside terrace/bench US upper slope E cliff/ledge	C crest M high plateau N narrow valley D drainage channel	Patchy, canopy is broken and fields of Ostrich fern (Matteuccia s.) exist between the forested areas where sun reaches herb layer.

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth: _____ cm OR > 1 m _____

vonPost decomposition: _____

ALL SOILS:

DEPTH TO WATER TABLE: _____

DEPTH to OBSTRUCTION: _____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:

- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- (lacustrine/fluvial) Alluvial
- marine
- aeolian
- other:

Surface:

- ____% Bedrock
- ____% Boulders (>50 cm)
- ____% Cobbles/Gravel
- 15 % Bare mineral soil
- ____% Organic soil
- 15 % Litter (note type) ferns, tree leaves
- ____% Water
- 70 % Total vegetation
- ____ Other:

Average Texture:

- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:

Igneous
- granite
- dioritic
- gabbroic
- other igneous

_____

Metamorphic
- slate/phyllite
- schist/gneiss
- other metamorphic

_____

Sedimentary
- limestone
- other sedimentary

_____

details?

Soil stoniness:

- v. little (< 1%)
- moderate (2-25%)
- very (25-100%)

Drainage & moisture regime (see MAPPSS key):

- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:

- upland
- nontidal wetland:
  - permanently flooded
  - semiperm'ly flooded
  - (seasonally flooded)
  - saturated
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown

NATURAL COMMUNITY SURVEY PART I: RECONNAISSANCE Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: Housatonic River [Small Mammal Trap site 8]			Date: 16 September 1998
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: Arthur Haines, Eugenie Moore	Town: Lenox County: Berkshire, MA (Biophysical Region:)	USGS 7.5 Quad: 1:25,000 x15 Pittsfield East, MA	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.

Directions (if not obvious from topo or Maine Atlas):
follow western field edge (faint road) from New Lenox Road just east of RR and Pump station south to road through forest that parallels RR. After ca. 0.15 miles, take right fork and continue south into Red Maple swamp.

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: Circumneutral Hardwood Swamp	Community type:	Community type:
Soil:	Soil:	Soil:
Slope, aspect, topography: flat, relatively even ground	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 70 Acer rubrum Prunus serotina Populus tremuloides	Tree layer: Total cover (%):	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 25 Acer rubrum Fraxinus americanus	Sapling / tall shrub layer: Total cover (%)	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) 40 Viburnum dentatum Vaccinium corymbosum	Shrub (1-2 m) layer: Total cover (%)	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 40 Osmunda cinnamomea Athyrium felix-femina Rubus hispidus	Herb layer: Total cover (%)	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) Only present on downed woody material	Bryoid layer: Total cover (%)	Bryoid layer: Total cover (%)
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: Some trail construction for Archery targets	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? yes tree cores? yes photos? yes relatively dry red maple swamp ~ +/- sometimes poorly drained soils	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

ATURAL COMMUNITY SURVEY PART II: DESCRIPTION

complete separate description forms for each notable natural community on reconnaissance page.

ENTIFIERS / LOCATION

rea (specific/general): Housatonic River, Small Mammal Trap site 8			Obs. Pt. # 1
Community type: Circumneutral Hardwood Swamp			Adjacent communities: Circumneutral Shrub Swamp, Low Gradient Stream, Anthropogenic fields (Hay fields)
Quad: Pittsfield, East 1:25,000	(Lat.:) Northing: 469360	Size (acres) of community EO (not site):	BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
Quadcode:)	(Long:) Easting: 0644370		

LASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

DDITIONAL DATA FOR FORESTS

Tree canopy height:	Core data: ring counts (– 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):	
70 Feet	① Acer rubrum 13 dbh, 54 ybp ② Acer rubrum 10 dbh, 40 ybp ③ Prunus serotina, 11 dbh, +/- 55 years before present	Little deadwood present, what exists is relatively small (< 15 inches diameter) and scarce.	
supercanopy trees? NO			

STORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
NO	NO	none observed, but likely within last 60 years.	Agricultural fields are present bordering the community.	NO

comment

DDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

Cornus amomum
Rubus idaeus
Viburnum acerifolium
Onoclea sensibilis
Osmunda regalis
Spiraea alba
Rhododendron viscosum
Thelypteris noveboracensis
Dryopteris intermedia
Vaccinium corymbosum
Parvus virginiana
Maianthemum canadense
Solidago rugosa
Ilex verticillata
Cornus sericea
Berberis vulgaris
Lysimachia ciliata
Lycopodium hickeyi
Diphasiastrum complanatum
Lycopodium clavatum
Gentiana clausa
Ulmus americana
Lycium ligustrinum

Species list sketchy or basically complete?
Comment:
Moderate survey effort

VEGETATION PLOT DATA

Area: Harsgtaric River, Small Mammal Trap Site 8 | Obs. pt. #: 1

Community type: Circumneutral Hardwood Swamp | (Regional alliance/community:)

LAYER	plot # 1A	1B	1C	1D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: inches QUAD SIZE: note which size used (5.64 m radius for 1/100th ha) 7.98 m radius for 2/100th ha use same size throughout!	Populus tremuloides 8, 9	Acer rubrum 5, 6, 7, 7, 7, 8, 10, 15, 18 Quercus rubra 12	Acer rubrum 9, 9, 8, 10, 5	Acer rubrum 18, 8, 9, 8, 11 Prunus serotina 8 Populus tremuloides 11, 12
SAPLING / TALL SHRUB cover class by species of trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	Fraxinus americanus 9 Prunus serotina 9 Acer rubrum 3	Acer rubrum 1	Prunus serotina 19	Acer rubrum 9
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	Acer rubrum 3 Viburnum dentatum 9 Vaccinium corymbosum 3	Prunus serotina 9 Viburnum dentatum 9 Pinus strobus 3	Prunus serotina 9 Viburnum dentatum 9 Amelanchier cf. arborea 3	Viburnum dentatum 9 Fraxinus americana 3
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① Osmunda cinnam. 9 Rubus hispidus 1 ② Osmunda cinnam. 37 Rubus idaeus 3 Rubus hispidus 19 Prunus virginiana 1	① Viburnum dentatum 9 Rubus hispidus 1 ② Osmunda cinna. 37 Viburnum dent. 9 Rubus hispidus 1	① Osmunda cinn. 19 Rubus hispidus 3 ② Osmunda cinn. 19 Osmunda regalis 9 Viburnum dentatum 1	① Quercus sensibilis 3 Rubus hispidus 37 Viburnum dent. 1 ② Osmunda regalis 37 Osmunda cinnamomea 19 Quercus sensibilis 3 Prunus serotina 1
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): __"moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	NA	NA	NA	NA
REMARKS				

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials: p. 3 of 4

TOPOGRAPHY / SOILS

Area: Housatonic River, Small Mammal Trap site 8 | Obs. pt. #: 1

Community type: Circumneutral Hardwood Swamp | (Regional alliance/community:)

Elevation: 294 meters

Aspect: flat (magnetic or true?)

Slope: 0° (measured or estimated?)

Microtopography: Even ground with only slight mounds Present around some tree clump bases/ or fern plants

pH (note kit or meter type)

Topographic position:

- (P) low plain, level
- T toe of slope
- LS lower slope
- MS middle slope
- TB hillside terrace/bench
- US upper slope
- E cliff/ledge
- C crest
- M high plateau
- N narrow valley
- D drainage channel

Habitat patchiness (describe zones or patches if present): Relatively uniform

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth:_____cm OR > 1 m_____

vonPost decomposition:_____

ALL SOILS:

DEPTH TO WATER TABLE:_____

DEPTH to OBSTRUCTION:_____

Soil temperature reading _____ F/C at _____ (depth)

Hydrologically relatively dry compared against most red maple swamps, but vegetation is mostly hydrophytic.

Surficial deposit:

- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- lacustrine/fluvial
- marine
- aeolian
- other:

Surface:

- _____% Bedrock
- _____% Boulders (>50 cm)
- _____% Cobbles/Gravel
- _____% Bare mineral soil
- _____% Organic soil
- 55 % Litter (note type) broadleaf
- _____% Water
- 45 % Total vegetation
- _____ Other:

Average Texture:

- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:

Igneous
- granite
- dioritic
- gabbroic
- other igneous
- _____

Metamorphic
- slate/phyllite
- schist/gneiss
- other metamorphic
- _____

Sedimentary
- limestone
- other sedimentary
- _____

details?

Soil stoniness:

- v. little (< 1%)
- moderate (2-25%)
- very (25-100%)

Drainage & moisture regime (see MAFPSS key):

- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:

- upland
- nontidal wetland:
  - permanently flooded
  - semipermanently flooded
  - (seasonally flooded)
  - saturated
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown

NATURAL COMMUNITY SURVEY PART I: RECONNAISSANCE Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: Small Mammal - 14			Date: Sept 99
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: AN KK	Town: County: (Biophysical Region:)	USGS 7.5' Quad:	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.

Directions (if not obvious from topo or Maine Atlas):
North of New Lenox Road, follow gravel road (across from parking lot west of Decker Canoe Launch) to field with EMR towers. Trail continues on west side of field. Follow trail 90 metes then north through forest to floodplain and large crescent-shaped vernal pool.

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: Floodplain Forest	Community type:	Community type:
Soil: fluvial silt (as to surficial deposit)	Soil:	Soil:
Slope, aspect, topography: Relatively flat, East aspect	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 65 Acer saccharinum Tilia americana Crataegus punctata	Tree layer: Total cover (%):	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 25 Crataegus punctata Carpinus caroliniana	Sapling / tall shrub layer: Total cover (%)	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) Cornus amomum	Shrub (1-2 m) layer: Total cover (%)	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 70 Matteuccia Struthiopteris Lysimachia nummularia Geum canadense Pilea pumila	Herb layer: Total cover (%)	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) 5 moss.	Bryoid layer: Total cover (%)	Bryoid layer: Total cover (%)
Other diagnostic or notable species: Allium tricoccum Ribes Americanum Viola pubescens Laportea canadensis	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: Adjacent agricultural fields	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? 5x64 tree cores? yes photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

Observation Point 4	Observation Point 5	Observation Point 6
Community type:	Community type:	Community type:
Soil:	Soil:	Soil:
Slope, aspect, topography:	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____
Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____
Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____
Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____
Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use:	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

*STRATA are defined as:

TREE = canopy (if emergents present, note as "E");
SAPLING / TALL SHRUB = > 2 m tall and < 5 cm dbh: woody plants not forming tree canopy but > 2 m tall;
SHRUB = 1 - 2 m: woody plants 1 - 2 m tall;
HERB = < 1 m: all herbaceous vascular plants plus any woody plants < 1 m tall;
BRYOID = all ground-layer non-vascular plants.

NATURAL COMMUNITY SURVEY   PART II: DESCRIPTION

--> complete separate description forms for **each** notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): SMALL MAMMAL - 14			Obs. Pt. # 1
Community type: FLOODPLAIN FOREST			Adjacent communities: Low gradient Stream
Quad:	~~(Lat.)~~ northing 469550	Size (acres) of community EO (not site):	**BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO.** Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	~~(Long.)~~ easting 0644915		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest) [circled]	evergreen woody	(broad-leaf woody) [circled]
woodland	(deciduous woody) [circled]	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FORESTS

Tree canopy height:	Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):	
41-70	① Tilia americana 24 in, 65 feet, 70 ybp ② Tilia americana 22 in, 61 feet, 74 ybp ③ Carpinus caroliniana 9 dbh, 38 Ft, 50 ybp	Moderate amounts of deadwood, larger logs +/- 25 cm in diameter, with decayed, mossy exteriors.	Vernal Pool PLANTS: SIAM SWAMP LYCOPUS UNIFLORUS CALLITRICHE . ♥ (stagnalis) CICUTA BULBIFERA PELTANDRA (?) CEDNDES LEMNA MINOR ♥ CAREX LACUSTRIS SPARGANIUM ECHINATUM Carex crinita Nuphar variegata Glyceria cf. borealis
supercanopy trees?			

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
NO	NO	NO	adjacent fields, (Crataegus punctata abundance indicating past disturbance)	NO

comment: Urban flotsam visible in floodplain (originating in pittsfield) (Boards, sports balls, cans, trash)

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.	Species list sketchy or basically complete? Comment:
fraxinus americana CUSCUTA GRONOVII BOEHMERIA CYLINDRICA clematis virginiana Ranunculus recurvatus Epilobium ciliatum ssp. glandulosum Onoclea sensibilis Carex bromoides Actaea rubra Lonicera Morrowii fraxinus nigra Quercus rubra Iris versicolor Rhamnus cathartica Verbena urticifolia Solidago gigantea Impatiens capensis Echinocystis lobata Sicyos angulatus Solanum dulcamara Galeopsis tetrahit Galium asprellum Sambucus Canadensis (thicket)	Moderate survey effort Photos 20 - Southern portion of vernal Pool 21 - Dotted hawthorn, ostrich fern 22 - silver maple 23 - river terrace 24 - West across vernal Pool

RIBES AMERICANUM   PERSICARIA VIRGINIANA
SMILAX HERBACEA   BERBERIS THUNBERGII

date: initials: p. 3 of 5

VEGETATION PLOT DATA

Area: SMALL MAMMAL - 14 | Obs. pt. #:

Community type: FLOODPLAIN FOREST | (Regional alliance/community:)

LAYER	plot # 1A	1B	1C	1D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	CRATAEGUS PUNCTATA 10,7.5 CARPINUS CAROLINIANA 4,6,8	CARPINUS CAROLINIANA 3,4,9,9,5,4 TILIA AMERICANA 22, 11 CRATAEGUS PUNCTATA 3,3,5,3	CRATAEGUS PUNCTATA 7 ACER NEGUNDO 4,4,4,3 ACER SACCHARINUM 25,22	NONE
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m^2	CRATAEGUS PUNCTATA 9 CARPINUS CAROLINIANA 1	CARPINUS CAROLINIANA 3 CRATAEGUS PUNCTATA 3	NONE	NONE
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall QUAD SIZE: 2.8 m radius or 25 m^2	CRATAEGUS PUNCTATA 1	PRUNUS VIRGINIANA 1 LONICERA MORROWII 1	NONE	CEPHALANTHUS OCC. 1 CORNUS AMOMUM 37
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m^2, 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① PARTHENOCISSUS STRIATIFOLIA 37 PILEA PUMILA 19 ALLIARIA PETIOLATA 3 GEUM CANADENSE 3 SYMPHORICARPOS ORBICULATUS 1 SYMPH. LATERIFLORUM 1 STAPHYLEA TRIFOLIA 1 ② PARTHENOCISSUS STRIATIFOLIA 37 GEUM CANADENSE 9 HESPERIS MATRONALIS 3 LYSIMACHIA NUMMULARIA 19 SYMPH. LATERIFLORUM 3 ERIGERON PHILADELPHICUS 1 OXALIS STRICTA 1	① VIOLA PUBESCENS 3 GEUM CANADENSE 1 ALLIUM TRICOCCUM 3 RANUNCULUS HISPIDUS 3 MATTEUCCIA STRUTHIOPTERIS 37 ATHYRIUM FELIX-FEMINA 19 CAREX PROJECTA 3 ② MATTEUCCIA S 37 GALIUM TRIFLORUM 3 LYSIMACHIA NUMMULARIA 19 EQUISETUM VIRGINIANUM 3 SMILAX LATIFOLIA 3 GEUM CANADENSE 3 SYMPH. LATERIFLORUM 3 ALLIUM TRICOCCUM 3	① MATTEUCCIA S. 37 LYSIMACHIA NUMM. 37 GEUM LACINIATUM 3 AGERATINA ALTISSIMA 3 PILEA PUMILA 1 ARISEMA PEREGRINUM 1 ② MATTEUCCIA S. 63 ALLIARIA PETIOLATA 9 PILEA PUMILA 3 LOBARIA CAROLINIS 1 LEERSIA VIRGINICUM 1	① SPAGANIUM EURYCARPUM 19 DRYOPTERIS HYDROPHYLLOIDES 37 LYTHRUM SALICARIA 9 ② SPARGANIUM EURYC. 37 LYTHRUM SALICARIA 19 LYSIMACHIA TERRESTRIS 9 PERSICARIA HYDROPIPEROIDES 3
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): __"moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	① MOSS 3 ② MOSS 3	① MOSS 3 ② MOSS 3	① NONE ② NONE	① NONE ② NONE
REMARKS			ON FLUVIAL TERRACE ADJACENT TO STREAMBANK	MARGIN OF VERNAL POOL

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 [1] 2-5% [3] 6-12% [9] 13-24% [19] 25-49% [37] 50-74% [63] 75-100% 87

date: initials: p. 4 of 5

TOPOGRAPHY / SOILS

Area: SMALL MAMMAL - 14 | Obs. pt #: 1

Community type: Floodplain Forest | (Regional alliance/community:)

Elevation:	Aspect: East (magnetic or true?)	Slope: Flat (measured or estimated?)	Microtopography: uneven ground with occasional large depressions (vernal Pools).
294 meters			

pH (note kit or meter type)

Topographic position: (P) low plain, level; T toe of slope; LS lower slope; MS middle slope; TB hillside terrace/bench; US upper slope; E cliff/ledge; C crest; M high plateau; N narrow valley; D drainage channel

Habitat patchiness (describe zones or patches if present): Patchy – open to forested areas → Herb, Shrub

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth:_____cm OR > 1 m_____

vonPost decomposition:_____

ALL SOILS:

DEPTH TO WATER TABLE:_____

DEPTH to OBSTRUCTION:_____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:
- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- lacustrine/fluvial
- marine
- aeolian
- other:

Surface:
- ____% Bedrock
- ____% Boulders (>50 cm)
- ____% Cobbles/Gravel
- 10 % Bare mineral soil
- ____% Organic soil
- 20 % Litter (note type) broadleaf/fern
- ____% Water
- 70 % Total vegetation
- ____ Other:

Average Texture:
- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:
- Igneous: granite, dioritic, gabbroic, other igneous _____
- Metamorphic: slate/phyllite, schist/gneiss, other metamorphic _____
- Sedimentary: limestone, other sedimentary _____
- details?

Soil stoniness:
- v. little (< 1%)
- moderate (2-25%)
- very (26-100%)

Drainage & moisture regime (see MAPPSS key):
- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:
- upland
- nontidal wetland: permanently flooded, semiperm'ly flooded, (seasonally flooded), saturated
- tidal - irregularly
- tidal - regularly: saltwater, brackish, freshwater
- unknown


PITTSFIELD
Fire Sta
Subsation
DAKES
MARION AVE
Edgemont Sch
SAMPSON PKWY
Park
Herberg Middle Sch
ABOVEGROUND
Williams Sch
HRVSWMA
Court Hill
Substa
East Part Cem
Morewood Lake
Hells Sch
Sackett
Gravel Pit
PIPELINE
Sackett Brook Park
Sykes Brook
RIVER
25′
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Ashley Reservoir
Sewage Treatment Plant
location of observation point 1
Substation
CORPORATE BOUNDARY
Mill Brook Reservoir
St Helena's Chapel
New Lenox
New Lenox Cem
Mill
Farnham Reservoir
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
Roaring
OCTOBER MOUNTAIN
STATE FOREST
510 000 FEET

NATURAL COMMUNITY SURVEY PART I: RECONNAISSANCE

Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: Housatonic River [C3] = Small Mammal trapsite 15			Date: 2 September 1998
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: Arthur Haines, Eugenie Moore	Town: Lenox County: Berkshire, MA (Biophysical Region:)	USGS 7.5' Quad: x15' 1:25,000 East Lee, MA	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.	Directions (if not obvious from topo or Maine Atlas): From parking lot, north of mill on Willow Creek Rd, walk to RR tracks and head north 1950 meters, turning right (east) and into forest 25 meters.

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: Circumneutral hardwood Swamp - Bur Oak Association	Community type: Floodplain forest - Silver Maple - false nettle - Sensitive fern association	Community type:
Soil: Primarily mineral	Soil: Alluvial	Soil:
Slope, aspect, topography: Flat, plain	Slope, aspect, topography: Flat, small island shelves	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 65 Quercus macrocarpa Acer rubrum Fraxinus nigra	Tree layer: Total cover (%): 70 Acer saccharinum	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 35 Carpinus caroliniana	Sapling / tall shrub layer: Total cover (%) 5 Acer saccharinum	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) 10 Spiraea alba Lindera benzoin	Shrub (1-2 m) layer: Total cover (%) 40 Cornus amomum	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 80 Osmunda regalis Onoclea sensibilis	Herb layer: Total cover (%) 90 Laportea canadensis Urtica dioica Impatiens capensis Matteuccia struthiopteris Pilea pumila	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) virtually absent	Bryoid layer: Total cover (%) essentially absent	Bryoid layer: Total cover (%)
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: none	Condition / evidence of human use: none	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

COMMUNITY SURVEY — PART II: DESCRIPTION

separate description forms for each notable natural community on reconnaissance page.

IERS / LOCATION

rea (specific/general): Housatonic River [C3]			Obs. Pt. #
Community type: Circumneutral Hardwood Swamp — Bur Oak Association		Adjacent communities: Circumneutral shrub swamp, Floodplain forest	
Quad: East Lee	(Lat/Long) Northing 4692700	Size (acres) of community EO (not site):	BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
Quadcode:)	(Lat/Long) Easting 0644400		

LASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	broad-leaf woody
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

DDITIONAL DATA FOR FORESTS

Tree canopy height:	Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):	
85 feet	① Quercus macrocarpa 32 in dbh, >170 years before present	Some large downed wood	
subcanopy trees? yes, a few Pinus strobus,			

ISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
No	no	No	No	Woods Pond has been impounded and flooded back into some areas that were forested.

Comment:

DDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

A.H. Field Book 8.27.98
pg. 7

Helenium autumnale Boehmeria cylindrica
Bromus kalmii
Ribes americanum
Lysimachia nummularia

Species list sketchy or basically complete?
Comment:
Relatively complete

VEGETATION PLOT DATA

Area: Houseknecht Rhein [?] EC 37	Obs. pt. #:
Community type: Bur oak association	(Regional alliance/community:)

LAYER	plot # 1A		1B		1C		1D	
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout	Quercus macrocarpa 15; Standing Dead 7; Acer rubrum 18		Quercus macrocarpa 10, 6; Acer rubrum 5; Fraxinus nigra 7, 7, 10		Acer rubrum 27, 6; Tsuga canadensis 9, 10		Quercus macrocarpa 16; Acer rubrum 5, 8, 9, 10, 14	
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	Carpinus caroliniana 9		Carpinus c. 63		Acer rubrum 9; Carpinus c. 19		Carpinus carol? 37; Ulmus americana 1	
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	Lindera benzoin 1		NA		Fraxinus nigra 1; Ilex verticillata 3		NA	
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	(1) Onoclea sens. 3; Equisetum sylvaticum 9; Smilax 1; Rubus pubescens 3; Elymus virginicus 1; Carex [illegible] 1; (2) Symphyotrichum lateriflorum 1; Onoclea sens. 9; Athyrium felix-f. 3; Toxicodendron radicans 3; Geum canadense 1		(1) Osmunda regalis 37; Onoclea sensibilis 1; (2) Equisetum syl. 3; Fraxinus nigra 1; Osmunda cinn. 3; Onoclea sen. 1; Thalictrum pub. 1		(1) Carex projecta 3; Onoclea sen. 3; Symphyotrichum lateriflorum 1; Chelone glabra 1; Equisetum sylv. 3; Carex cf. bromo. 3; Athyrium felix-f. 3; (2) Carex cf. brom. 3; Athyrium felix-f. 1; Onoclea sens. 3; Equisetum sylva. 3		(1) Onoclea s. 9; Athyrium f.-f. 3; Osmunda reg. 9; Carex projecta 3; (2) Osmunda reg. 63; Onoclea s. 1	
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): X "moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	NA		NA		(1) Moss 3; (2) Moss 0		(1) Moss 19; (2) Moss 1	
REMARKS								

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials: p. 3 of 7

Housatonic River C3

Community type: Bur Oak association

Obs. pt. #: 1

(Regional alliance/community:)

Elevation: 294 meters

Aspect: NA (magnetic or true?)

Slope: 0° (measured or estimated?)

Microtopography: Slightly uneven ground with shallow pits and few mounds.

pH (note kit or meter type)

Topographic position:

(P) low plain, level
T toe of slope
LS lower slope
MS middle slope
TB hillside terrace/bench
US upper slope
E cliff/ledge
C crest
M high plateau
N narrow valley
D drainage channel

Habitat patchiness (describe zones or patches if present): Relatively uniform

Pages 5-7 are observations that do not pertain to this exact site

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth: _____ cm OR > 1 m _____

von Post decomposition: _____

ALL SOILS:

DEPTH TO WATER TABLE: _____

DEPTH to OBSTRUCTION: _____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:

- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- (lacustrine/fluvial) alluvial
- marine
- aeolian
- other:

Surface:

- ____% Bedrock
- ____% Boulders (>50 cm)
- ____% Cobbles/Gravel
- ____% Bare mineral soil
- ____% Organic soil
- 40 % Litter (note type) broadleaf tree and fern
- ____% Water
- 60 % Total vegetation
- ____ Other:

Average Texture:

- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:

Igneous
- granite
- dioritic
- gabbroic
- other igneous

Sedimentary
- limestone
- other sedimentary

Metamorphic
- slate/phyllite
- schist/gneiss
- other metamorphic

details?

Soil stoniness:

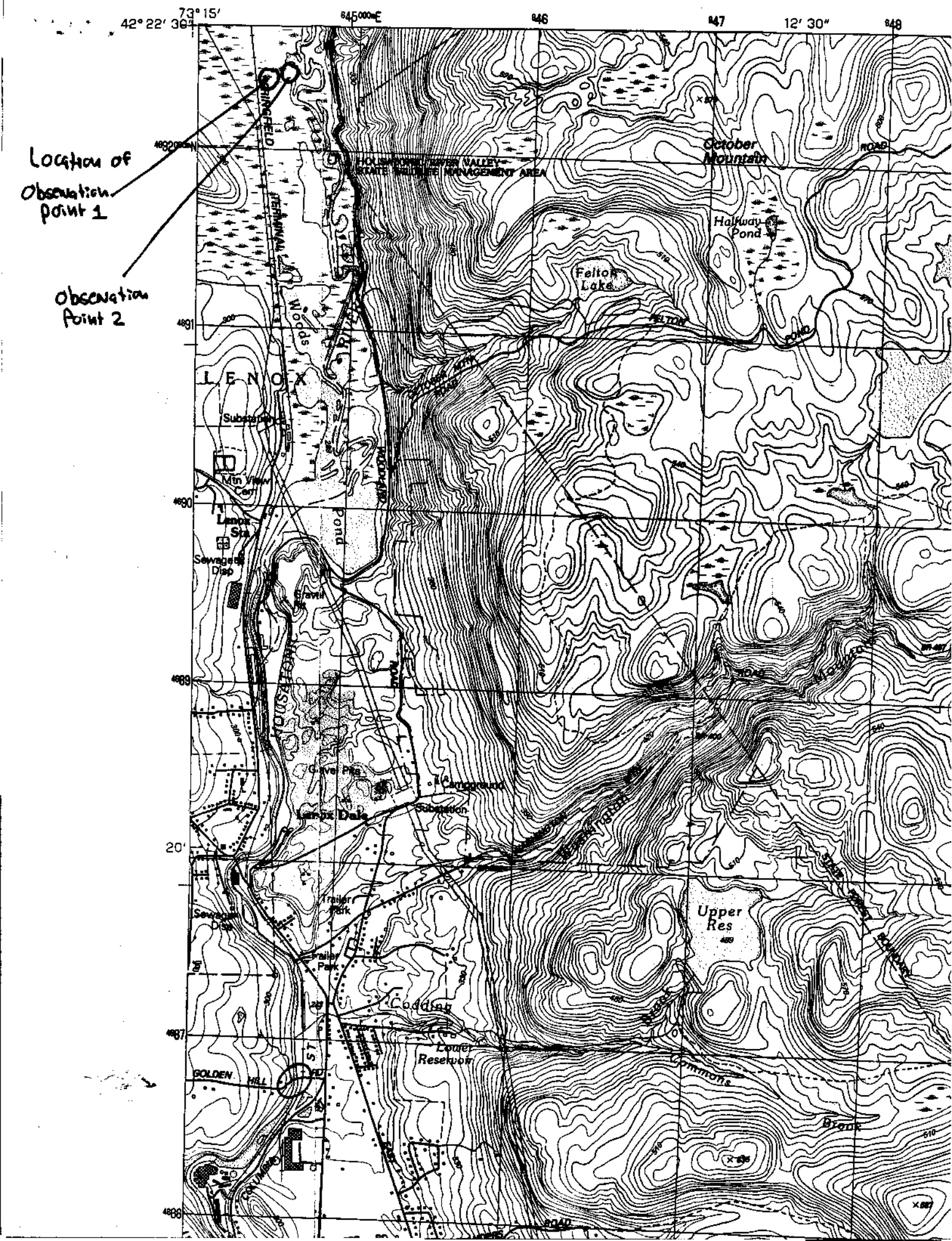
- v. little (< 1%)
- moderate (2-25%)
- very (25-100%)

Drainage & moisture regime (see MAPPSS key):

- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:

- upland
- nontidal wetland:
  - permanently flooded
  - semipermanently flooded
  - (seasonally flooded)
  - saturated
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown


Location of Observation Point 1
Observation Point 2
73° 15'
42° 22' 30"
545000mE
546
547
12' 30"
548
4692000mN
4691
4690
4689
4688
4687
4686
20'
PITTSFIELD
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
October Mountain
ROAD
Halfway Pond
Felton Lake
Woods
L E N O X
Substation
Min View Cem
Lenox Sta
Sewage Disp
Pond
Gravel Pits
Campground
Lenox Dale
Substation
Trailer Park
Trailer Park
Sewage Disp
Upper Res
Cobdins
Lower Reservoir
GOLDEN HILL
Commons
Brook
ROAD

NATURAL COMMUNITY SURVEY PART I: RECONNAISSANCE

Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: Small Mammal Trap site #13 (near waste water treatment plant)			Date: 25 August 1999
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: Arthur Haines (Kris Kennedy)	Town: Pittsfield County: Berkshire, MA (Biophysical Region:)	USGS 7.5' Quad: Pittsfield East (1:25,000)	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.

Directions (if not obvious from topo or Maine Atlas): from Pittsfield Sewage Plant, follow road north (through yellow gate) and through large open field to road east (on right). Follow road east to end (concrete structure) and continue east 100 meters into floodplain in a left-facing right-angle of river channel.

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: Floodplain forest	Community type:	Community type:
Soil: Alluvial silt loam	Soil:	Soil:
Slope, aspect, topography: Relatively flat plain	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 50 Acer saccharinum Acer negundo Ulmus americana	Tree layer: Total cover (%):	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 10 Ulmus americana Crataegus punctata Rhamnus frangula	Sapling / tall shrub layer: Total cover (%)	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) 10 Cornus sericea Cornus amomum	Shrub (1-2 m) layer: Total cover (%)	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 80 Matteuccia struthiopteris Laportea canadensis Urtica dioica	Herb layer: Total cover (%)	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) Essentially absent	Bryoid layer: Total cover (%)	Bryoid layer: Total cover (%)
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: Urban floodplain	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? 5.64 m tree cores? yes photos? yes	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

Observation Point 4	Observation Point 5	Observation Point 6
Community type:	Community type:	Community type:
Soil:	Soil:	Soil:
Slope, aspect, topography:	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____
Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____
Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____
Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____
Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use:	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

*STRATA are defined as:

TREE = canopy (if emergents present, note as "E");
SAPLING / TALL SHRUB = > 2 m tall and < 5 cm dbh: woody plants not forming tree canopy but > 2 m tall;
SHRUB = 1 - 2 m: woody plants 1 - 2 m tall;
HERB = < 1 m: all herbaceous vascular plants plus any woody plants < 1 m tall;
BRYOID = all ground-layer non-vascular plants.

NATURAL COMMUNITY SURVEY PART II: DESCRIPTION

--> complete separate description forms for **each** notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): Small Mammal Trapsite #13			Obs. Pt # 1
Community type: Floodplain Forest			Adjacent communities: Low Gradient Stream
Quad:	~~(lat:)~~ northing 4697670	Size (acres) of community EO (not site):	**BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO.** Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	~~(long)~~ easting 0644980		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FORESTS

Tree canopy height:	Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):
supercanopy trees? None	① Acer negundo 13 inch dbh, 79 feet tall, >30 ybp ② Ulmus americana 14 in DBH, 51 feet tall, 28 ybp ③ Acer Saccharinum 18 in DBH, 100 feet, >36 ybp ④ Ulmus americana 22 inch, 75 feet, 68 ybp ⑤ 54 in, 90 feet, 58 ybp	Moderate amounts composed primarily of tree limbs rather than downed trees. Diameter mostly < 10". Acer Saccharinum

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
No	No	No	Fields adjacent to community	No

comment: Urban flotsam (bottles etc.), tree house, structures and roads maintained for waste water treatment facility

ADDITIONAL SPECIES LIST Plant species Bird species

List additional plant species in community not included in the plot data that follows.

Impatiens capensis, Acer negundo, Phalaris arundinacea, Lythrum salicaria, Eupatorium maculatum, Solidago altissima, Cornus amomum, Crataegus punctata, Carex cf. radiata, Lysimachia nummularia, Symphyotrichum lateriflorum (Parsifera form), Circaea lutetiana, Bidens frondosa, Onoclea sensibilis, Solanum dulcamara, Oxalis stricta, Salix alba, Echinocystis lobata, Deschampsia cespitosa, Ulmus virginicus, Cirsa lattifolia

American Goldfinch, Wood duck, Rose-breasted grosbeak, American Crow, White-breasted nuthatch, Black capped chickadee, Blue Jay, Hairy Woodpecker, Spring Peeper

Species list sketchy or basically complete?
Comment: Moderate survey effort

date: initials: p. ____ of ____

VEGETATION PLOT DATA

Area: Small Mammal Trapsite #13 | Obs: pt. #: 1

Community type: Floodplain Forest | (Regional alliance/community:)

LAYER	plot # 1a	1b	1c	1d
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	ACER SACCHARINUM 18, 26, 20, 16	N/A	Ulmus americana 7 Acer negundo 14, 15, 9, 9	Acer saccharinum 26, 11, 19, 6, 24, 25, 10, 9 10, 14 * single multi stemed individual
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m^2	N/A	N/A	N/A	
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m^2	N/A	Ulmus americana 1	N/A	Cornus sericea 1
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m^2, 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① LEPORTA CANADENSIS 37 MATTEUCIA STRUTH. 9 CARDAMINE PRATENSIS 19 CINNA LATIFOLIA 19 PILEA PUMILA 9 GEUM CF. ALEPICUM 3 ② LEPORTA CANADE 1 BOEHMERIA CYLINDRICA 37 CINNA LATIFOLIA 3 SMOOTH SENSIBILIS 19 PILEA PUMILA 3 GALLIUM PALUSTRA 9 CARDAMINE PRATENSIS 63 IMPATIENS CAPENSIS 1 GEUM CF. LEPICUM 1	① Sicyos angulatus 9 Matteuchia struth 63 Persicaria sagittata 3 Pilea pumila 19 Fallopia scandense 3 Urtica dioica 3 Alliaria petiolata 1 ② Urtica dioica 37 Matteuchia struth 37 Rudbeckia laciniata 3 Alliaria petiolata 3 Myosotis scorpioides 3	① Matteuchia struth 37 Poa nemoralis 3 Alliaria petiolata 37 Viola cf. sororia 1 ② Matteuchia struth 37 Lysimachia nummularia 37 Alliaria petiolata 37 Geum canadense 1	① Pilea pumila 3 Myosotis scorpioides 3 Boehmeria cylindrica 3 Zanthoxylum tumorium 1 Leersia virginica 37 ② Alliaria pet. 37 Matteuchia struth 37 Sicyos angulatus 3
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): X "moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	① MOSS 1 ② N/A	① N/A ② N/A	① N/A ② N/A	
REMARKS	PORTIONS OF PLOT OCC. W/ FLOTSAM FROM RIVER CONS. OF SMALL BRANCHES + PLANT STEM			Herb quad #1 from erected pool

in box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 [1] 2-5% [3] 6-12% [9] 13-24% [19] 25-49% [37] 50-74% [63] 75-100% [87]

date: 25AUG99 initials: p. ____ of ____

TOPOGRAPHY / SOILS

Area: Small Mammal Trap Site 13 | Obs. pt. #: 2

Community type: Floodplain forest | (Regional alliance/community:)

Elevation: 294 meters

Aspect: Flat (magnetic or true?)

Slope: 0-10° (measured or estimated?)

Microtopography: Flat w/ depressions and channels

pH (note kit or meter type)

Topographic position:
- (P) low plain, level
- T toe of slope
- LS lower slope
- MS middle slope
- TB hillside terrace/bench
- US upper slope
- E cliff/ledge
- C crest
- M high plateau
- N narrow valley
- D drainage channel

Habitat patchiness (describe zones or patches if present): Forested w/ open areas of herbaceous vegetation and vernal pools

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth: _____ cm OR > 1 m _____

vonPost decomposition: _____

ALL SOILS:

DEPTH TO WATER TABLE: _____

DEPTH to OBSTRUCTION: _____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:
- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- (lacustrine/fluvial)
- marine
- aeolian
- other:

Surface:
- ____% Bedrock
- ____% Boulders (>50 cm)
- ____% Cobbles/Gravel
- 5 % Bare mineral soil
- ____% Organic soil
- 15 % Litter (note type) broad leaf
- ____% Water
- 80 % Total vegetation
- ____ Other: During high water events standing water

Average Texture:
- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:

Igneous
- granite
- dioritic
- gabbroic
- other igneous

_____

Metamorphic
- slate/phyllite
- schist/gneiss
- other metamorphic

_____

Sedimentary
- limestone
- other sedimentary

_____

details?

Soil stoniness:
- v. little (< 1%)
- moderate (2-25%)
- very (25-100%)

Drainage & moisture regime (see MAPPSS key):
- very poorly drained
- poorly drained
- somewhat poorly drained
- (moderately well drained)
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:
- upland
- nontidal wetland:
  - permanently flooded
  - semiperm'ly flooded
  - (seasonally flooded)
  - saturated
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown

date: initials: p. ____ of ____


PITTSFIELD
Fire Sta
Subsation
Pits
DAWES
MARION AVE
Egremont Sch
SAMPSON
Herberg Middle Sch
Williams Sch
ABOVEGROUND
HRVSWMA
Morewood Lake
Holmes Rd
Court Hill
Sackett
Gravel Pit
PIPELINE
East Part Cem
Sackett Brook Park
WASHINGTON
Location of Observation Point 1
RIVER
Sykes Brook
Gravel Pit
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Ashley Reservoir
Sykes Mountain
Sewage Treatment Plant
PITTSFIELD CORPORATE BOUNDARY
Substation
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
New Lenox Cem
Mill Brook Reservoir
Roaring
BM
L E N O X
HOUSATONIC
Sew Disp
Farnham Reservoir
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
STATE FOREST
25'

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1.Site name: ____________________ 2.Survey site name: 8-UP-1

3.Quad name(s) Pittsfield East (1:25,000) 4.Quad code(s): ________ 5.County name(s): Berkshire 6.County code(s): ________

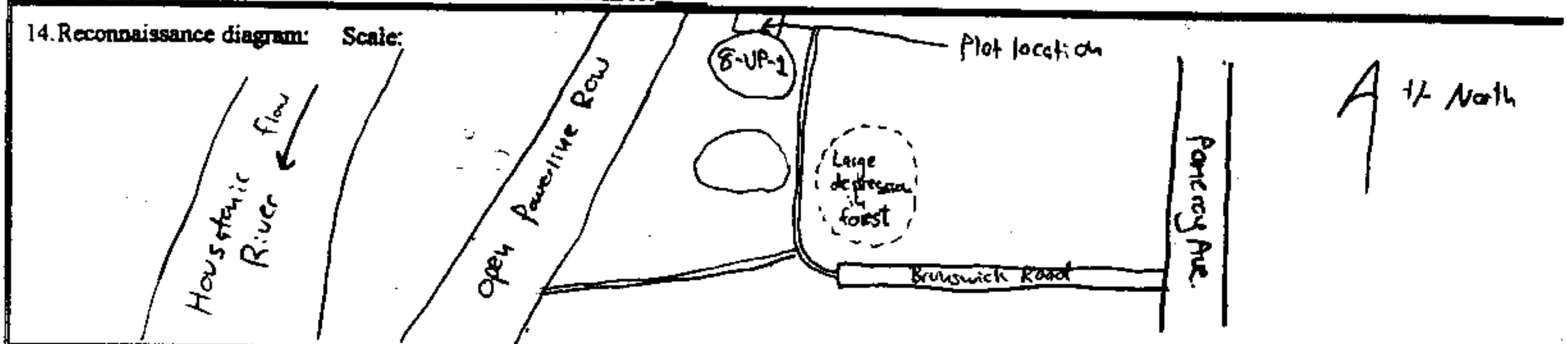
7.Town (LOCALJURIS): Pittsfield 8.Directions: Follow Brunswick Road (off Pomeroy Avenue) to its end. A small trail leads to the north along a raised terrace. The vernal pool is to the left (west), at the base of the terrace, +/- 50 meters from the end of the Brunswick Road.

9.Sourcecode: F00HAI01MAUS 10.Survey date 17 Aug 2000 11.State: MA

12.Surveyors: Arthur Haines, Kurt Kowalczyk

B. Topography 13. Transect

14.Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1___	Observation point 2___	Observation point 3___
16. Community name: Transitional floodplain forest 17. Additional data: Site form X form 3 X	Community name: ________ Additional data: Site form___ form 3___	Community name: ________ Additional data: Site form___ form 3___
18.General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Floodplain forest of Housatonic River, with species transitional to High terrace floodplain forest. Canopy dominated by Acer negundo, Acer platanoides, Ulmus americana, and Tilia americana. Shrubs almost entirely non-native — Lonicera morrowii, Rhamnus cathartica. Herbs are a mix of wetland and rich forest species — Onoclea sensibilis, Matteuccia struthiopteris, Persicaria virginiana, Solidago flexicaulis.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 17 August 2000 Today's Date: 17 August 2000
Type of Communtiy: Transform Floodplain forest Code:
Town: Pittsfield County: Berkshire Survey Site Name: S-VP-1
Surveyor Name(s): Arthur Haines, Kurt Korwacky
Directions to site: see site survey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
floodplain forest with species transitional to high terrace floodplain forest. Canopy mostly comprised of Acer negundo, locally (where plot performed) with Tilia americana and Ulmus americana. Shrubs non-native (Lonicera morrowii, Rhamnus cathartica, and in area - Ligustrum vulgare and Evonymus europaea). Dominant Herbs include Onoclea sensibilis, Matteuccia struthiopteris, Persicaia virginiana, and Solidago flexicaulis.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
High floodplain terrace of Housatonic River with many local depressions forming vernal pools (some of which are permanent). Floodwater channels, filled only during high-water events, are present in vicinity and appear much of the year and sandy, dry streambeds.

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Urban Pittsfield is located nearby and affects species composition (non-native plants). A small trail system also passes through forest. Open right of ways for powerlines and waste-water system have created field-like strips through floodplain that are commonly used for recreational paths.

Are there any rare species at this site? Please specify: Wood turtles observed near this plot

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley SWMA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications, if applicable, discuss why the community may no longer exist here): Invasive species — control of the species will be needed to preserve natural character of riparian communities.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Non-native plant species, open right-of-ways.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ____yes ____no ____unknown Protecting EO? ____yes ____no ____unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent **B** - Good **(C)** - Marginal **D** - Poor

Comments: Though fragmented and influenced by non-native species, the area provides an important wildlife corridor.

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent **B** - Good **(C)** - Marginal **D** - Poor

Comments:

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent **B** - Good **(C)** - Marginal **D** - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

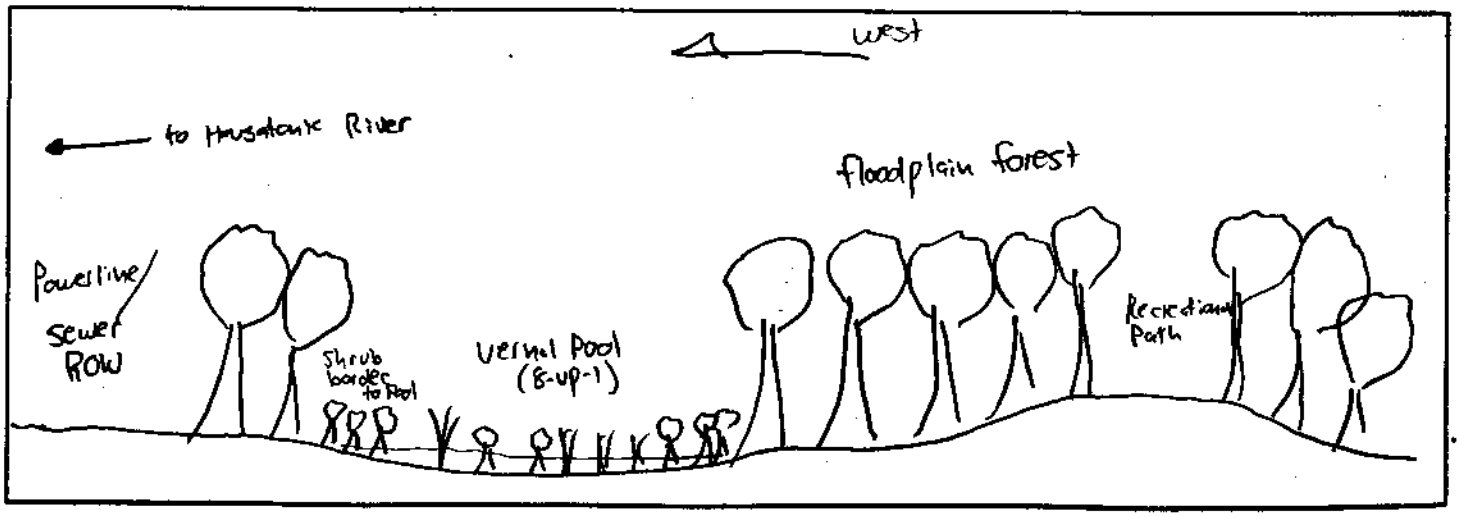
A - Excellent **B** - Good **(C)** - Marginal **D** - Poor

Comments:

EO Rank: (A summary of all factors listed above.) **A** - Excellent **B** - Good **(C)** - Marginal **D** - Poor

Comments: The floodplain forest is used by a tremendous number of plant and animal species and is part of a largely continuous forest corridor through Pittsfield. It also plays a major role in flood flow control.

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: 8-VP-1

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): _____ 17.State: _____ 10.Lat: N (UTM) 4699100 11.~~Long~~ 0644950 W E

12. Directions: See Community Form 1.

13.Sourcecode: FOOHALOIMAUS 14.Survey date 17 August 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines, Kurt Kanwecky

B. Environmental Description

19.Transect / Observation point # 1

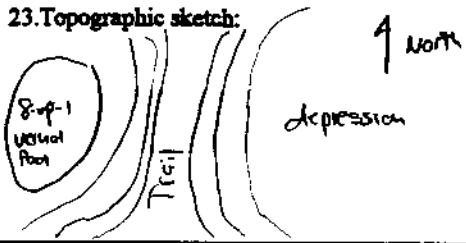
20.Image annotation # _____

21.Elevation: 298m ms

22.Topographic position:

- ___ Interfluve
- ___ Backslope
- ___ High slope
- ___ Step in slope
- ___ High level
- ___ Lowslope
- ___ Midslope
- ___ Toeslope
- X Low level
- ___ Channel wall
- ___ Channel bed
- ___ Basin floor
- ___ Other

23.Topographic sketch:



24.Slope degrees: 0-3°

25.Slope aspect: west

26.Parent material: _____

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:

- ___ Extremely dry
- X Somewhat wet
- ___ Very dry
- X Wet
- ___ Dry
- ___ Very wet
- ___ Somewhat moist
- ___ Moist
- ___ Permanently inundated
- X Periodically inundated high water events

32.Stoniness:

- _____ Stone free <0.1%
- _____ Moderately stony 0.1-1%
- _____ Stony 3-15%
- _____ Very stony 15-50%
- _____ Exceedingly stony 50-90%
- _____ Stone piles >90%

unknown

33.Soil drainage:

- ___ Rapidly drained
- ___ Somewhat poorly drained
- ___ Well drained
- X drained
- ___ Moderately well drained
- X Poorly drained
- ___ Very poorly drained

34.Average texture: unknown

- ___ sand
- ___ clay loam
- ___ sandy loam
- ___ clay
- ___ loam
- ___ peat
- ___ silt loam
- ___ muck

other _____

35.Unvegetated surface:

- ___ % Bedrock
- ___ % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Sand (0.1-2 mm)
- 30 % Bare soil
- 45 % Litter, duff
- 20 % Wood (> 1 cm) flotsam
- 5 % Water
- ___ % Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

37.Plot representativeness:

Fairly representative of floodplain forest, though some areas more heavily influenced by non-native species.

C. Vegetation 38.System: X Terrestrial ___ Palustrine ___ Estuarine 39.Plot number: 1 40.Plot dimensions: 20 x 20 m

41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:	
X Broad-leaf	X Deciduous	X Forest	___ Woodland
___ Semi-broad-leaf	___ Semi-deciduous	___ Sparse woodland	___ Scrub thicket
___ Semi-needle-leaf	___ Semi-Evergreen	___ Shrubland	___ Sparse shrubland
___ Needle-leaf	___ Evergreen	___ Dwarf shrubland	___ Dwarf scrub thicket
___ Graminoid	___ Perennial	___ Sparse dwarf shrubland	___ Non-vascular
___ Broad-leaf herbaceous	___ Annual	___ Herbaceous	
___ Pteridophyte		___ Sparsely vegetated	

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	27m	50
T3 Tree sub- canopy	10m	20
S1 Tall shrub	5m	10
S2 Short shrub	1 m	10
H Herbaceous	1 m	50
N Non-vascular	0.001	1
E Epiphyte	Absent	0
V Vine / liana	5 m	1

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D6-8c Acer platanoides 18,14	1:1	Viburnum opulus	r.1	Carex gracillima	+.2
Acer negundo 4,10,15,6	2:1	Ligustrum valgre	r.1	Fracsinum americana	r.1
Ulmus americana 9,6,4,6,8,11	2:1	Symphyotrichum lateriflorum	+.1	Hespiris matronalis	+.1
Fraxinus americana 6,5	1:1	Rhamnus cathartica	r.1	Agiratina altissima	r.1
Tillia americana 4,19,10	2-1	Carix grisea	r.2	Lonicera Morowii	2+.2
Quercus rubra 10	r.1	Carix appilachica	2-2		
D5r		Geum Candense	r.1		
Rhamnus cathartica r	+.1	Alliaria petiolata	2.1		
Ulmus americana	+.1	Mainthamum racemosum	+.1		
D4p:		Arisaema triphyllum	+.1		
Lonicera morrowii	r.1	Thalictrum pubescens	+.1	C1-5r	
Rhamnus cathartica	+.1	Carix bromoides	+.1	Vitis riparia	r.1
Fraxinus americana	r.1	Carix intumescens	+.1		
Fagus grandifolia	r.1	Boehmeria cylindrica	+.1		
Acer platanoides	r.1	Berberis thunbergii	1.2		
H1-3i		Solidago flexicaulis	+.1		
Persicaria virginiana	1.3	Polystichum acrostichoides	r.2		
Onoclea sensibilis	3.2	Acer saccharum	r.1		
Matteuccia struthiopteris	1.2	Prunus virginiana	r.1		
Athyathyrium felix-femina	+.2	Circaea lutetiana	r.1		
Cinna latifolia	+.1	Trillium erectum	r.1		

8-up-1


20 KM TO INTERSTATE 90
LENOX 12 KM
County Jail
LINCOLN ST
Substa
BM 303.2
BM 300.2
Silver Lake
St Lukes Hospital
High Sch
Branch
Goodrich Pond
BRATTLE BROOK
Deming Park
PITTSFIELD
Fire Sta
DAWES
MARION AVE
SAMPSON PKWY
WILLIAM
Egremont Sch
Herberg Middle Sch
4700
4699
HRVSWMA
Morewood Lake
Court Hill
Sackett
Gravel Pit
4698
PIPELINE
RIVER
25′
4697
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
4696
Substation
CORPORATE
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helena Chapel
4695
New Lenox
Mill Brook Reservoir

NATURAL COMMUNITY SURVEY PART I: RECONNAISSANCE

Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: RVP-1			Date: 31 Aug 99
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: AH KK	Town: PITTSFIELD County: BERKSHIRE (Biophysical Region:)	USGS 7.5' Quad: PITTSFIELD EAST (1:25,000)	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.

Directions (if not obvious from topo or Maine Atlas):
Off end of Brunswick Road, travel west along trail (along top of berm) for ca. 60 meters to vernal pool on left (at base of berm).

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: Floodplain Forest	Community type:	Community type:
Soil: Alluvial Silt-loam	Soil:	Soil:
Slope, aspect, topography: 0-30° Relatively flat except berm	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 80 Acer Saccharum Prunus Serotina Ulmus americana	Tree layer: Total cover (%):	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%): 25 Ulmus americana Acer Saccharum	Sapling / tall shrub layer: Total cover (%)	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%): 30 Lonicera Morrowii Berberis thunbergii Cornus Amomum	Shrub (1-2 m) layer: Total cover (%)	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%): 60 Solidago flexicaulis Dioclea Sinuata Maianthemum racemosum	Herb layer: Total cover (%)	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) Essentially None	Bryoid layer: Total cover (%)	Bryoid layer: Total cover (%)
Other diagnostic or notable species: Aegopodium podagraria	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: Trail and power line right-of-ways	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? 5.64 m tree cores? Yes photos? yes	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

Observation Point 4	Observation Point 5	Observation Point 6
Community type:	Community type:	Community type:
Soil:	Soil:	Soil:
Slope, aspect, topography:	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____
Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____
Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____
Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____
Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use:	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

* STRATA are defined as:

TREE = canopy (if emergents present, note as "E");
SAPLING / TALL SHRUB = > 2 m tall and < 5 cm dbh: woody plants not forming tree canopy but > 2 m tall;
SHRUB = 1 - 2 m: woody plants 1 - 2 m tall;
HERB = < 1 m: all herbaceous vascular plants plus any woody plants < 1 m tall;
BRYOID = all ground-layer non-vascular plants.

NATURAL COMMUNITY SURVEY PART II: DESCRIPTION

-> complete separate description forms for each notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): SVP-1			Obs. Pt. # 1
Community type: Floodplain Forest			Adjacent communities: Mesic Northern Hardwood Forest
Quad:	(Lat:) Northing 4699150	Size (acres) of community, EO (not site):	BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO. Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	(Long:) easting 0643990		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FOREST

Tree canopy height:	Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):	
supercanopy trees? No	① Ulmus americana 11 inch dbh, 84 feet high, 50 ybp ② Prunus serotina 13 dbh, 70 height, 40 ybp ③ Tilia americana 17 dbh, 70 height, ybp	Fairly scarce, mostly smaller branches (<10cm)	Shrub thicket immediately north of pool Cornus amomum * majority of woody stems. V. dense Acer negundo Vitis riparia - climbing box elder

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
No	No	No	No	No

comment: Powerline right-of-way adjacent to community. Relatively young forest.

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

Mimulus ringens -VP
Carex stipata VP
Boehmeria cylindrica -VP
Peltandra sagittata - VP
Impatiens capensis - VP
Urtica dioica-VP

Claytonia caroliniana observed in spring
Erythronium americanum
Osmorriza claytonii
Carex cephaloidea
Ligostrum vulgare
Aster schreberi
Maianthemum racemosum
Berberis thunbergerii
Echinocystis lobata
Smilax herbacea
Platanus occidentalis

Symphyotrichum lateriflorum
Rannus cathiritica
Acer saccharum
Aegipodium podagraria
Arisaema triflum
Allium tricoccum
Alliaria petiolata
Persicaria virginiana
Ulmus virginicus
Betula papyrifera
Fraxinus nigra

Species list sketchy or basically complete?
Comment: Moderate survey effort

date: initials: p. ____ of ____

VEGETATION PLOT DATA

Area: EVP-1	Obs. pt. #:
Community type: Floodplain Forest	(Regional alliance/community:)

LAYER	plot # 1A (VERNAL POOL)	1B	1C	1D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used (5.64 m radius for 1/100th ha) 7.98 m radius for 2/100th ha use same size throughout!	NONE	Acer platanoides 19 Tilia americana 17.	Prunus serotina 12 Quercus rubra 18 Acer saccharum 12	NONE
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	NONE	None	Acer saccharum 19 Cornus alternifolia 3 Ulmus americana 3 Cornus ammomum 3	NONE
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	NONE	None	Lonicera morrowii 37 Euonymus alatus 1	CORNUS AMMOMUM 3 VITIS RIPARIA 1
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① SCIRPUS CYPERINUS 37 SIUM SUAVE 3 PENTHORUM SEDOIDES 9 PERSICARIA PUNCTATA 19 LYTHRUM SALICARIA 3 LUDWIGIA PALUSTRIS 3 ② SIUM SUAVE 9 SCIRPUS CYPERINUS 19 LEERSIA ORYZOIDES 19 PERSICARIA HYDROPIPER 3 GALIUM PALUSTRE 1 PENTHORUM SEDOIDES 3 IMPATIENS TRIDALE 3	① Onoclea sensibilis 37 Athyrium filix-femena 19 Symphyotrichum lateriflorum 3 Cinna latifolia 1 Carex radiata 37 ② Athyrium f.-f. 37 Carex radiata 1 Ranus cathartica 1 Phanthemum race. 1 Fraxinus americanus 1 Epipactus helleborine 1	① Solidago flexicaulis 37 Aster divaricatus 3 ② Solidago flexicaulis 37 Circaea lutiana 3 Symphyotrichum cordifolium 1 Athyrium felix-femena 3 Carex sprengelii 3	① MATTEUCCIA STRUTHIOPTERIS 19 PERSICARIA SAGITTATA 9 BOEHMERIA CYLINDRICA 9 PHALARIS ARUNDINACEA 19 IMPATIENS CAPENSIS 1 ② MATT. STRUTHIOPTERIS 37 PHALARIS ARUNDINACEA 37 PERSICARIA VIRGINIANA 1
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): △"moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	① MOSS 19 ② Moss 37	① Moss Restricted to downed woody material 3 ② None	① None ② None	① ABSENT ② ABSENT
REMARKS			On berm, trail passes through	

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 [1] 2-5% [3] 6-12% 9) 13-24% 19 25-49% 37) 50-74% 63) 75-100% 87

date: initials: p. ____ of ____

TOPOGRAPHY / SOILS

Area: SVP-1 | Obs. pt. #: 1

Community type: Floodplain Forest | (Regional alliance/community:)

Elevation: 294 meters | Aspect: magnetic or true? | Slope: 0-5° up to 30° at edge of terrace/berm measured or (estimated)? | Microtopography: Relatively flat w/ large depressions (i.e. vernal pools)

pH (note kit or meter type)

Topographic position:
(P) low plain, level; T toe of slope; LS lower slope; MS middle slope; TB hillside terrace/bench; US upper slope; E cliff/ledge; C crest; M high plateau; N narrow valley; D drainage channel

Habitat patchiness (describe zones or patches if present):

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth:_____cm OR > 1 m_____

vonPost decomposition:_____

ALL SOILS:

DEPTH TO WATER TABLE:_____

DEPTH to OBSTRUCTION:_____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:
bedrock
talus slope
glacial till
moraine
esker/outwash
glacial delta
(lacustrine/fluvial)
marine
aeolian
other:

Surface:
____% Bedrock
____% Boulders (>50 cm)
____% Cobbles/Gravel
5 % Bare mineral soil
____% Organic soil
25 % Litter (note type) broadleaf, fern, and Grass-like Plants
____% Water
70 % Total vegetation
____ Other:

Average Texture:
gravel
sand
loamy sand / sandy loam
loam
silt loam
clay loams
sandy clay / clay
peat
muck

Bedrock type:
Igneous
granite
dioritic
gabbroic
other igneous
_____
Metamorphic
slate/phyllite
schist/gneiss
other metamorphic
_____
Sedimentary
limestone
other sedimentary
_____
details?

Soil stoniness:
v. little (< 1%)
moderate (2-25%)
very (26-100%)

Drainage & moisture regime (see MAPPSS key):
very poorly drained
poorly drained
(somewhat poorly drained)
moderately well drained
well drained
somewhat excessively drained
excessively drained

Hydrologic regime:
upland
nontidal wetland:
permanently flooded
semiperm'ly flooded
(seasonally flooded)
saturated - in pool
tidal - irregularly
tidal - regularly
saltwater
brackish
freshwater
unknown

date: initials: p. ____ of ____


PITTSFIELD
Fire Sta
Subsation
ABOVEGROUND
DAWES
MARION AVE
SAMPSON
WILLIAM
Egremont Sch
PKWY
Park
Herberg Middle Sch
Williams Sch
HRVSWMA
Subsats
East Part Cem
Count Hill
Sackett
Sackett Brook
Park
Morewood Lake
Hallo Sch
Gravel Pit
PIPELINE
RIVER
Sykes
Brook
Gravel Pit
Ashley Reservoir
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes
Mountain
CORPORATE
BOUNDARY
Substation
Mill Brook Reservoir
St Helenas Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill
Brook
HOUSATONIC
L E N O X
Sew Disp
Farnham Reservoir
Dewey Hill
OCTOBER MOUNTAIN
STATE FOREST
25'
510 000 FEET

NATURAL COMMUNITY SURVEY PART I: RECONNAISSANCE Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: 8-VP-2			Date: 24 SEPT 99
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: C.W. & A.H.	Town: Pittsfield County: Berkshire MA (Biophysical Region:)	USGS 7.5' Quad: Pittsfield East 1:25,000	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.

Directions (if not obvious from topo or Maine Atlas): Accessed off end of Brunswick Road, Southwest to Powerline ROW, and south along powerline to first trail/road on left (east). Follow east along trail ca. 70 meters to vernal pool on right (South).

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: Floodplain Forest	Community type:	Community type:
Soil: fluvial	Soil:	Soil:
Slope, aspect, topography: Relatively flat	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 75 Acer negundo Populus deltoides	Tree layer: Total cover (%):	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 10 Acer negundo Ulmus americana	Sapling / tall shrub layer: Total cover (%)	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) 25 Cornus ammomum Cornus sericea	Shrub (1-2 m) layer: Total cover (%)	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 70 Matteuccia struthiopteris Onoclea sensib Lysimachia nummularia Laportea canadensis Boehmeria cylindrica	Herb layer: Total cover (%)	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) Essentially absent	Bryoid layer: Total cover (%)	Bryoid layer: Total cover (%)
Other diagnostic or notable species: Ribes americanum Alliaria hesperus	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use:	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? 5.64 tree cores? yes photos? yes	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

Observation Point 4	Observation Point 5	Observation Point 6
Community type:	Community type:	Community type:
Soil:	Soil:	Soil:
Slope, aspect, topography:	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____
Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____
Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____
Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____
Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use:	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

* STRATA are defined as:

TREE = canopy (if emergents present, note as "E");
SAPLING / TALL SHRUB = > 2 m tall and < 5 cm dbh: woody plants not forming tree canopy but > 2 m tall;
SHRUB = 1 - 2 m: woody plants 1 - 2 m tall;
HERB = < 1 m: all herbaceous vascular plants plus any woody plants < 1 m tall;
BRYOID = all ground-layer non-vascular plants.

NATURAL COMMUNITY SURVEY PART II: DESCRIPTION

-> complete separate description forms for **each** notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): S-VP 2			Obs. Pt. #
Community type: Floodplain Forest			Adjacent communities: Low gradient Stream
Quad:	~~(Lat.)~~ Northing 4698820	Size (acres) of community, EO (not site):	**BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO.** Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	~~(Long.)~~ easting 0644200		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FORESTS

Tree canopy height	Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)	Deadwood (describe distribution, abundance, degree of decay):	
supercanopy trees?	① Ulmus americana 11 inch, 54 feet, 29 ybp	Little deadwood, mostly large branches ≈ 4 in dbh	Around the margin of VP 2 patches within these are thickets of Cornus amomum & some Cornus sericea
No	② Acer negundo 22 inch, 40 feet, +/- 42 ybp	Few logs ≈ 8 in dbh	
	③ Populus deltoides 26 inch dbh, 105 feet, 40 ybp		
	④ Acer saccharinum 20 inch, 75 feet, 32 ybp		

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
No	No	No	No	No

comment: Relatively young forest w open power line right of way in vicinity

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

VP Carex vesicaria	VP Lythrum salicaria	Ribes Americanum	Species list sketchy or basically complete? Comment:
VP Gallium palustre	VP Lycopus americanus	Populus delt. 28 dbh	Moderate survey effort
VP Rorippa palustris	VP Mentha arvensis	Scutellaria lateriflora	
VP Carex retrorsa	VP Calamagrostis canadensis	Persicaria virginiana	
VP Phalaris arundinacea	Rubus idaeus	Circaea lutetiana	
VP Juncus effusus	Geum aleppicum	Hesperis matronalis	
Parthenocissus quinquefolia	Rubus occidentalis	Agrostis alba/stolonifera	
Rhamnus cathartica	Arisaema triphyllum	Poa pratensis	
Euonymus europaea	Elymus virginicus	Cornus sericea	
		Prunus virginiana	

date: initials: p. ____ of ____

VEGETATION PLOT DATA

Area: 8-VP-2 | Obs. pt. #: 1

Community type: Floodplain Forest | (Regional alliance/community:)

LAYER	plot # 1-B ↔ 1-A.		1-C	1-D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	Acer rubrum 9 Populus treb. 10,6,8 Betula populifolia 3,4 Crataegus punc. 3,3,3 Ulmus americana 6,5 Alnus incana 3,3		None	Acer negundo 8,8,13,4	Acer negundo 12,8 Standing dead 4
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	Crataegus punc. 3 Cornus ammomum 3 Vitis riparia 1		None	Ulmus americana 9 Acer negundo 3	Acer negundo 1
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	Cornus ammomum 1		Cornus amomum 3	N/A	N/A
HERB ① cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	Solidago gigantea 3 Rubus pubescens 3 Athyrium filix-femina 9 Cardamine pratensis 19 Carex lacustris 9 Onoclea sensibilis 9		Persicaria penn. 63 Persicaria punctata 9 Leersia oryzoides 37 Boehmeria cylindrica 3	Boehmeria cylindrica 19 Onoclea sensibilis 19 Cinna latifolia 3 Pilea pumila 1 Geum cf. canadense 1	Lysomachia nummularia 87 Onoclea sensibilis 9 Cinna latifolia 3
②	Cardamine pratensis 3 Impatiens capensis 3 Ranunculus hispidus 3 Geum laciniatum 3 Carex projecta 3 Carex cf. appalachica 9		Scirpus cyperinus 63 Cuscuta gronovii 9 Persicaria punctata 37 Boehmeria cylindrica 3 Cardamine pratensis 3 Cornus amomum 3 Persicaria sagittata 1	Matteuccia struth. 3 Laportea canadensis 19 Cinna latifolia 3 Symphotrichum lat. 1 Pilea pumila 9 Carex cf. radiata 37 Carex appalachica 9	Matteuccia struth. 63 Alliaria petiolata 19 Lysomachia nummularia 10 Cinna latifolia 3 Thalictrum pubescens 3 Carex cf. radiata 1
BRYOID ① ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): __"moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	moss		NA	Lysomachia nummularia 1 NA	NA
②	moss		NA	NA	NA
REMARKS				Herb quad # 1 in low depression	

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials: p. ____ of ____

TOPOGRAPHY / SOILS

Area: 8-VP-2 | Obs. pt. #: 1

Community type: Floodplain Forest | (Regional alliance/community:)

Elevation: 294 m

Aspect: Flat (magnetic or true?)

Slope: 0-5° (measured or estimated?)

Microtopography: Relatively flat w/ several large depressions (Vernal Pools)

pH (note kit or meter type)

Topographic position:

- (P) low plain, level
- T toe of slope
- LS lower slope
- MS middle slope
- TB hillside terrace/bench
- US upper slope
- E cliff/ledge
- C crest
- M high plateau
- N narrow valley
- D drainage channel

Habitat patchiness (describe zones or patches if present):

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth:_____cm OR > 1 m_____

vonPost decomposition:_____

ALL SOILS:

DEPTH TO WATER TABLE:_____

DEPTH to OBSTRUCTION:_____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:

- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- (lacustrine/fluvial)
- marine
- aeolian
- other:

Surface:

- 0 % Bedrock
- 0 % Boulders (>50 cm)
- 0 % Cobbles/Gravel
- 5 % Bare mineral soil
- 0 % Organic soil
- 10 % Litter (note type) ~~broadleaf trees~~
- 5 % Water
- 80 % Total vegetation
- ____ Other:

Average Texture:

- gravel
- sand
- loamy sand / sandy loam
- loam
- silt loam
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:

Igneous
- granite
- dioritic
- gabbroic
- other igneous

_____

Metamorphic
- slate/phyllite
- schist/gneiss
- other metamorphic

_____

Sedimentary
- limestone
- other sedimentary

_____

details?

Soil stoniness:

- v. little (< 1%)
- moderate (2-25%)
- very (26-100%)

Drainage & moisture regime (see MAPPSS key):

- very poorly drained
- poorly drained
- somewhat poorly drained
- (moderately well drained)
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:

- upland
- nontidal wetland:
  - permanently flooded
  - semiperm'ly flooded
  - (seasonally flooded)
  - saturated
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown


PITTSFIELD
Location of Observation Point 2
HRVSWMA
Herberg Middle Sch
Williams Sch
Subsation
Substa
Court Hill
Sackett
East Part Cem
Morewood Lake
Gravel Pit
PIPELINE
Sykes
RIVER
25'
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Farnham Reservoir
Mill Brook Reservoir
CORPORATE
BOUNDARY
New Lenox
New Lenox Cem
St Helenas Chapel
HOUSATONIC
L E N O X
Dewey Hill
10,000 FEET
OCTOBER MOUNTAIN
STATE FOREST

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: 18-UP-2

3. Quad name(s) Pittsfield East 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

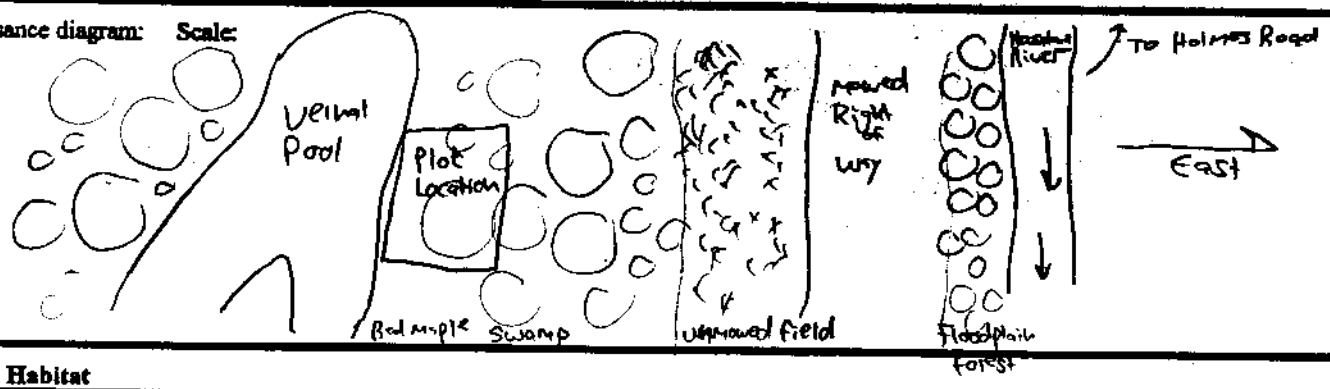
7. Town (LOCALJURIS): Pittsfield 8. Directions: From the Holmes Road, on the west side of the bridge over the Housatonic River, pass through a yellow gate and follow an open field/road south along river for 100 meters. Turn right (west) and walk directly into swamp until intersection with Vernal Pool.

9. Sourcecode: FOOHAIOCMAUS 10. Survey date 31 Aug 2004 11. State: MA

12. Surveyors: Arthur Haines, Lisa Kuroiwa

B. Topography 13. Transect 1

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: Red maple swamp 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form ___ form 3 ___	Community name: _____ Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Red Maple Swamp with some early successional trees and Pinus Strobus (adjacent to field). Other dominent trees include Ulmus americana, Populus tremuloides, and Betula populifolia. Shrub layer largely comprised of dense Cornus amomum thickets. Herb layer filling gaps between shrubs in understory. Dominated by Onoclea sensibilis, Cinna latifolia, Symphyotrichum lateriflorum, and Cardamine pratensis.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 __	Observation Point 6 __	Observation Point 7 __
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 31 August 2000 Today's Date: 13 October 2000
Type of Communtiy: Red Maple Swamp Code:
Town: Pittsfield County: Berkshire Survey Site Name: 18-VP-2
Surveyor Name(s): Arthur Haines, Lisa Kuroky9
Directions to site: see Community form 1.

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Forested Swamp dominated by Acer rubrum, Betula populifolia Ulmus americana, and Populus tremuloides. Understory strongly dominated by Cornus amomum in large, dense tangles. Herbaceous species largely filling space between shrub thickets and comprised mainly of facultative wetland plants

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Relatively level topography that is flooded from adjacent vernal pool During high water events. Residential Areas surround forest on two sides. An open field for Sewer Access lies to the east. Vernal Pool located to the west is surrounded by dense border of Cornus amomum and used by several herpetiles for breeding (Rana sylvatica, Rana pipiens, Pseudacris cucifer).

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Residential use on two sides of Swamp fragment, open to east for Sewer access (open field). This swamp is part of a largely continuous, narrow strip of forested community that forms a wildlife corridor through much of Pittsfield, Lenox, and Lee.

Are there any rare species at this site? Please specify: none observed

Management / Ownership

Is this area part of a managed conservationa area: Yes Managed Area Name: Housatonic River State WMA.
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here):
Threatened by PCB contamination and mediated, in part, by cleanup of source areas.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Area likely cleared in recent past as evidenced by early successional Trees.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good C - Marginal (D) - Poor

Comments: Fragmented by Urbanization, with Many non-native species

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good C - Marginal (D) - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

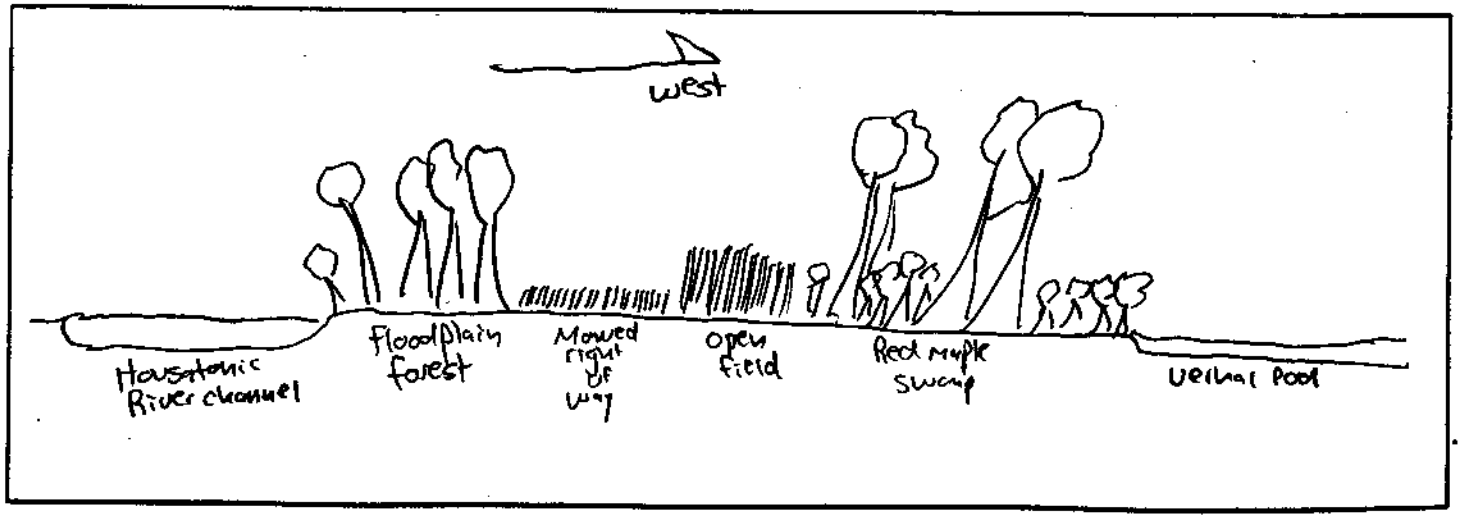
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public Ownership of Property

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: Though of low rank, site does provide important wildlife habitat for the local area

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: 18-UP-2

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Pittsfield 17.State: MA 10.Lat: N 4698450 11.Long 0644820 W E

12. Directions: See Community Form 1.

13.Sourcecode: FOOHAIOI MAUS 14.Survey date 31 August 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Lisa Kurovya

B. Environmental Description

19.Transect / Observation point #

20.Image annotation #

21.Elevation: ca. 295 meters

22.Topographic position:
- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- ___High level
- ___Lowslope
- ___Midslope
- ___Toeslope
- X Low level
- ___Channel wall
- ___Channel bed
- ___Basin floor
- ___Other

23.Topographic sketch:

24.Slope degrees: 0-5°

25.Slope aspect: west

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:
- ___Extremely dry
- X Somewhat wet
- ___Very dry
- ___Wet
- ___Dry
- ___Very wet
- ___Somewhat moist
- ___Moist
- ___Permanently inundated
- X Periodically inundated

32.Stoniness:
- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

unknown

33.Soil drainage:
- ___Rapidly drained
- X Somewhat poorly drained
- ___Well drained
- ___Poorly drained
- ___Moderately well drained
- ___Very poorly drained

34.Average texture:
- ___ sand
- ___clay loam
- ___sandy loam
- ___ clay
- ___loam
- ___ peat
- X silt loam
- ___muck

other _____

35.Unvegetated surface:
- ___ % Bedrock
- ___ % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Sand (0.1-2 mm)
- 20 % Bare soil
- 65 % Litter, duff
- 10 % Wood (> 1 cm)
- 5 % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Local Area heterogeneous as to plant communities, alternates between shrub thickets and open-understory swamp with nearby vernal pool and open field.

37.Plot representativeness:

Relatively representative

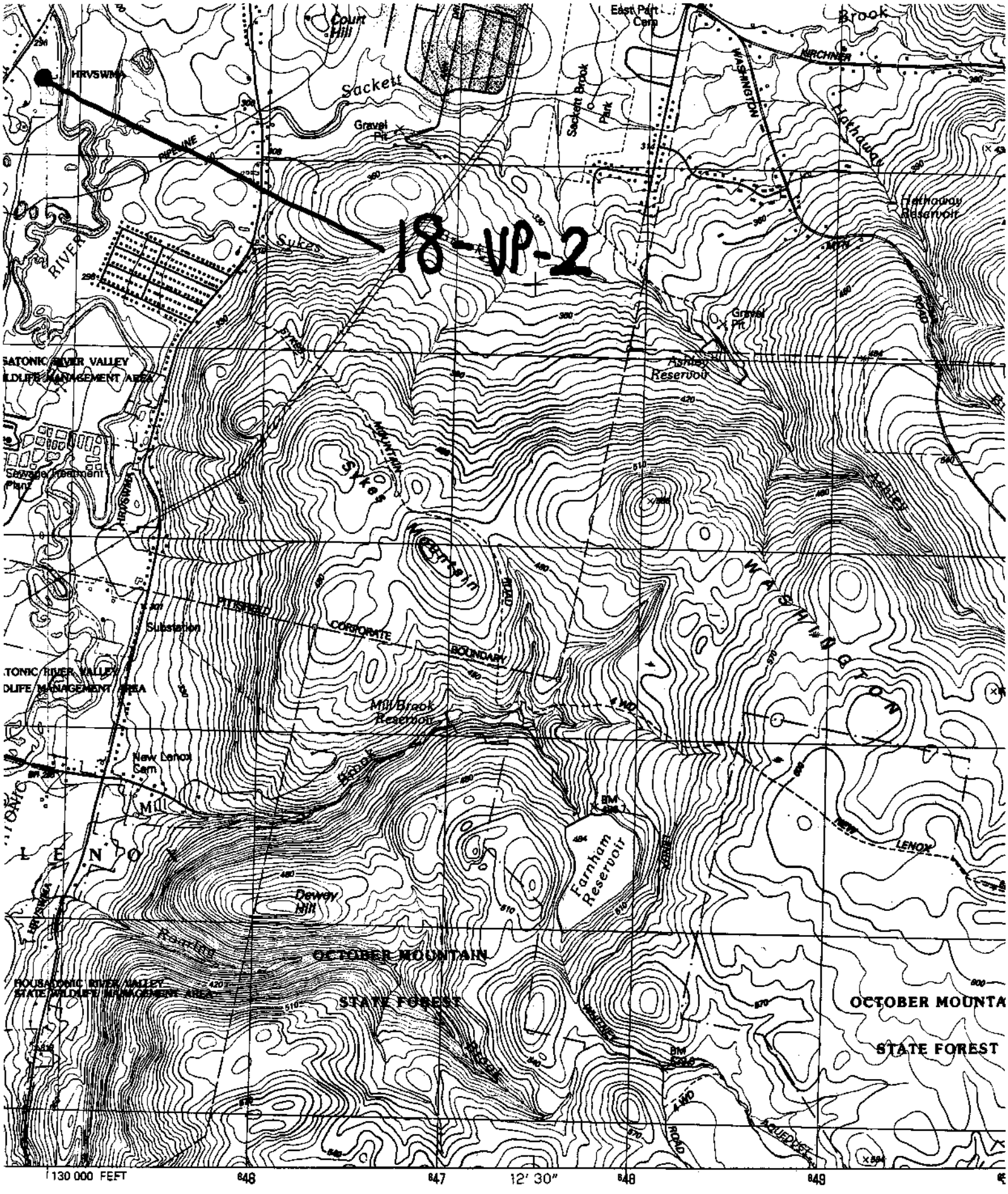
C. Vegetation 38.System: ___ Terrestrial X Palustrine ___ Estuarine 39.Plot number: ___ 40.Plot dimensions: 20 X 20 meters

41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:	
X Broad-leaf	X Deciduous	X Forest	___ Woodland
___ Semi-broad-leaf	___ Semi-deciduous	___ Sparse woodland	___ Scrub thicket
___ Semi-needle-leaf	___ Semi-Evergreen	___ Shrubland	___ Sparse shrubland
___ Needle-leaf	___ Evergreen	___ Dwarf shrubland	___ Dwarf scrub thicket
___ Graminoid	___ Perennial	___ Sparse dwarf shrubland	___ Non-vascular
___ Broad-leaf herbaceous	___ Annual	___ Herbaceous	
___ Pteridophyte		___ Sparsely vegetated	

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	25m	50
T3 Tree sub- canopy	10m	20
S1 Tall shrub	2m	50
S2 Short shrub	1m	5
H Herbaceous	1m	35
N Non-vascular	0.001m	1
E Epiphyte	Absent	0
V Vine / liana	5m	5

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or (inches).

D6-7; [redacted]		Carex projecta	+.2		
Ulmus americana 12,15	1.1	Athyrthium felix-femina	+.2		
Acer rubrum 15,22,15,13	2+.1	Galium trifidum	+.2		
Betula populifolia 5,	+.1	Lysimichia ciliata	r.1		
Populus tremuloides 14,5,11	2+.1	Juglands cinerea	r.1		
D5r		Cardamine pratensis var. pratensis	1.2		
Rhamnus cathartica	+.2	Solidago gigantea	r.1		
Populus tremuloides	r.1	Impatiens capensis	+.2		
D4i		Iris versicolor	r.2		
Cornus amomum var. amomum	4.4	Lonicera Morrowii	+.2		
Viburnum dentatum	+.2	Alliaria petiolata	r.1		
Rhamnus cathartica	r.1				
H1-3i		C1-4r			
Onoclea sensibilis	1.2	Vitis riparis	2.2		
Persicaria punctata	+.2				
Cinna latifolia	1.1				
Symphyotricum lateriflorum	+.1				
Persicaria virginiana	r.1				
Arisaema triphyllum	r.1				
Spiraea alba var. latifolia	+.2				
Cornus amomum	+.1				


18-VP-2
Court Hill
East Part Cem
Brook
HRVSWMA
Sackett
Gravel Pit
Sackett Brook Park
WASHINGTON
NIRCHNER
Hathaway
Hathaway Reservoir
PIPELINE
RIVER
Sykes
Gravel Pit
Ashley Reservoir
ROAD
Sewage Treatment Plant
HRVSWMA
Substation
PUSHER
CORPORATE
BOUNDARY
Mill Brook Reservoir
New Lenox Cem
Mill
Brook
L E N O X
Farnham Reservoir
NEW LENOX
Dewey Hill
OCTOBER MOUNTAIN
STATE FOREST
OCTOBER MOUNTA
STATE FOREST
130 000 FEET
12' 30"
KILOMETERS
MILES

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: 23B-VP-1

3. Quad name(s) PITTSFIELD EAST (1:25,000) 4. Quad code(s): _____ 5. County name(s): BERKSHIRE 6. County code(s): _____

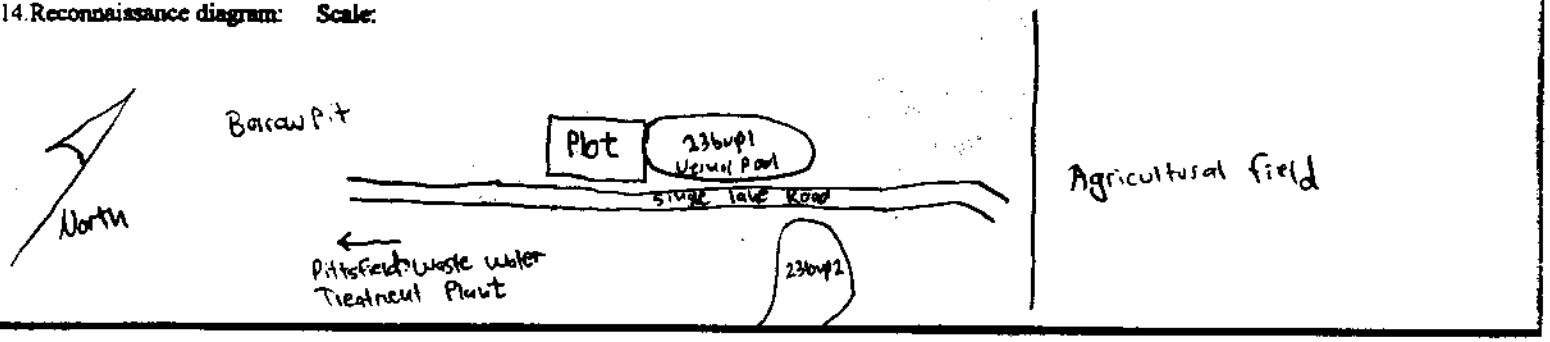
7. Town (LOCALJURIS): PITTSFIELD 8. Directions: From Holmes Road, take Utility Drive toward Waste water treatment Plant. Before Reaching office Buildings, turn left on gravel road through yellow gate. Continue east on gravel road, which turns northeast. follow gravel road through open borrow pit, and downhill to pool on left side of gravel road. Distance from gate to pool along gravel road is approximately 500 meters.

9. Sourcecode: FOOHAI 01 MAUS 10. Survey date 7 JUNE 2001 11. State: MA

12. Surveyors: ARTHUR HAINES, KURT KACWINSKY

B. Topography 13. Transect 1

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1___	Observation point 2___	Observation point 3___
16. Community name: Successional northern hardwoods 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form___ form 3___	Community name: _____ Additional data: Site form___ form 3___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Early Successional trees growing in sparse spacing on disturbed, Sandy slope of borrow pit at edge of vernal pool. Populus deltoides, Populus tremuloides, Betula papyrifera — trees Salix eriocephala, Cornus amomum — shrubs Solidago Juncea, Poa compressa, Equisetum variegatum — herbs	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form___ form 3____	Community name:_____ Additional data: Site form___ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 7 June 2000 **Today's Date:** 7 June 2000
Type of Communtiy: Early successional forest **Code:**
Town: Pittsfield **County:** Berkshire **Survey Site Name:** 23bvP1
Surveyor Name(s): Arthur Haines, Kurt Karwacky
Directions to site: See Site Survey Summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure): Early successional and colonizing plant species growing on slope of abandoned borrow pit. Common species include Populus deltoides, Populus tremuloides, Betula papyrifera, Salix eriocephala, Cornus amomum, Solidago juncea, Poa Complessa, and Equisetum variegatum.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards): Plot located in an abandoned Borrow Pit Adjacent to vernal Pool, Substrate consists of sand, vernal pools located in depressions of excavation.

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Immediate area is within abandoned borrow pit. Agricultural fields (both fallow and in use) as well as Pittsfield Waste Water Treatment plant in local area.

Are there any rare species at this site? Please specify: Equisetum variegatum.

Management / Ownership

Is this area part of a managed conservationa area: yes **Managed Area Name:** Housatonic River Valley SWA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): Recreational motorbike traffic and continued gravel mining would threaten existing plant communities.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Excavation for Sand mining.

Owner Information

Owner's Name: Commonwealth of MA Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Area heavily impacted by gravel mining, but with plant EO's

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good C - Marginal (D) Poor

Comments:

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good C - Marginal (D) Poor

Comments: Community will succeed without intervention

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

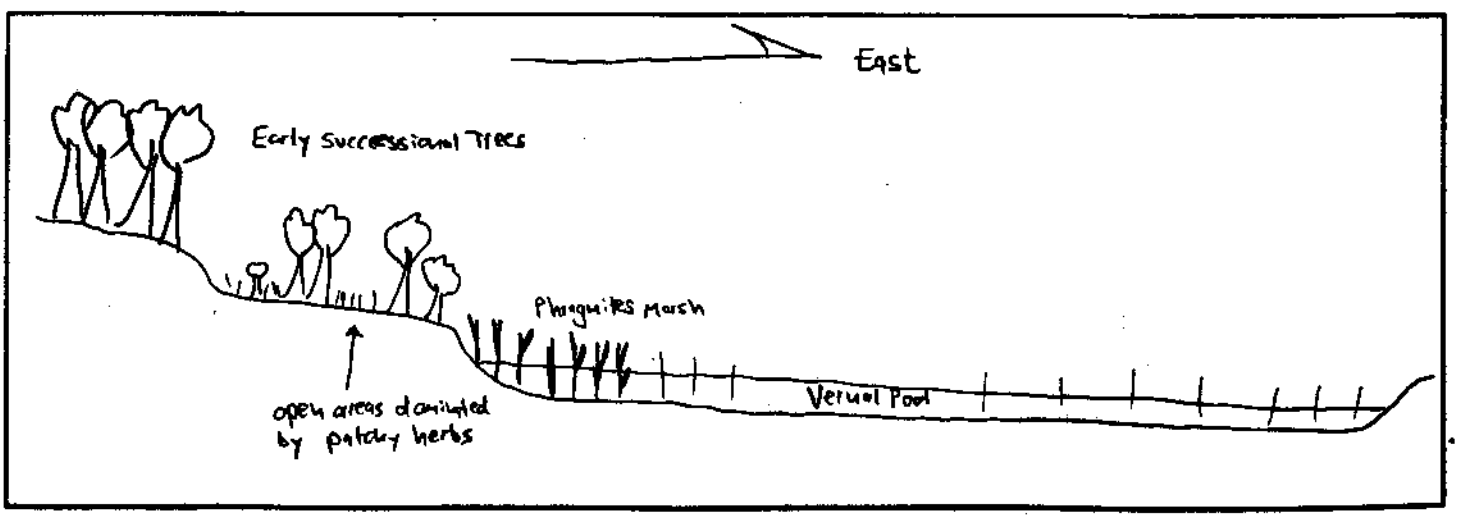
A - Excellent B - Good (C) Marginal D - Poor

Comments:

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good C - Marginal (D) Poor

Comments:

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: 23bup1 4.Survey site name: 23B-VP-1

5.Quad name(s): PITTSFIELD EAST 6.Quad code(s): 42073-DL-TM-025 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Pittsfield 17.State: MA 10.~~Lat~~ Northing 4696875 11.~~Long~~ easting 0644875 W

12. Directions: See site Survey Summary

13.Sourcecode: _____ 14.Survey date 7 June 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines, Kurt Kiewacky

B. Environmental Description

19.Transect / Observation point #

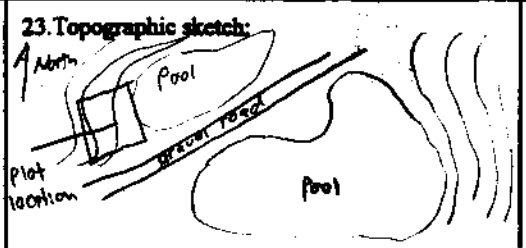
20.Image annotation #

21.Elevation: 294 meters

22.Topographic position:

- ___Interfluve
- ___High slope
- ___High level
- ___Midslope
- ___Low level
- ___Channel bed
- ___Other
- ___Backslope
- ___Step in slope
- ___Lowslope
- X Toeslope
- ___Channel wall
- ___Basin floor

23.Topographic sketch:



24.Slope degrees: 0-10°

25.Slope aspect: East

26.Parent material: unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

$\bar{X}$ pH of pool = 6.89

31.Soil moisture regime:

- ___Extremely dry
- ___Very dry
- 9 Dry
- ___Somewhat moist
- ___Moist
- ___Wet
- ___Very wet
- ___Permanently inundated
- ___Periodically inundated

32.Stoniness:

- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

unknown

33.Soil drainage:

- ___Rapidly drained
- ___Well drained
- ___Moderately well drained
- ___Somewhat poorly drained
- ___Poorly drained
- ___Very poorly drained

34.Average texture:

- 9 sand
- ___sandy loam
- ___loam
- ___silt loam
- ___clay loam
- ___clay
- ___peat
- ___muck

other _____

35.Unvegetated surface:

- ___ % Bedrock
- ___ % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- 70 % Sand (0.1-2 mm)
- ___ % Bare soil
- 30 % Litter, duff
- ___ % Wood (> 1 cm)
- ___ % Water
- ___ % Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Community is heterogeneous as slope, hydrology, and vegetation. Most of site is relatively xeric, but low depressions are filled with water. Plants are not uniformly distributed.

37.Plot representativeness: Plot taken at one end of pool and somewhat representative of vegetated

C. Vegetation 38.System: ∝ Terrestrial ___ Palustrine ___ Estuarine 39.Plot number: 1 40.Plot dimensions: 20m x 20m

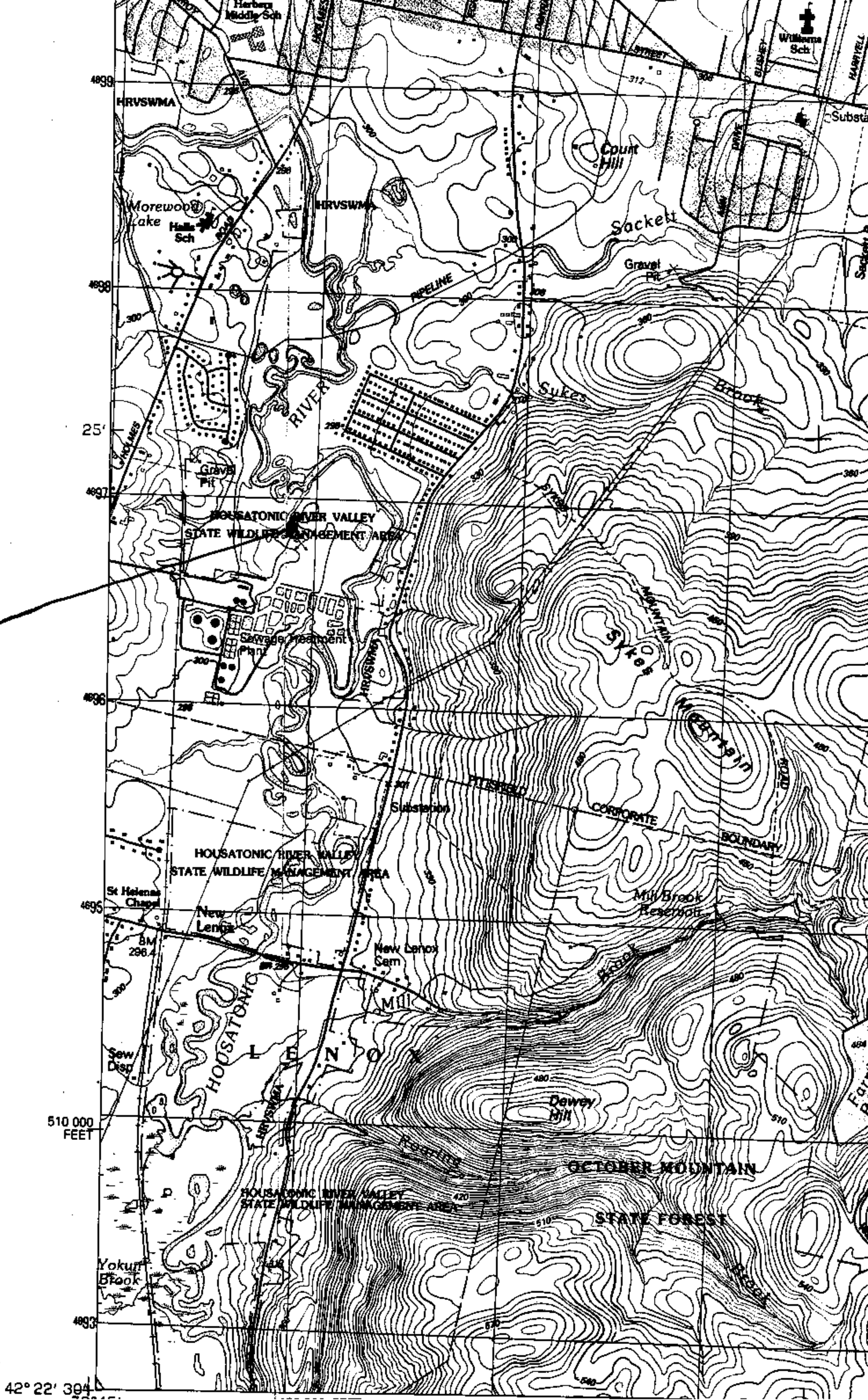
41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:	
∝ Broad-leaf	∝ Deciduous	___ Forest	∝ Woodland
___ Semi-broad-leaf	___ Semi-deciduous	___ Sparse woodland	___ Scrub thicket
___ Semi-needle-leaf	___ Semi-Evergreen	___ Shrubland	___ Sparse shrubland
___ Needle-leaf	___ Evergreen	___ Dwarf shrubland	___ Dwarf scrub thicket
___ Graminoid	___ Perennial	___ Sparse dwarf shrubland	
___ Broad-leaf herbaceous	___ Annual	___ Herbaceous	___ Non-vascular
___ Pteridophyte		___ Sparsely vegetated	

44.	height	% cover
T1 Emergent tree	N/A	0
T2 Tree canopy	N/A	0
T3 Tree sub-canopy	16m	25
S1 Tall shrub	10m	10
S2 Short shrub	5m	5
H Herbaceous	2m	50
N Non-vascular	0.001m	1
E Epiphyte	N/A	0
V Vine / liana	1m	1

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D6p		PICEA GLAUCA	r.1	EQUISETUM VARIEGATUM	2.4
POPULUS DELTOIDES - 6, 7, 7, 5, 8, 4, 8	+.1	QUERCUS RUBRA	r.1	PANICUM ACUMINATUM	r.2
POPULUS TREMULOIDES - 4, 5, 4, 5	2.1	SALIX BEBBIANA	+.1	ERIGROSTIS PECTINACEA	r.1
BETULA PAPYRIFERA - 4, 4, 5, 4, 4, 4	2.1	VITIS RIPARIA	r.1	LYTHRUM SALICARIA	1.2
PINUS STROBUS - 10, 8	r.1	LONICERA MORROWEI	+.1	PHRAGMITES AUSTRALIS	1.3
SALIX ALBA	+.1			LYCOPUS ANDRICANUS	+.1
		H1-3p		SPIREIE ALBA	r.1
D4-9r		EUPHORBIA CYPERISSIUS	+.2	GALIUM cf. TINCTORIUM	+.2
POPULUS TREMULOIDES	2.1	SYMPHIOTRICHUM ERICOIDES	+.1	CAREX cf. GARBERI	+.2
POPULUS GRANDIDENTATA - 6,	+.1	SAPONARIA OFFICINALIS	+.2		
CORNUS AMMOMUM	r.2	MELILOTUS OFFICINALIS	+.1		
QUERCUS RUBRA	r.1	ASCLEPIA SYRIACA	r.1		
SALIX ERIOCEPHELA	+.2	SOLIDAGO JUNCEA	2.2		
BETULA PAPYRIFERA	r.1	POA COMPRESSA	2.1		
POPULUS DELTOIDES	r.1	HYPERICUM PERFORATUM	+.1		
		HIERACEUM PILOSELLOIDES	+.1		
D2-3r		ACHILLEA MILLIFOLIUM	+.1		
CORNUS AMM.	1.2	PLANTAGO LANCEOLATA	r.1		
ACER RUBRUM	r.1	RUDBECKIA HIRTA	r.1		
POPULUS TREM.	1.1	FREGARIA VIRGINIANA	1.2		
PINUS STROBUS	r.1	CENTAUREA MACULOSA	1.2		

23bvp1


Herberg Middle Sch
Williams Sch
Substa
HRVSWMA
Count Hill
Morewood Lake
Halls Sch
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes Brook
Gravel Pit
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes Mountain
PITTSFIELD CORPORATE BOUNDARY
Substation
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
Mill Brook
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
Roaring
OCTOBER MOUNTAIN STATE FOREST
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
Brook
25'
42° 22' 30"

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1.Site name: _____ 2.Survey site name: 23bup2

3.Quad name(s) Pittsfield East (1:25,000) 4.Quad code(s): _____ 5.County name(s): Berkshire 6.County code(s): _____

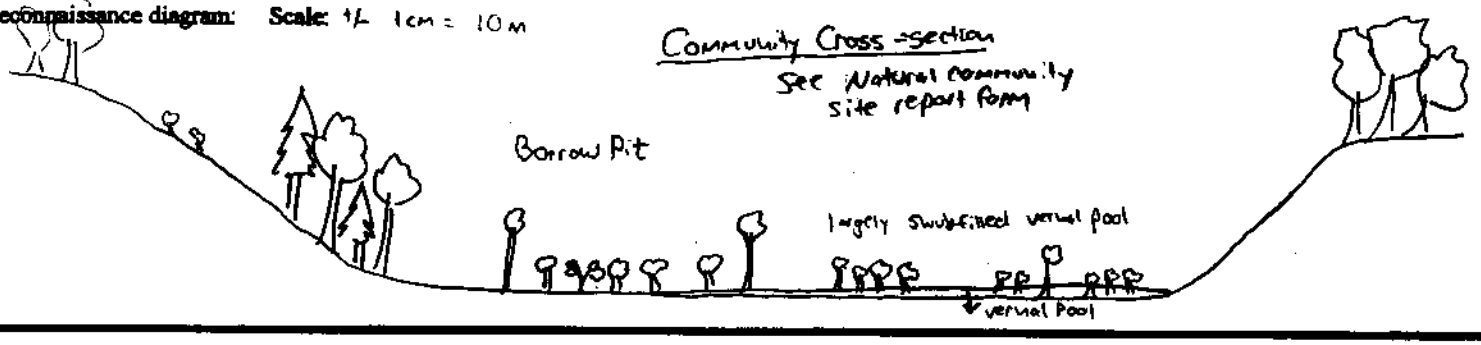
7.Town (LOCALJURIS): Pittsfield 8.Directions: Drive down the Utility Road (from Holmes Road) under a Railroad trestle to a left turn (northeast) onto a single-lane road at a yellow gate. Pass through gate and follow road to east (road the bends north through forest) through a gravel pit to a second large excavation with 2 roadside pools (on on each side of the road). Plot performed on south side of right hand (east) pool.

9.Sourcecode: FOOHAIO1MAUS 10.Survey date 8 June 2000 11.State: MA

12.Surveyors: Arthur Haines, Kurt Kanwacky

B. Topography **13. Transect**

14.Reconnaissance diagram: Scale: 1cm = 10m



C. Vegetation / Habitat

15. Observation point 1___	Observation point 2___	Observation point 3___
16. Community name: Successional northern hardwoods 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form___ form 3___	Community name: _____ Additional data: Site form___ form 3___
18.General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Early successional forest with an open, sparse canopy. Dominant trees include Populus deltoides, Populus tremuloides, and Pinus strobus. Shrubs include Salix bebbiana, Salix eriocephala, and Salix discolor. Frequent herbs include Equisetum hyemale, Poa compressa, Solidago altissima, and Vicia cracca.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 8 June 2000 Today's Date: 8 June 2000
Type of Communtiy: Successional northern hardwoods Code:
Town: Pittsfield County: Berkshire Survey Site Name: 23bup2
Surveyor Name(s): Arthur Haines, Kurt Kornacky
Directions to site: See site survey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure): Canopy ranging from scattered individuals to dense thickets of young trees. Dominants include Populus tremuloides, Populus deltoides, and Pinus strobus. Common shrubs are Salix bebbiana, Salix discolor, and Salix eriocephala. Herbs common to site are Poa compressa, Equisetum hyemale, Solidago altissima, and Vicia cracca.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards): Large depression of abandoned borrow pit. Bottom of pit occupied by shrub-filled pool surrounded by shrubs and small trees on border and top of bank. Sand substrate.

Surrounding Land Use (physical structures and land use practices in the surrounding area): Agricultural fields / both fallow and in-use agricultural fields adjacent to Housatonic River. Pittsfield waste water treatment plant located nearby.

Are there any rare species at this site? Please specify: Equisetum variegatum occurs in vicinity

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley SWMA.
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications, if applicable, discuss why the community may no longer exist here): Continued gravel mining and motor bike traffic.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna): Gravel mining and motor bike disturbance. Site was cleared for gravel mining in recent past.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good C - Marginal (D) - Poor

Comments: Community limited in size and bordered by other altered communities

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good C - Marginal (D) - Poor

Comments: Topography, hydrology, and species composition altered by gravel mining

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Site utilized by Motocross riders

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

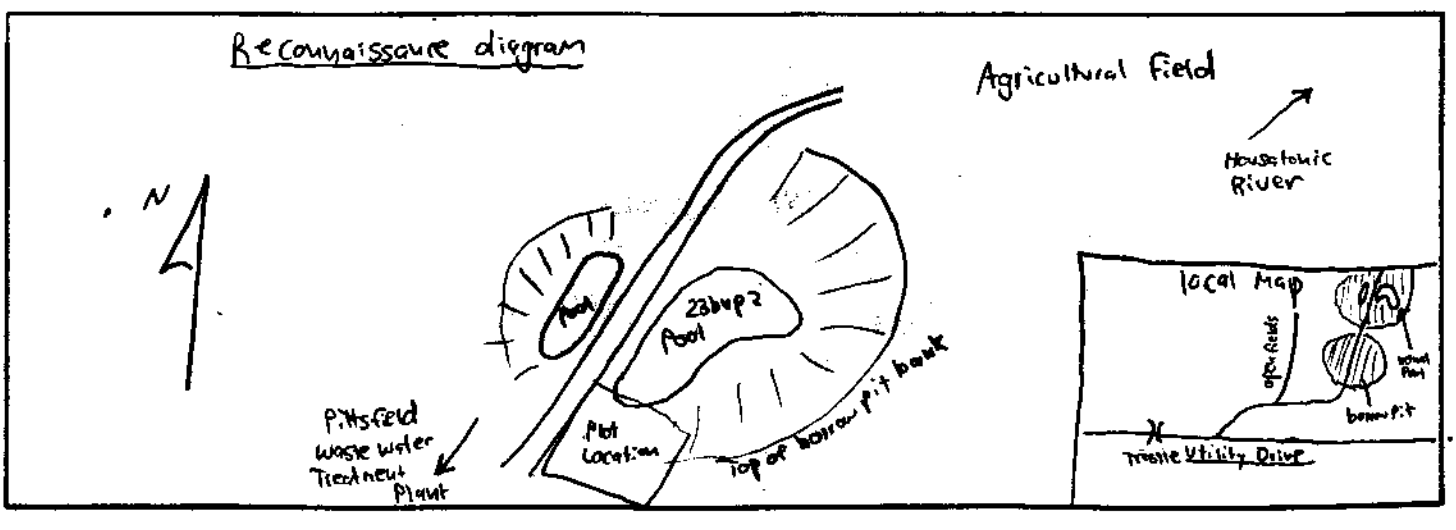
A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good C - Marginal (D) - Poor

Comments: Community is utilized by breeding amphibians that utilize vernal pool within successional northern hardwoods.

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: 23bvp2

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Pittsfield 17.State: MA 10.~~Lat~~ UTM N 4696800 11.~~Long~~ 0644920 WE

12. Directions: See site survey summary

13.Sourcecode: FOOHATOIMAUS 14.Survey date: 8 June 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines, Kurt Karweeky

B. Environmental Description

19.Transect / Observation point # 1

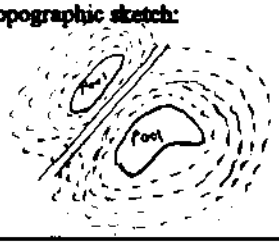
20.Image annotation #

21.Elevation: 295 m

22.Topographic position:

___Interfluve ___Backslope
___High slope ___Step in slope
___High level ___Lowslope
___Midslope X Toeslope
___Low level ___Channel wall
___Channel bed ___Basin floor
___Other

23.Topographic sketch:



24.Slope degrees: 0-25°

25.Slope aspect: NE

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:

___Extremely dry ___Somewhat wet
___Very dry ___Wet
X Dry ___Very wet
___Somewhat moist
___Moist

___Permanently inundated
___Periodically inundated

32.Stoniness:

_____Stone free <0.1%
_____Moderately stony 0.1-1%
_____Stony 3-15%
_____Very stony 15-50%
_____Exceedingly stony 50-90%
_____Stone piles >90%

unknown

33.Soil drainage:

___Rapidly drained ___Somewhat poorly drained
X Well drained ___Poorly drained
___Moderately well drained ___Very poorly drained

34.Average texture:

X sand ___clay loam
___sandy loam ___clay
___loam ___peat
___silt loam ___muck

other _____

35.Unvegetated surface:

___% Bedrock
___% Large rocks (cobbles, boulders > 10 cm)
___% Small rocks (gravel, 0.2-10 cm)
15 % Sand (0.1-2 mm)
___% Bare soil
85 % Litter, duff
___% Wood (> 1 cm)
___% Water
___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Vegetation heterogeneous, depending on elevation in depression and proximity to vernal pool.

37.Plot representativeness:

Relatively representative of upland borrow pit community.

C. Vegetation 38.System: X Terrestrial ___ Palustrine ___ Estuarine 39.Plot number: ___ 40.Plot dimensions: 20m x 20m

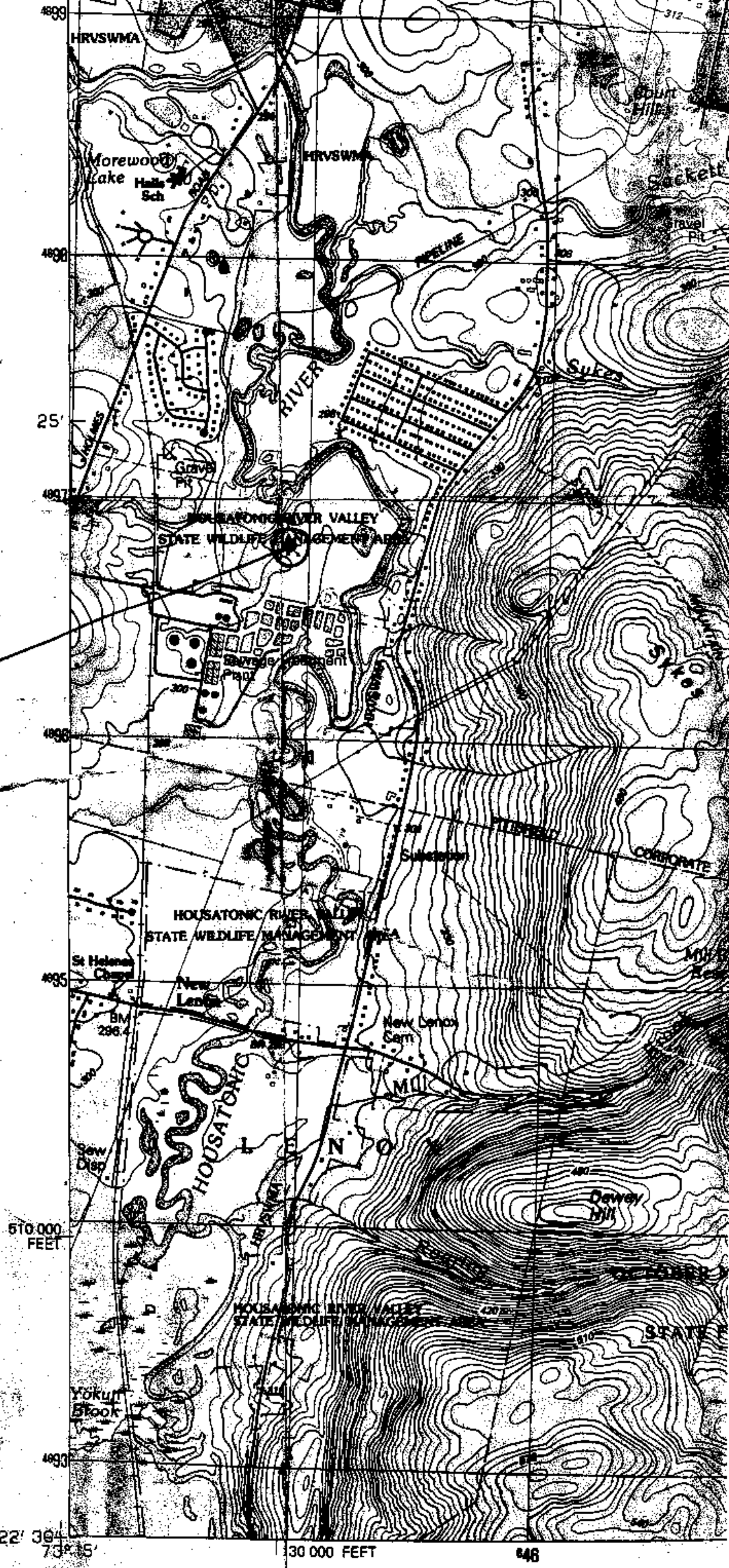
41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:	
X Broad-leaf	X Deciduous	___Forest	X Woodland
___Semi-broad-leaf	___Semi-deciduous	___Sparse woodland	___Scrub thicket
___Semi-needle-leaf	___Semi-Evergreen	___Shrubland	___Sparse shrubland
___Needle-leaf	___Evergreen	___Dwarf shrubland	___Dwarf scrub thicket
___Graminoid	___Perennial	___Sparse dwarf shrubland	
___Broad-leaf herbaceous	___Annual	___Herbaceous	___Non-vascular
___Pteridophyte		___Sparsely vegetated	

44.	height	% cover
T1 Emergent tree		
T2 Tree canopy	20m	5
T3 Tree sub- canopy	10m	20
S1 Tall shrub	5m	10
S2 Short shrub	2m	15
H Herbaceous	0.5m	50
N Non-vascular	0.001m	T
E Epiphyte	NM	0
V Vine / liana	0.5m	1

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

M5-6p		H1-2i		LONICERA MORROWII	r .1
POPULUS TREMULOIDES	2- .1	POA COMPRESSA	2+ .1	LYTHRUM SALICARIA	r .1
POPULUS DELTOIDES - 10, 13, 8, 9, 8, 10	1 .1	SOLIDAGO ALTISSIMA	1 .2	ACER RUBRUM	r .1
PINUS STROBUS - 14,	+ .1	VICIA CRACCA	+ .1	CENTAUREA MACULOSA	r .2
BETULA POPULIFOLIA - 5	r .1			TRIFOLIUM PRATENSE	r .2
BETULA PAPYRIFERA	r .1	TRIFOLIUM CAMPESTRE	r .1	APOCYNUM ANDROSAEMIFOLIUM	r .1
		ERIGERON ANNUS	r .1	SYMPHOTRICHUM NOVAE-ANGLIAE	r .1
D4p		PANICUM ACUMINATUM SSP. FASCICULATUM	r .1	ONOCLEA SENSIBILIS	r .2
POPULUS TREM.	+ .1	MELILOTUS OFFICINALIS	1 .2	SPIREA ALBA	r .2
POPULUS DELT.	r .1	EQUISETUM HYEMALE	2+ .4	POTENTILLA SIMPLEX	r .2
CORNUS AMMOMUM VAR. AMMOMUM	1 .3	ERIGROSTIS PECTINACEA	r .2		
SALIX DISCOLOR	+ .1	POA PRATENSIS SSP. ANGUSTIFOLIA	+ .1		
BETULA POP.	r .1	CORNUS AMMOMUM	+ .2	C1-2b	
SALIX ERIOCEPHALA	r .1	SAPONARIA OFFICINALIS	r .2	VITIS RIPARIA	
SALIX BEBBIANA	r .1	QUERCUS RUBRA	r .1		
		HYPERICUM PERFORATUM	r .2		
M3p		ULMUS AMERICANA	r .1		
SALIX BEBB.	r .1	DAUCUS COROTA	r .1		
SALIX ERIOC.	r .1	RUDBECKIA HIRTA VAR. PULCHERIMA	r .2		
SALIX DISC.	r .1	SOLIDAGO JUNCEA	r .2		
POPULUS TREM.	r .1	FRAGARIA VIRGINIANA	+ .2		

23b-vp-2


4899
HRVSWMA
Morewood Lake
Halls Sch
HRVSWMA
Gravel Pit
PIPELINE
4898
RIVER
Sykes
25'
Gravel Pit
4897
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
4896
Substation
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helena Chapel
4895
New Lenox
BM 296.4
New Lenox Cem
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
4893
42° 22' 30"
73° 15'
30 000 FEET
646

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—19

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: 38-VP-1

3. Quad name(s) Pittsfield East 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

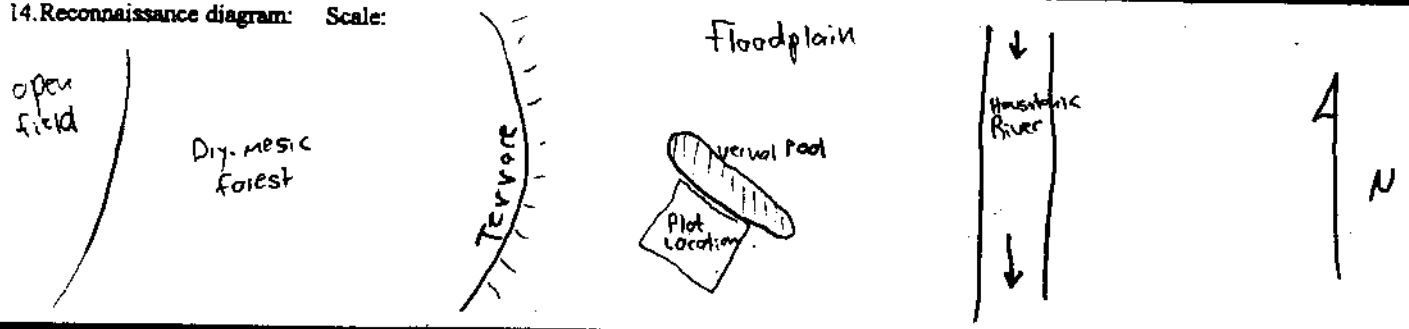
7. Town (LOCALJURIS): Lenox 8. Directions: From the New Lenox Road, travel north (opposite the Decker Canoe launch) along a single-lane road to an open field with 2 large arch-towers. About ½-way across the field, turn right (east) and drop off the upland terrace to the west end of an oblong vernal pool. The plot was performed on the south side of the pool.

9. Sourcecode: FOOHAJO1MAVS 10. Survey date: 1 Sep 2000 11. State: MA

12. Surveyors: Arthur Haines, Kurt Kanwacky

B. Topography **13. Transect**

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: Transitional Floodplain forest 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form ___ form 3 ___	Community name: _____ Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Transitional floodplain forest in some aspects transitional to a high terrace floodplain. Acer rubrum, Acer saccharinum, Fraxinus americana, and Prunus serotina dominant Trees. Common shrubs included Viburnum lentago, Lapinus caroliniana, and Crataegus punctata. Common herbs are Matteuccia struthiopteris, Laportea canadensis, Impatiens capensis, Alliaria petiolata, Athyrium felix-femina, and Agrostis altissima.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 __	Observation Point 6 __	Observation Point 7 __
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 1 September 2000 Today's Date: 16 October 2000
Type of Communtiy: Riverine floodplain forest Code:
Town: Lenox County: Berkshire Survey Site Name: 38-VP-1
Surveyor Name(s): Arthur Haines, Kurt Karwacky
Directions to site: See Site Survey Summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
A rich, floodplain of the Housatonic River with species commonly found in rich mesic forests. Vegetation diverse and dependent on location relative to vernal pools (the low depressions frequented by hydrophytes). Common species include Acer rubrum, Acer saccharinum, fraxinus americana, Crataegus punctata, Carpinus caroliniana, Matteuccia Struthiopteris, Lysimachia Canadensis, Ageratina altissima, and Alliaria petiolata.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Local floodplain frequented by low depressions that are filled with water during spring season. Most vernal pools in this area are not permanent during normal years. Woodfrogs, Leopard frogs, Green frogs, Spring peepers, and Spotted Salamanders utilize the pools for breeding. floodplain littered with flotsam debris from storm events

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Land use in floodplain predominantly Agriculture (Food Crop and Cows).

Are there any rare species at this site? Please specify: None observed

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley SWMA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): forestry clearing; non-native species

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
non-native species are an abundant component of flora of this site; some clearing appears to have occured in recent past.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ____yes ____no ____unknown Protecting EO? ____yes ____no ____unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Size of community reduced due to past clearing

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Non-native species dominant members of community

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

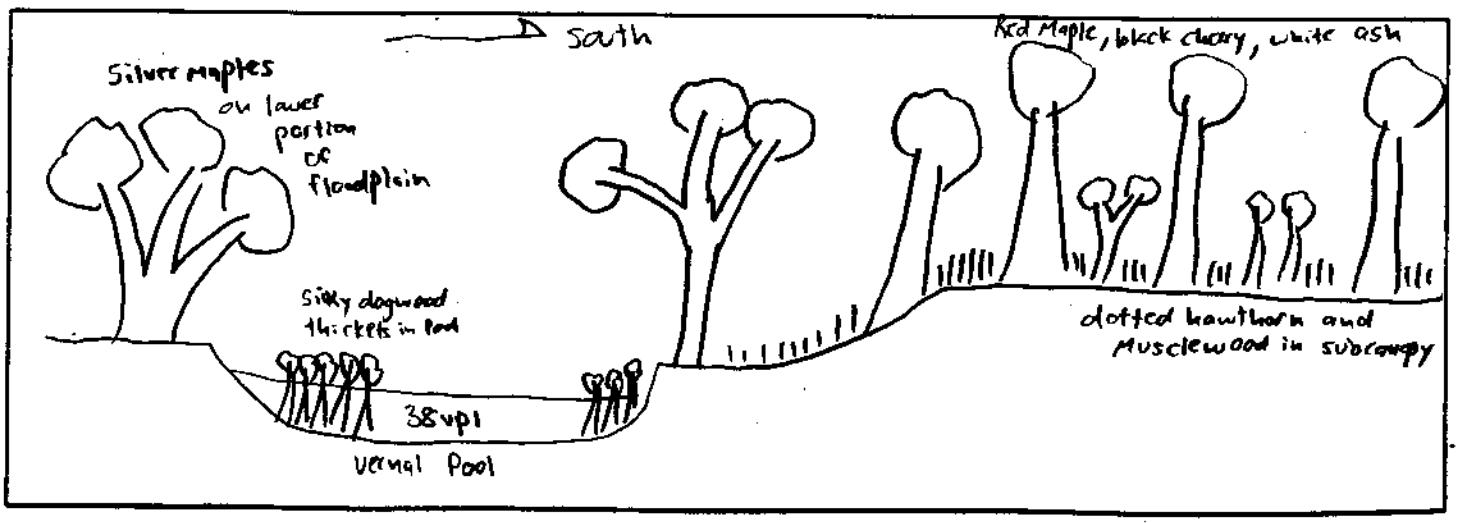
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership of property

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: Though of marginal EO rank, this forest is very important locally to breeding amphibians, mammals, wading birds, etc.

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: 38-VP-1

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Lenox 17.State: MA 10.~~Lat~~ UTM N 4695245 11.~~Long~~ 064535 ~~W~~ E

12. Directions: See Site Survey Summary

13.Sourcecode: _____ 14.Survey date 1 September 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines, Scott Learnsky

B. Environmental Description

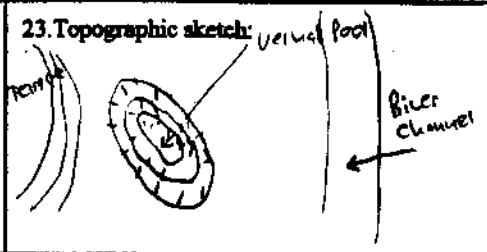
19.Transect / Observation point #

20.Image annotation #

21.Elevation: 295 m

22.Topographic position:
- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- ___High level
- ___Lowslope
- ___Midslope
- ___Toeslope
- X Low level
- ___Channel wall
- ___Channel bed
- ___Basin floor
- ___Other

23.Topographic sketch:



24.Slope degrees: 0-5°

25.Slope aspect: East

26.Parent material: unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:
- ___Extremely dry
- X Somewhat wet
- ___Very dry
- ___Wet
- ___Dry
- ___Very wet
- ___Somewhat moist
- X Moist
- ___Permanently inundated
- ___Periodically inundated

32.Stoniness:
- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

unknown

33.Soil drainage:
- ___Rapidly drained
- X Somewhat poorly drained
- ___Well drained
- ___Moderately well drained
- X Poorly drained
- ___Very poorly drained

range

34.Average texture: unknown
- ___sand
- ___clay loam
- ___sandy loam
- ___clay
- ___loam
- ___peat
- ___silt loam
- ___muck

other _____

35.Unvegetated surface:
- ___% Bedrock
- ___% Large rocks (cobbles, boulders > 10 cm)
- ___% Small rocks (gravel, 0.2-10 cm)
- ___% Sand (0.1-2 mm)
- 25 % Bare soil
- 60 % Litter, duff
- 10 % Wood (> 1 cm)
- 5 % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

floodplain is heterogenous due to influence of vernal pool aquatic systems on flora.

37.Plot representativeness:

Representative of local area.

C. Vegetation 38.System: ___ Terrestrial X Palustrine ___ Estuarine 39.Plot number: ___ 40.Plot dimensions: 20 x 20 M

41.Leaf type:
- X Broad-leaf
- ___ Semi-broad-leaf
- ___ Semi-needle-leaf
- ___ Needle-leaf
- ___ Graminoid
- ___ Broad-leaf herbaceous
- ___ Pteridophyte

42.Leaf phenology:
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

43.Physiognomic type:
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Sparsely vegetated
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	25 M	50
T3 Tree sub- canopy	9 M	20
S1 Tall shrub	5 M	5
S2 Short shrub	2 M	5
H Herbaceous	1.5 M	65
N Non-vascular	0.001 M	1
E Epiphyte	Absent	0
V Vine / liana	up to	1

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D6-7i		VIRATRUM VIRIDE	r.1	C1-Sh	
Acer rubrum 16, 24, 14, 7	2-.1			VITIS RIPARIA	r.1
Prunus serotina 10, 8, 16, 7	2-.1	H1-2p		TOX. RAD.	r.1
Fraxinus americanus 12, 9, 19	2-.1	AGERATINA ALT.	1-2		
L		CIRCAEA LUTETIANA	1.1		
D5p		ALLIARIA PETIOLATA	2-.2		
Carpinus caroliniana 5, 7	1.1	PILEA PUMILA	+.1		
Crataegus punctata 5, 5, 6, 6, 6	2-.1	PERSICARIA VIRGINIANA	1.1		
Acer negundo 5, [illegible]	+.1	ATHYRIUM FELIX-FEMINA	2-.2		
		TOXICODENDRON RAD.	r.1		
D4r		GEUM CANAD.	+.1		
VIBURNUM LANTAGO	+.1	ONOCLEA SENS.	+.2		
ALNUS INCANA	r.1	THALICTRUM PUB.	r.1		
PRUNUS VIRGINIANA	r.1	SOLIDAGO GIG.	+.1		
		CAREX APPAL.	1.2		
H3i		LYSIMACHIA NUMM.	r.1		
MATTEUCCIA STRUTHIOPTERIS	3.4	CARDAMINE PRAT.	1.2		
LAPORTEA CANAD.	2-.3	SOLIDAGO RUG.	+.1		
BURBURUS THUNBERGII	+.2	ALLIUM TRIC.	+.2		
IMPATIENS CAPENSIS	2-.2				
AGERATINA ALTISSIMA	1.2				


38-VP-1
Court Hill
Sackett
Sackett Brook
Park
Gravel Pit
East Part Cem
Substa
Grace Ch
Brook
KIRCHNER
Hathaway
Morewood Lake
HRVSWMA
PIPELINE
RIVER
Sukes Brook
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Reservoir
CORPORATE
BOUNDARY
Mill Brook Reservoir
New Lenox Cem
Mill
HOUSATONIC
Dewey Hill
Farnham Reservoir
OCTOBER MOUNTAIN
STATE FOREST
130 000 FEET
12' 30"

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: 38-UP-2

3. Quad name(s) Pittsfield East (1:25,000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

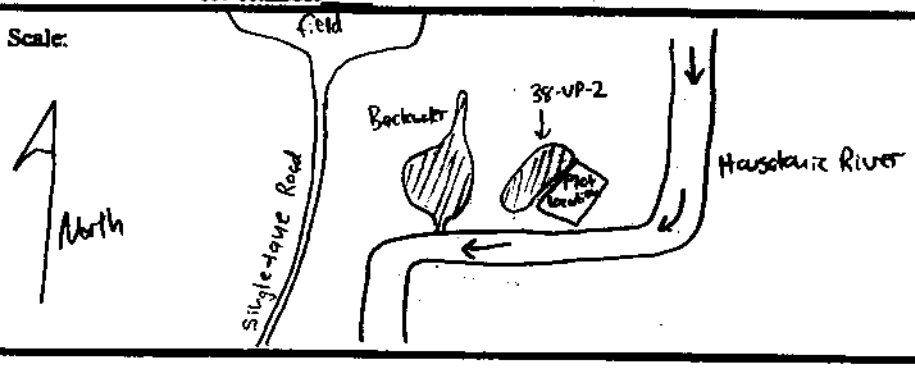
7. Town (LOCALJURIS): Lenox 8. Directions: A small, single lane road (with a cable gate) can be followed north from the New Lenox Road that travels north along the west side of the Housatonic River for 500 meters. Then turn right (east) and travel through floodplain along an east to west section of the river channel, past a permanent pool (often connected to river) to a moderate-sized, semi-permanent pool. Plot on east side of pool.

9. Sourcecode: FOOHAIOIMAUS 10. Survey date 6 Sep 00 11. State: MA

12. Surveyors: Arthur Haines, Eugenie Moore

B. Topography **13. Transect**

14. Reconnaissance diagram: **Scale:**



C. Vegetation / Habitat

15. Observation point 1 X	Observation point 2 ___	Observation point 3 ___
16. Community name: Floodplain Forest (Typical)	Community name: _____	Community name: _____
17. Additional data: Site form X form 3 X	Additional data: Site form ___ form 3 ___	Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Forested floodplain with Acer saccharinum, Acer rubrum, and Ulmus americana as dominant trees. Common shrubs/small trees Cornus amomum, Acer negundo, and Crataegus punctata. Frequent herbs are Matteuccia Struthiopteris, Lysimachia nummularia, Pilea fontana, and Impatiens capensis.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 6 September 2000 Today's Date: 13 October 2000
Type of Communtiy: Floodplain forest (transitional) Code:
Town: Lenox County: Berkshire Survey Site Name: 38-UP-2
Surveyor Name(s): Arthur Haines, Eugenie Moore
Directions to site: See site survey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Rich, floodplain forest with overstory of tall Acer saccharinum. Crataegus punctata is common as an understory tree. Herb stratum vegetated by dense Matteuccia Struthiopteris along with other herbs. Invasive species such as Alliaria petiolata and Lythrum salicaria (in wet depressions) are common components of community.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Relatively flat, low floodplain of Housatonic River. Area is frequented by small depressions which form breeding pools for amphibians. forest is littered with flotsam (wood) from high water events.

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Local Region used for Agriculture. forest was likely cleared near the middle of the century. A large open field is maintained for Electromagnetic Study (EPRI) to the north.

Are there any rare species at this site? Please specify: Sagittaria cuneata

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley SWMA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications, if applicable, discuss why the community may no longer exist here): Forest clearing and exotic species would threaten community. Currently, non-native species are largely limited to herbaceous layer.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
Area appears to have been cleared with last 60-70 years. Exotic species are frequent in herb stratum.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Relatively small size of forest and somewhat young canopy trees

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Abundant non-native species

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

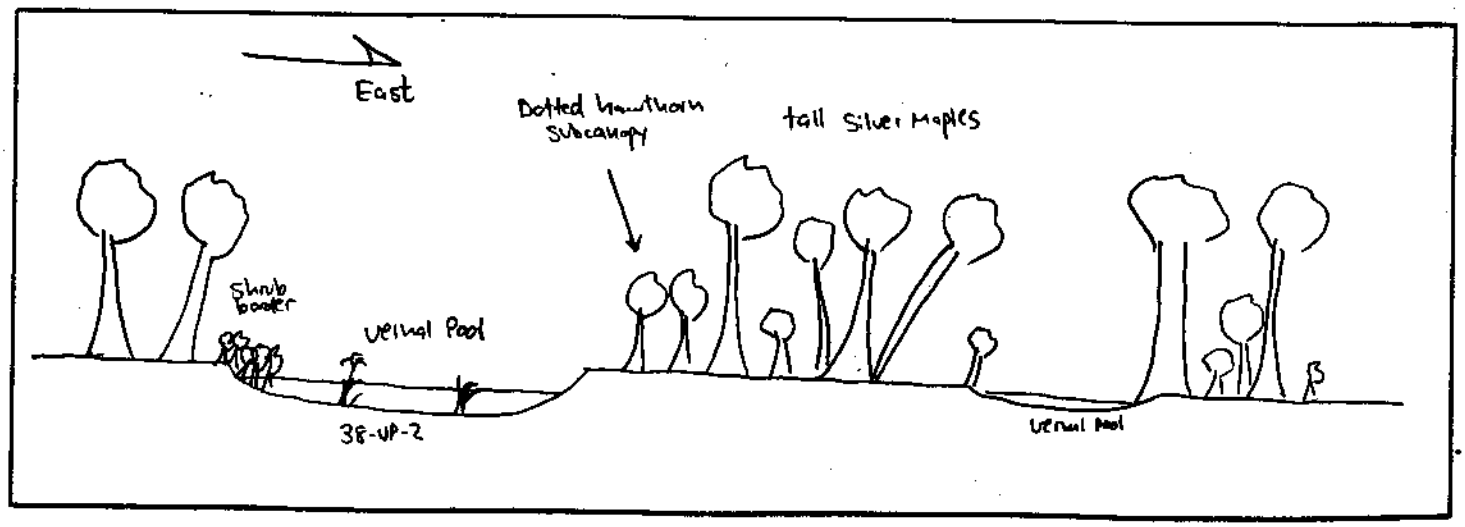
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership of property

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments:

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: 38 up 2

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Lenox 17.State: MA 10.Lat N (UTM) 4695200 11.Long 0644950 W E

12. Directions: See Site Survey Summary

13.Sourcecode: FOOHAI01MAUS 14.Survey date 6 September 00 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines, Eugene Moore

B. Environmental Description

19.Transect / Observation point #

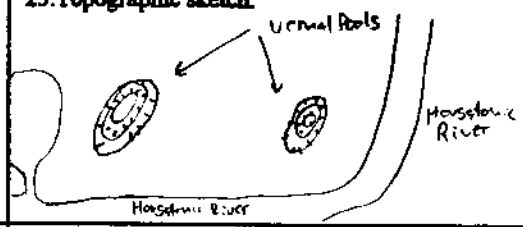
20.Image annotation #

21.Elevation: 294 M

22.Topographic position:

- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- ___High level
- ___Lowslope
- ___Midslope
- ___Toeslope
- X Low level
- ___Channel wall
- ___Channel bed
- ___Basin floor
- ___Other

23.Topographic sketch:



24.Slope degrees: 0-5°

25.Slope aspect: West (toward vernal Pool)

26.Parent material:

Fluvial Silt

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:

- ___Extremely dry
- ___Somewhat wet
- ___Very dry
- ___Wet
- ___Dry
- ___Very wet
- ___Somewhat moist
- ___Moist
- ___Permanently inundated
- X Periodically inundated

32.Stoniness:

- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

Unknown

33.Soil drainage:

- ___Rapidly drained
- ___Somewhat poorly drained
- ___Well drained
- ___Poorly drained
- ___Moderately well drained
- ___Very poorly drained

34.Average texture: Unknown

- ___ sand
- ___clay loam
- ___sandy loam
- ___ clay
- ___loam
- ___ peat
- ___silt loam
- ___muck

other: _____

35.Unvegetated surface:

- ___ % Bedrock
- ___ % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Sand (0.1-2 mm)
- 30 % Bare soil
- 60 % Litter, duff
- 5 % Wood (> 1 cm)
- 5 % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Area is somewhat heterogeneous due to vernal pools adding landscape diversity. Some shrub thickets are also present in understory of forest.

37.Plot representativeness:

Relatively Representative of floodplain forest.

C. Vegetation 38.System: X Terrestrial ___ Palustrine ___ Estuarine 39.Plot number: ___ 40.Plot dimensions: 20x20m

41.Leaf type:
- X Broad-leaf
- ___ Semi-broad-leaf
- ___ Semi-needle-leaf
- ___ Needle-leaf
- ___ Graminoid
- ___ Broad-leaf herbaceous
- ___ Pteridophyte

42.Leaf phenology:
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

43.Physiognomic type:
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Sparsely vegetated
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	22 M	50
T3 Tree sub- canopy	9 M	25
S1 Tall shrub	5 M	5
S2 Short shrub	essentially absent	0
H Herbaceous	2 M	65
N Non-vascular	0,001 M	2
E Epiphyte		
V Vine / liana	5 M	1

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D6-7p		Laportia canadensis	1.1	C 1-4 b	
Ulmus americana 9, 12, 11	1.1	Elymus virginicus	+.2	Toxicodendron radicans	+.2
Acer saccharinum 58, 22	3.2	Persicaria virginiana	+.1		
Acer rubrum 10	+.1	Rhamnus cathartica	r.1		
D5p		Geum canadense	+.1		
Crataegus punctata 6,7,6,4,6,5,7,8,8,6,4,4	2+.2	Dryopteris carthusiana	+.1		
Acer negundo 4	r.1	Persicaria sagitata	r.1		
Malus sylvestris	r.1	Onoclea sensibilis	1.1		
		Circaea lutiana	r.1		
D4r		Cinna latifolia	+.1		
		Persicaria punctata	r.1		
Viburnum lentago	r.1	H 1p			
Cornus amomum	+.1	Lysimachia nummularia	2+3		
Alnus incana	r.1	Pilia fontana	2+2		
Lyonia ligustrina	r.1	Cardamine pratensis	+.1		
Acer negundo	+.1	Galium trifidum	r.1		
Prunus virginiana	r.1	Penthorum sedoides	r.1		
H 2-3i		Toxicodendron radicans	r.1		
Matteuccia struthiopteris	3.3	Thelypteris noveboracensis	r.1		
Aliaria petiolata	1.1				
Impatiens capensis	2+2				

HRVSWMA
Court Hill
Sackett
Morewood Lake
Gravel Pit
PIPELINE
RIVER
Sykes Brook
Ashley Reservoir
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sykes Mountain
CORPORATE
BOUNDARY
Mill Brook Reservoir
New Lenox Cem
Mill
HOUSATONIC
L E N O X
Farnham Reservoir
Dewey Hill
STATE FOREST
East Part Cem
Sackett Brook Park
38-UP-2
130 000 FEET
646
647
12' 30"
648
649
INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1986
KILOMETERS 1 .5 0

NATURAL COMMUNITY SURVEY PART I: RECONNAISSANCE

Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: 38-WP-2			Date: 17 August 1999
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: A. H. K. K.	Town: Lenox County: Berkshire (Biophysical Region:)	USGS 7.5' Quad: East Lee (1:25,000)	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.

Directions (if not obvious from topo or Maine Atlas):
North of New Lenox Road along west edge of river until it makes a prominent turn to east (in 400 meters). Travel east, past large pool on left (north) to adjacent vernal pool.

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: floodplain forest	Community type:	Community type:
Soil: Alluvial silt	Soil:	Soil:
Slope, aspect, topography: flat terrace, gently featured	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 60 Acer saccharum Crataegus punctata Acer rubrum	Tree layer: Total cover (%):	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 25 Crataegus punctata Prunus virginiana	Sapling / tall shrub layer: Total cover (%)	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) 25 Cornus amomum	Shrub (1-2 m) layer: Total cover (%)	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 85 Matteuccia struthiopteris Lysimachia nummularia Athyrium felix femina Onoclea sensibilis	Herb layer: Total cover (%)	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) 5 Mosses	Bryoid layer: Total cover (%)	Bryoid layer: Total cover (%)
Other diagnostic or notable species: Sagittaria cuneata	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: Past Agriculture	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? 5.64 m Radius tree cores? yes photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

Observation Point 4	Observation Point 5	Observation Point 6
Community type:	Community type:	Community type:
Soil:	Soil:	Soil:
Slope, aspect, topography:	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____
Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____
Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____
Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____
Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use:	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

* STRATA are defined as:

TREE = canopy (if emergents present, note as "E");
SAPLING / TALL SHRUB = > 2 m tall and < 5 cm dbh: woody plants not forming tree canopy but > 2 m tall;
SHRUB = 1 - 2 m: woody plants 1 - 2 m tall;
HERB = < 1 m: all herbaceous vascular plants plus any woody plants < 1 m tall;
BRYOID = all ground-layer non-vascular plants.

NATURAL COMMUNITY SURVEY PART II: DESCRIPTION

--> complete separate description forms for **each** notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): 38-UP-2			Obs. PL #
Community type: Floodplain Forest			Adjacent communities: Low, Gradient Stream
Quad:	~~(Lat:)~~ northing 4695170	Size (acres) of community, EO (not site):	**BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO.** Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	~~(Long:)~~ easting 0645945		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FORESTS

Tree canopy height: +/- 70 feet

supercanopy trees? no

Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)

① Ulmus americana DBH - 19" Age - 53 height - 75 feet

② Acer saccharinum DBH - 16.0 Age - >24 height - 71.0

Deadwood (describe distribution, abundance, degree of decay): Infrequent, mostly small (<10cm diam) sticks and larger branches.

③ Ulmus americana 18 dbh, 76 feet, 68 ybp

④ Ulmus americana 13 dbh, 80 feet, 51 ybp

Acer saccharinum is the dominant forest tree in the area, but not in the plots (which are adjacent to the vernal pool).

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
no	no	no	early successional species, forest like openings, pastures in area	no

comment:

ADDITIONAL SPECIES LIST

List additional plant species in community not included in the plot data that follows.

Veratrum viride
Aesculus hippocastanum
Arisaema triphyllum
Parisella virginiana
UP Sagittaria latifolia
UP Sagittaria cuneata
Boehmeria cylindrica
Ulttica dioica
UP Dulichium arundinaceum
UP Penthorum sedoides
UP Impatiens capensis
UP Eleocharis acicularis
UP Myosotis scorpioides
UP Carex lurida
UP Lemna minor
UP Lycopus virginicus
UP Scutellaria lateriflora
UP Leersia virginica
UP Sium suave
Cicuta bulbifera
Solidago gigantea
Salix nigra

Species list sketchy or basically complete? Comment: Moderate survey effort

date: initials: p. ____ of ____

VEGETATION PLOT DATA

Area: 38-VP-2 | Obs. pt. #: 1

Community type: Floodplain Forest | (Regional alliance/community:)

LAYER	plot # 1A (vernal pool)	1B (North)	1C (southeast)	1D (southwest)
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	N/A	Crataegus punctata 3, 3, 2, 3 Acer saccharinum 30 Prunus virginiana 3, 2,	CRATAEGUS PUNCTATA 7, 7, 5, 5, 4, 6, 5, 5 MALUS SYLVESTRIS 9, 6	ACER RUBRUM TAXODIUM CRATAEGUS PUNCTATA 2, 7, 5, 5, 3
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	N/A	Crataegus punctata 9 Cornus amomum 3 Prunus virginiana 3	CRATAEGUS PUNCTATA 9 ACER RUBRUM 3 ACHNISTIS LOBATA 1	CORNUS AMOMUM 9 Taxodium ascendens 3
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	N/A	Cornus amomum 3 Ulmus americana 3 Prunus virginiana 1	[redacted] CRATAEGUS PUNCTATA 1	CORNUS AMOMUM 2
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① PERSICARIA HYDROPIPEROIDES 19 ULMUS AMERICANA 3 FRAXINUS PENNSYLVANICA 37 LYSIMACHIA NUMMULARIA 1 ONOCLEA SENSIBILIS 1 ② ALISMA TRIVIALE 9 LYSIMACHIA TERRESTRIS 19 LEERSIA ORYZOIDES 37 ACER RUBRUM 3 PERSICARIA HYDROPIPEROIDES 3 SMILAX SAGITTATA 3	Impatiens capensis 3 Athyrium felix-femina 9 Matteuccia struth. 3 Lysimachia nummularia 3 Pilea pumila 3 Symplocarpus foetidus 9 Geum canadense 9 Carex projecta 19 Matteuccia struth. 19 Lysimachia nummularia 3 Onoclea sensibilis 3 Carex bromoides 9	① ALLIARIA PETIOLATA 3 CIRCAEA LUTETIANA 1 GEUM CANADENSE 3 IMPATIENS CAPENSIS 3 LYSIMACHIA NUMMULARIA 1 MATTEUCCIA STRUTHIOPTERIS 37 LAPORTEA CANADENSIS 3 ② RANUNCULUS HISPIDUS 3 MATTEUCCIA STRUTHIOPTERIS 37 GEUM CANADENSE 3 ALLIARIA PETIOLATA 1 LYSIMACHIA NUMMULARIA 37 CIRCAEA LUTETIANA 3 IMPATIENS CAPENSIS 1 PILEA PUMILA 3	Athyrium felix-femina 37 Lysimachia nummularia 3 Onoclea sensibilis 3 Alliaria petiolata 3 Toxicodendron radicans 1 Geum canadense 1 Athyrium felix-femina 3 Onoclea sensibilis 9 Toxicodendron radicans 1 Cornus amomum 1 Lysimachia nummularia 1 Ilex verticillata 1 Sambucus canadensis 3
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): X "moss"/"liverwort"/"lichen" only; △ identified to major group; __ identified to genus; __ identified to species.	ABSENT	NA NA	MOSS 79	MOSS 3
REMARKS	Sagittaria cuneata (endangered) present in drawn down portion of vernal pool.			

In box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 2-5% 3 6-12% 9 13-24% 19 25-49% 37 50-74% 63 75-100% 87

date: initials: p. ____ of ____

TOPOGRAPHY / SOILS

Area: 38-UP-2 | Obs. pt. #: 1

Community type: flood plain forest | (Regional alliance/community:)

Elevation: 294 meters | Aspect: UP | magnetic or true? NA | Slope: 0-5° | measured or (estimated)?

Microtopography: Gently contoured plain of forest with small depressions (vernal pools).

pH (note kit or meter type)

Topographic position:
(P) low plain, level
T toe of slope
LS lower slope
MS middle slope
TB hillside terrace/bench
US upper slope
E cliff/ledge
C crest
M high plateau
N narrow valley
D drainage channel

Habitat patchiness (describe zones or patches if present): Patchy - vernal pool, in forest

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth:_____cm OR > 1 m_____

vonPost decomposition:_____

ALL SOILS:

DEPTH TO WATER TABLE:_____

DEPTH to OBSTRUCTION:_____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:
bedrock
talus slope
glacial till
moraine
esker/outwash
glacial delta
(lacustrine/fluvial)
marine
aeolian
other:

Surface:
____% Bedrock
____% Boulders (>50 cm)
____% Cobbles/Gravel
5 % Bare mineral soil
____% Organic soil
10 % Litter (note type) broadleaf trees and ferns
5 % Water
80 % Total vegetation
____ Other:

Average Texture:
gravel
sand
loamy sand / sandy loam
loam
silt loam
clay loams
sandy clay / clay
peat
muck

Bedrock type:
Igneous
granite
dioritic
gabbroic
other igneous
_____
Metamorphic
slate/phyllite
schist/gneiss
other metamorphic
_____
Sedimentary
limestone
other sedimentary
_____
details?

Soil stoniness:
v. little (< 1%)
moderate (2-25%)
very (26-100%)

Drainage & moisture regime (see MAPPSS key):
very poorly drained
poorly drained
somewhat poorly drained
(moderately well drained)
well drained
somewhat excessively drained
excessively drained

Hydrologic regime:
upland
nontidal wetland:
permanently flooded
semiperm'ly flooded
(seasonally flooded)
saturated
tidal - irregularly
tidal - regularly
saltwater
brackish
freshwater
unknown

date: initials: p. _____ of _____


Location of Observation Point 1
HRVSWMA
Morewood Lake
Hales Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
Sackett Brook Park
East Part Cem
WASHINGTON
Sykes Brook
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Ashley Reservoir
Sykes Hill
TUNNEL ROAD
CONDUIT
BOUNDARY
Mill Brook Reservoir
St Helena Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill
Pond
Saw Dam
HOUSATONIC
RIVER
LENOX
Dewey Hill
Farnham Reservoir
OCTOBER MOUNTAIN
STATE FOREST
Yokum Brook
510 000 FEET
130 000 FEET
42° 22' 30"
73° 15'
12' 30"

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

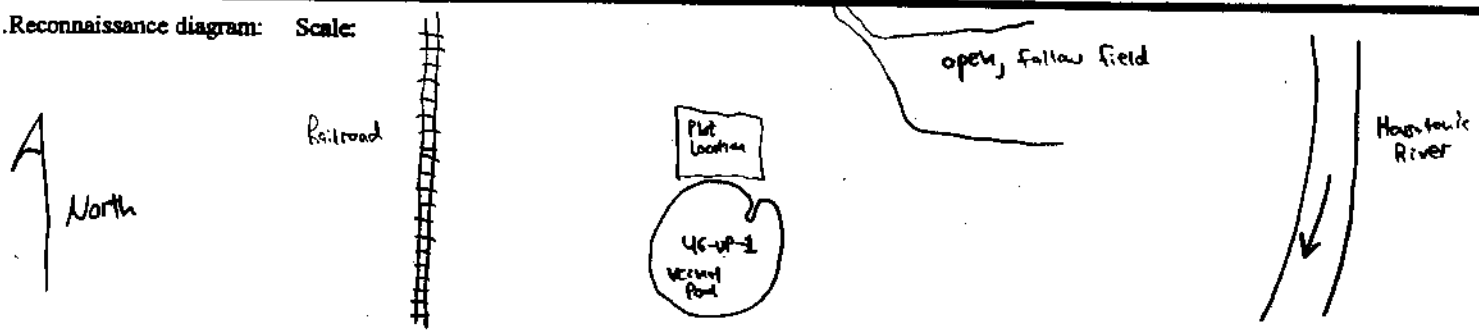
MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: 46-VP-1
3. Quad name(s) Pittsfield East (1:25,000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____
7. Town (LOCALJURIS): Lenox 8. Directions: from the New Lenox Road in Lenox, follow the RR tracks south (on the west side of the Housatonic River) for 1.3 km to a pair of wetland pools (one on each side of the RR tracks). From the north end of the east pool, travel east (left) into the swamp for 100 meters and a shrub filled pool will be reached. The plot was taken on the north side of the pool.
9. Sourcecode: FOOHAIOIMAUS 10. Survey date 6 Sep 2000 11. State: MA
12. Surveyors: Arthur Haines, Eugenie Moore

B. Topography 13. Transect

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: Red Maple Swamp 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form ____ form 3 ____	Community name: _____ Additional data: Site form ____ form 3 ____
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Red maple swamp with Acer rubrum in overstory. Limited numbers of Betula papyrifolia also occur. Shrubs include Viburnum dentatum, Ilex verticillata, and Prunus serotina saplings. Common herbs are Osmunda cinnamomea, Osmunda regalis, Rubus hispidus, and Thelypteris noveboracensis.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 6 September 2000 Today's Date: 16 October 2000
Type of Communtiy: Red Maple Swamp Code:
Town: Lenox County: Berkshire Survey Site Name: 46-VP-1
Surveyor Name(s): Arthur Haines, Eugenie Moore
Directions to site: see site survey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure):
Red Maple Swamp, dominated in canopy almost exclusively by Acer rubrum, with some Betula populifolia near vernal Pool Margin. Viburnum dentatum common in Shrub Stratum. Shrubs rarely so dense as to obstruct travel. Herb stratum dominated by dense Osmunda cinnamomea and some Osmunda regalis, with a mix of other herbs, Overstory is comprised of tall, relatively straight stemmed trees.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards):
Low level plain, at outer edge of Housatonic River floodplain (only flooded during severe storm events) therefor no flotsam debris. Relatively flat terrain with some low depressions (vernal Pools) and channels (intermittent streams).

Surrounding Land Use (physical structures and land use practices in the surrounding area):
Primarily Agriculture. Large fields to north are still open, fallow fields. Property also utilized by Lenox Sportsmans club, and therefore species such as ring-necked pheasant are released. A railroad line lies to the west.

Are there any rare species at this site? Please specify: Symphyotrichum prenanthoides in community

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley SWMA
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): forest clearing activities.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna):
This section of Red Maple Swamp is relatively intact as to overstory and flora. Only peripheral clearing has encroached on Swamp.

Owner Information

Owner's Name: _____ Telephone: (__)_____

Address: _____

Is Owner: Aware of EO? ____yes ____no ____unknown Protecting EO? ____yes ____no ____unknown

Owner Comments: _____

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent **B** - Good (**C**) - Marginal **D** - Poor

Comments: _____

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent (**B**) - Good C - Marginal D - Poor

Comments: _____

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent B - Good (**C**) - Marginal D - Poor

Comments: Clearings around forested swamp will likely create a non-native propagule source.

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

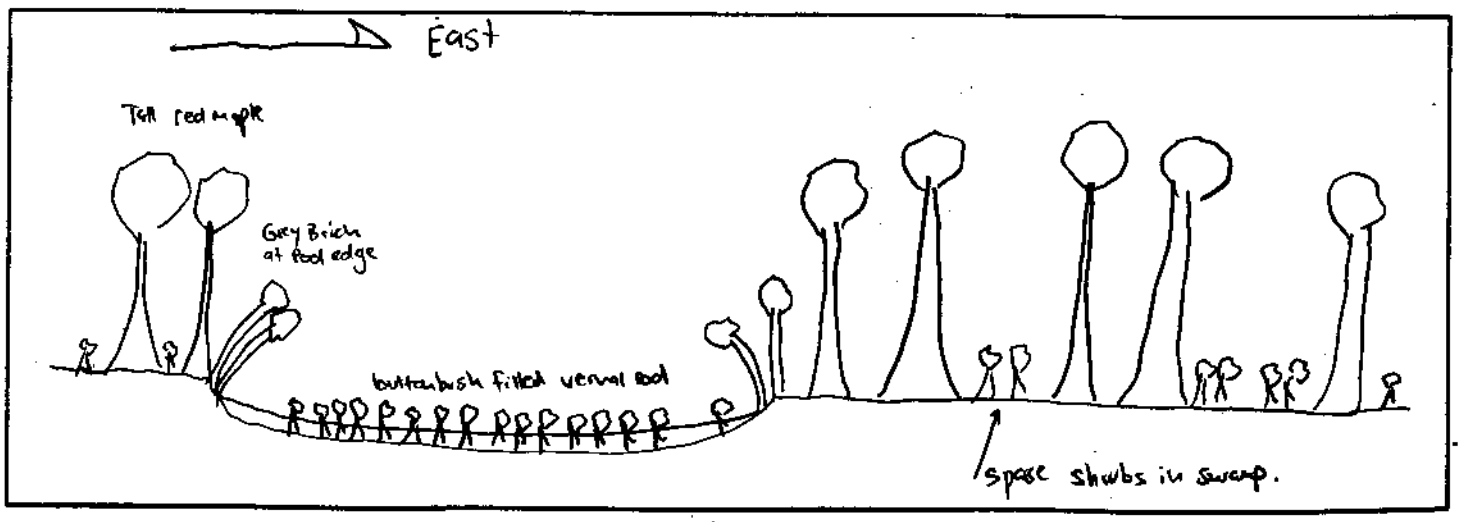
A - Excellent (**B**) - Good C - Marginal D - Poor

Comments: Public Ownership

EO Rank: (A summary of all factors listed above.) **A** - Excellent **B** - Good (**C**) - Marginal **D** - Poor

Comments: _____

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May. 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: 46-UP-1

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Lenox 17.State: MA 10.Lat N (UTM) 4693680 11.Long 0644106 W E

12. Directions: See Site Survey Summary

13.Sourcecode: FOOHAI01MAUS 14.Survey date 6 Sep 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines, Eugene Moore

B. Environmental Description

19.Transect / Observation point #

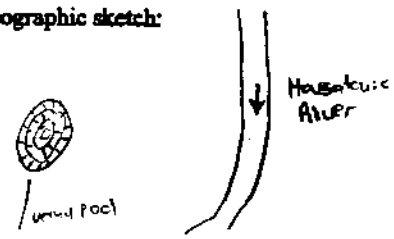
20.Image annotation #

21.Elevation: 294 m

22.Topographic position:

___Interfluve ___Backslope
___High slope ___Step in slope
___High level ___Lowslope
___Midslope ___Toeslope
_X_Low level ___Channel wall
___Channel bed ___Basin floor
___Other

23.Topographic sketch:



24.Slope degrees: 0-3°

25.Slope aspect: South (toward vernal pool)

26.Parent material:

Unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:

___Extremely dry ___Somewhat wet
___Very dry ___Wet
___Dry ___Very wet
___Somewhat moist
___Moist

___Permanently inundated
___Periodically inundated

32.Stoniness:

_____Stone free <0.1%
_____Moderately stony 0.1-1%
_____Stony 3-15%
_____Very stony 15-50%
_____Exceedingly stony 50-90%
_____Stone piles >90%

Unknown

33.Soil drainage:

___Rapidly drained _X_Somewhat poorly drained
___Well drained ___Poorly drained
___Moderately well drained ___Very poorly drained

34.Average texture:

___sand ___clay loam
___sandy loam ___clay
___loam ___peat
___silt loam ___muck

other _____

35.Unvegetated surface:

___% Bedrock
___% Large rocks (cobbles, boulders > 10 cm)
___% Small rocks (gravel, 0.2-10 cm)
___% Sand (0.1-2 mm)
3 % Bare soil
89 % Litter, duff
3 % Wood (> 1 cm)
5 % Water
___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Outside of vernal pools and their associated plants, community is fairly homogenous.

37.Plot representativeness:

Relatively representative

C. Vegetation 38.System: ___ Terrestrial X Palustrine ___ Estuarine 39.Plot number: 1 40.Plot dimensions: 20x20m

41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:	
X Broad-leaf	X Deciduous	X Forest	___ Woodland
___ Semi-broad-leaf	___ Semi-deciduous	___ Sparse woodland	___ Scrub thicket
___ Semi-needle-leaf	___ Semi-Evergreen	___ Shrubland	___ Sparse shrubland
___ Needle-leaf	___ Evergreen	___ Dwarf shrubland	___ Dwarf scrub thicket
___ Graminoid	___ Perennial	___ Sparse dwarf shrubland	___ Non-vascular
___ Broad-leaf herbaceous	___ Annual	___ Herbaceous	
___ Pteridophyte		___ Sparsely vegetated	

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	23 M	60
T3 Tree sub-canopy	14 M	10
S1 Tall shrub	3 M	40
S2 Short shrub	0.02 M	1
H Herbaceous	1 M	70
N Non-vascular	0.001 M	2
E Epiphyte (vascular)	Absent	0
V Vine / liana	0.5 M	1

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

D 5-7 i		Vaccinium angustifolia	r.1		
Acer rubrum 7,5,6,5,6,7,14,4,11,9,	4.2	Fraxinus americana	r.1		
6,7,5,23,10,12,11,10,5,4,6,		(Rhoderdron prinophyllum)	r.1		
Prunus serotina 12,	+.1	(Symphyotricum pernanthoides)			
Betula papulifolia	+.1	(Symphyotricum lateriflorum)			
D 4p		Solidago rugosa	r.1		
viburnum dentatum	2+.3	C 2b			
Prunus serotina	2-.1	smilax herbacea	+.1		
H 1-3i					
Osmunda cinnamomea	3.3				
Ilex verticillata	1.2				
osmunda regalis	1.2				
Rubus hispidus	2-.2				
Quercus rubra	r.1				
Pinus strobus	r.1				
Thelypteris noveboracensis	+.1				
Trientalis borealis	r.1				
Mitchella repens	r.1				
Thalictrum pubescens	r.1				
Betula papulifolia	r.1				


46-UP-1
Morewood Lake
HRVSWMA
Court Hill
Subeta
East Part Cem
Brook
Sackett
Gravel Pit
Sackett Brook Park
Hathaway
Sykes
Brook
RIVER
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Ashley Reservoir
CORPORATE BOUNDARY
Mill Brook Reservoir
New Lenox Cem
HOUSATONIC
Farnham Reservoir
Dewey Hill
OCTOBER MOUNTAIN
STATE FOREST
130 000 FEET
646
647
12′ 30″
648
649

NATURAL COMMUNITY SURVEY PART I: RECONNAISSANCE

Maine Natural Areas Program

IDENTIFIERS / LOCATION

Survey area: 46VP-5			Date: 5 Oct 99
(Site name:)		(Quadcode:)	Airphoto (#, scale, date):
Surveyors: AH KK	Town: Lenox County: Berkshire (Biophysical Region:)	USGS 7.5' Quad: Pittsfield, East	

Mark all observation points on a copy of the topo. Add any comments or sketches here if necessary to clarify the topo.

Directions (if not obvious from topo or Maine Atlas):
From New Lenox Road, follow RR South 1.4 km to a small vernal pool on left (east). Pool is just south of the small, paired pools that show up on topo map (one on each side of RR track).

VEGETATION / HABITAT

Observation Point 1	Observation Point 2	Observation Point 3
Community type: Circumneutral Hardwood Swamp	Community type:	Community type:
Soil:	Soil:	Soil:
Slope, aspect, topography Relatively Flat	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%): 60 Acer rubrum Quercus bicolor Quercus rubra	Tree layer: Total cover (%):	Tree layer: Total cover (%):
Sapling / tall shrub layer: Total cover (%) 25 Carpinus caroliniana Hamamelis virginiana	Sapling / tall shrub layer: Total cover (%)	Sapling / tall shrub layer: Total cover (%)
Shrub (1-2 m) layer: Total cover (%) 35 Viburnum dentatum Ilex virginiana Lyonia ligustrina	Shrub (1-2 m) layer: Total cover (%)	Shrub (1-2 m) layer: Total cover (%)
Herb layer: Total cover (%) 10 Thelypteris noveboracensis Osmunda cinnamomea Sium suave	Herb layer: Total cover (%)	Herb layer: Total cover (%)
Bryoid layer: Total cover (%) 5 moss	Bryoid layer: Total cover (%)	Bryoid layer: Total cover (%)
Other diagnostic or notable species: Rhododendron prinophyllum Quercus macrocarpa	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use: RR adjacent to vernal pool	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? 5,64 tree cores? yes photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

Observation Point 4	Observation Point 5	Observation Point 6
Community type:	Community type:	Community type:
Soil:	Soil:	Soil:
Slope, aspect, topography:	Slope, aspect, topography:	Slope, aspect, topography:
STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each	STRATA*: cover & 1-2 dominant spp. for each
Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____	Tree layer: Total cover (%):_____
Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____	Sapling / tall shrub layer: Total cover (%)_____
Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____	Shrub (1-2 m) layer: Total cover (%)_____
Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____	Herb layer: Total cover (%)_____
Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____	Bryoid layer: Total cover (%)_____
Other diagnostic or notable species:	Other diagnostic or notable species:	Other diagnostic or notable species:
Condition / evidence of human use:	Condition / evidence of human use:	Condition / evidence of human use:
Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?	Additional data collected / COMMENTS plots (size)? tree cores? photos?

* STRATA are defined as:

TREE = canopy (if emergents present, note as "E");
SAPLING / TALL SHRUB = > 2 m tall and < 5 cm dbh: woody plants not forming tree canopy but > 2 m tall;
SHRUB = 1 - 2 m: woody plants 1 - 2 m tall;
HERB = < 1 m: all herbaceous vascular plants plus any woody plants < 1 m tall;
BRYOID = all ground-layer non-vascular plants.

NATURAL COMMUNITY SURVEY PART II: DESCRIPTION

--> complete separate description forms for **each** notable natural community on reconnaissance page.

IDENTIFIERS / LOCATION

Area (specific/general): 46-UP-S			Obs. Pt # 1
Community type: Circumneutral hardwood swamp			Adjacent communities:
Quad:	(Lat:) northing 4693550	Size (acres) of community- EO (not site):	**BE SURE TO MAP EXTENT OF COMMUNITY ON TOPO.** Distinguish between portions ground-truthed vs. portions presumed to be part of community based solely on photo/map interpretation, where applicable.
(Quadcode:)	(Long:) easting 0644305		

CLASSIFICATION HIERARCHY

Physiognomy (Class)	Phenology (Subclass)	Leaf type (Group)
(forest)	evergreen woody	(broad-leaf woody)
woodland	(deciduous woody)	needle-leaf woody
shrubland	mixed woody	graminoid
dwarf shrubland	perennial	forb
herbaceous	annual	pteridophyte
sparse vascular/nonvascular		non-vascular

(ALLIANCE:)

ADDITIONAL DATA FOR FORESTS

Tree canopy height: 70

supercanopy trees? no

Core data: ring counts (~ 5 cores) of larger trees (give sp. & dbh)

1. Quercus bicolor 80 feet, 14 in, 79 ybp
2. Quercus bicolor 62 feet, 16 in, 94 ybp
3. Fraxinus americana 75 feet, 11 in, 65 ybp

Deadwood (describe distribution, abundance, degree of decay):

Some deadwood, mostly comprised of small stems / large branches. A few logs to 25 cm present, beginning stages of decay.

Photo

16 - Small vernal pool
17 - East through forest
18 - SE from track (RR)
19 - Eastern most Pool from RR track

HISTORY (describe evidence or lack thereof; please do not leave boxes blank. Indicate approximately how recent where possible.)

Fire:	Wind:	Cutting:	Agriculture:	Impoundment:
None observed	NA	At least for RR line.	Adjacent areas with Agricultural fields.	no

comment:

ADDITIONAL SPECIES LIST

Species list divided into vernal Pool area and adjacent R.Road

List additional plant species in community not included in the plot data that follows. Cornus amomum

Rhododendron prinophyllum
Hamamelis virginiana
Symphyotrichum puniceum
Symphyotrichum lateriflorum
Solidago rugosa
Lindera benzoin
Ulmus americana
Tsuga canadensis
Dianthus tenuiera
Rubus hispidus
Brachyelytrum septentrionale
Aster divaricatus
Ranunculus hispidus
Solidago gigantea
Carex projecta
Smilax herbacea
Iris versicolor
Tiarella cordifolia
Aralia nudicaulis
Lycopus uniflorus
Impatiens capensis

Species list sketchy or basically complete? Comment:

Moderate survey effort

RR - Tussilago farfara
Chaerophyllum procumbens
Agrostis gigantea
Verbascum thapsus
Lepidium campestre
Galium mollugo

Rhododendron groenlandicum
Lycopodium obscurum
Salix sericea
Chelone glabra
Thelypteris palustris

date: initials: p. 3 of 5

VEGETATION PLOT DATA

Area: YGVI-5 | Obs. pt. #:

Community type: FLOODPLAIN FOREST | (Regional alliance/community:)

LAYER	plot # 1A	1B	1C	1D
TREE list species and dbh for all trees >= 5 cm dbh; count standing dead as 1 species. note units: QUAD SIZE: note which size used 5.64 m radius for 1/100th ha 7.98 m radius for 2/100th ha use same size throughout!	NONE	STANDING DEAD 5 QUERCUS BICOLOR 22, 15, 13, 4 ACER RUBRUM 12, 9, 16, 4	ACER RUBRUM 18 QUERCUS BICOLOR 4 1	NONE
SAPLING / TALL SHRUB cover class by species of: trees > 2 m tall but < 5 cm dbh; and shrubs > 2 m tall QUAD SIZE: 2.8 m radius or 25 m²	SALIX NIGRA 9	CARPINUS CAROLINIANA 9 ILEX VERTICILLATA 3	FRAXINUS AMERICANA 9 PRUNUS VIRGINIANA 3 PRUNUS SEROTINA 3 ALNUS INCANA 3	BETULA POPULIFOLIA 1 POPULUS TREMULOIDES 3 QUERCUS RUBRA 9 FRAXINUS AMERICANA 3 QUERCUS MACROCARPA 1
SHRUB cover class* by species of shrubs/trees 1 - 2 m tall. QUAD SIZE: 2.8 m radius or 25 m²	QUERCUS MACROCARPA 3 SPIREA ALBA 3 CEPHALANTHUS OCCIDENTALIS 9	VIBURNUM DENTATUM 1 CARPINUS CAROLINIANA 3 LONICERA MORROWII 1	VIBURNUM DENTATUM 3 LONICERA LIGUSTRINA 3 ALNUS INCANA 1	LONICERA MORROWII 9 SPIREA ALBA 3 RUBUS IDAEUS 1 RUBUS PENNSYLVANICUS 1 ACER RUBRUM 1
HERB cover class* by species for all herbaceous plants plus any woodies < 1 m tall QUAD SIZE: 1 m², 2-4 herb quads per tree plot. Enter individual values in left-hand column and average in right-hand column. Remember the zeros for spp present in some but not all herb quads when figuring averages!	① SMILAX SUAVE 19 PENSYLVANICUM HEDYOPHEROIDES 3 SCIRPUS CYPERINUS 3 LYTHRUM SALICARIA 3 LYSIMACHIA TERRESTRIS 1	① SOLIDAGO PATULA 3 ATHYRIUM FELIX-FEMINUM 19 FRAGARIA VIRGINIANA 3 ALNUS STRAGUS 1 ONOCLEA SENSIBILIS 9 RUBUS PUBESCENS 3 ② ONOCLEA SENSIBILIS 3 CAREX BROMOIDES 37 EQUISETUM SYLVATICUM 1 OSMUNDA REGALIS 3 THALICTRUM PUBESCENS 3 CALLITRICHE PALUSTRIS 1 FRAXINUS AMERICANA 1	① OSMUNDA CINNAMOMEA 37 OSMUNDA REGALIS 3 DRYOPTERIS NOVEBORACENSIS 19 PTERIDIUM AQUILINUM 1 OSMUNDA CLAYTONIANA 3 ② DRYOPTERIS NOVEBORACENSIS 37 OSMUNDA CLAYTONIANA 3 ONOCLEA SENSIBILIS 3	① EQUISETUM ARVENSE 1 DRYOPTERIS NOVEBORACENSIS 37 RUBUS IDAEUS 3 ONOCLEA SENSIBILIS 3 ② CALLITRICHE HAMULATA 19 FRAGARIA VIRGINIANA 19 SPHENOPTERIS CRISTATA 1 PANICUM CLANDESTINUM 3 ANTENNARIA SPARSA 9 DAUCUS CAROTA 3 AGA COMPRESSA 3 PANICUM ACUMINATUM 1
BRYOID ground-layer mosses, liverwort, lichens in herb quads. resolution (check one): __"moss"/"liverwort"/"lichen" only; __identified to major group; __identified to genus; __identified to species.	① NONE ② NONE	① ABSENT ② MOSS BRYOID ABSENT 3	① ABSENT ② ABSENT	① ABSENT ② ABSENT MOSS (POLYTRICHUM) 3
REMARKS				PLOT NEAR MARGIN OF RAILROAD

n box on previous page, list plant spp. present in the community but not in the sample plots so we have a complete species list.

* cover classes (record midpoint): < 2 1 | 2-5% 3 | 6-12% 9 | 13-24% 19 | 25-49% 37 | 50-74% 63 | 75-100% 87

date: initials: p. 4 of 5

TOPOGRAPHY / SOILS

Area: 4611-5 | Obs. pt. #: 1

Community type: Circumneutral hardwood swamp. | (Regional alliance/community:)

Elevation: 293 meters

Aspect: flat (magnetic or true?)

Slope: flat (measured or estimated?)

Microtopography: uneven ground, some root buttressing

pH (note kit or meter type)

Topographic position: (P) low plain, level; T toe of slope; LS lower slope; MS middle slope; TB hillside terrace/bench; US upper slope; E cliff/ledge; C crest; M high plateau; N narrow valley; D drainage channel

Habitat patchiness (describe zones or patches if present): Relatively uniform (excepting vernal pools).

Mineral Soil Profile:

horizon	depth (cm)	color	mottling	other
O				
A				
E				
B				
C				

Organic Soil Profile:

peat depth:_____cm OR > 1 m_____

vonPost decomposition:_____

ALL SOILS:

DEPTH TO WATER TABLE:_____

DEPTH to OBSTRUCTION:_____

Soil temperature reading _____ F/C at _____ (depth)

Surficial deposit:
- bedrock
- talus slope
- glacial till
- moraine
- esker/outwash
- glacial delta
- lacustrine/fluvial
- marine
- aeolian
- other:

Surface:
- ____% Bedrock
- ____% Boulders (>50 cm)
- ____% Cobbles/Gravel
- 10 % Bare mineral soil
- ____% Organic soil
- 20 % Litter (note type) leaf litter from tree
- ____% Water
- 70 % Total vegetation
- ____ Other:

Average Texture:
- gravel
- sand
- loamy sand / sandy loam
- loam
- (silt loam) likely
- clay loams
- sandy clay / clay
- peat
- muck

Bedrock type:
- Igneous
  - granite
  - dioritic
  - gabbroic
  - other igneous
  - _____
- Metamorphic
  - slate/phyllite
  - schist/gneiss
  - other metamorphic
  - _____
- Sedimentary
  - limestone
  - other sedimentary
  - _____

details?

Soil stoniness:
- v. little (< 1%)
- moderate (2-25%)
- very (26-100%)

Drainage & moisture regime (see MAPPSS key):
- very poorly drained
- poorly drained
- somewhat poorly drained
- moderately well drained
- well drained
- somewhat excessively drained
- excessively drained

Hydrologic regime:
- upland
- nontidal wetland:
  - permanently flooded
  - semiperm'ly flooded
  - seasonally flooded
  - (saturated)
- tidal - irregularly
- tidal - regularly
  - saltwater
  - brackish
  - freshwater
- unknown

Location of Observation Point 1

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: 46-VP-5

3. Quad name(s) Pittsfield East 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

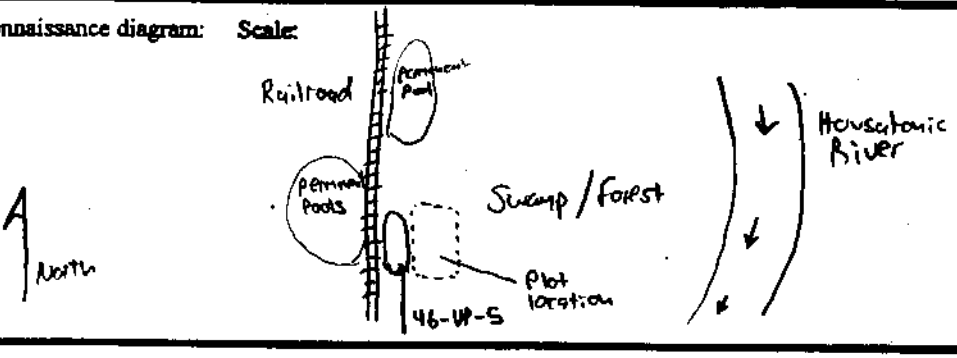
7. Town (LOCALJURIS): Lenox 8. Directions: from the New Lenox Road, follow the Springfield Terminal Rail line South along the West side of the Housatonic River to a small vernal pool on the east side of the track with a horizontal Salix nigra across its north end. Vernal Pool lies ca. 125 meters north of Yokum Brook. Plot in forest on east side of the pool.

9. Sourcecode: _____ 10. Survey date 5 Sep 2000 11. State: MA

12. Surveyors: Arthur Haines, Kurt Korwacky

B. Topography 13. Transect

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1___	Observation point 2___	Observation point 3___
16. Community name: Red Maple Swamp 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form___ form 3___	Community name: _____ Additional data: Site form___ form 3___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Red Maple swamp dominated by Acer rubrum with a few, local Quercus bicolor, A few upland inclusions on small areas of raised ground exist, so Quercus rubra locally abundant as well. Understory includes Hamamelis virginiana, Carpinus caroliniana, Lindera benzoin, Viburnum dentatum, Cornus amomum. Herbs include Osmunda claytoniana, Thelypteris noveboracensis, Solidago patula, Onoclea sensibilis, and Aralia nudicaulis. Site difficult to characterize as it is flooded regularly (as alluvial red maple swamp) but also has richness indicators (e.g., Solidago patula, Lindera benzoin)	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 __	Observation Polat 6 __	Observation Point 7 __
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3___	Community name:_____ Additional data: Site form____ form 3___	Community name:_____ Additional data: Site form____ form 3___
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 5 September 2000 Today's Date: 5 October 2000
Type of Communtiy: Red Maple Swamp Code:
Town: Lenox County: Berkshire Survey Site Name: 46-VP-5
Surveyor Name(s): Arthur Haines, Kurt Karwacky
Directions to site:

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure): Vernal Pool is largely surrounded by a forested swamp (except where railroad paces on west shore) dominated by Acer rubrum and some Quercus bicolor. A small inclusion of higher, upland ground dominated by Quercus rubra occurs on the east shore (and within the plot). Understory dominated by facultative wetland plants (e.g. Osmunda Claytoniana, Thelypteris novaboracensis, Viburnum dentatum, Hamamelis virginiana). Dense shrub thickets (Cornus, Viburnum) are fequent in area.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards): Vernal pool located at west end of a broad floodplain of Housatonic River. Landscape is relatively flat, and occupied by many low depressions (i.e., vernal pools) and backwater areas.

Surrounding Land Use (physical structures and land use practices in the surrounding area): To North and northeast, forest and swamp has been cleared for Agricultural fields. A narrow path has been cleared to west for Railroad Line.

Are there any rare species at this site? Please specify: Quercus Macrocarpa

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: Housatonic River Valley Swamp
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here):

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna): Clearing for agriculture and and railroad line.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ____yes ____no ____unknown Protecting EO? ____yes ____no ____unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent **B** - Good **C** - Marginal **D** - Poor

Comments:

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent **B** - Good **C** - Marginal **D** - Poor

Comments:

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent **B** - Good **C** - Marginal **D** - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

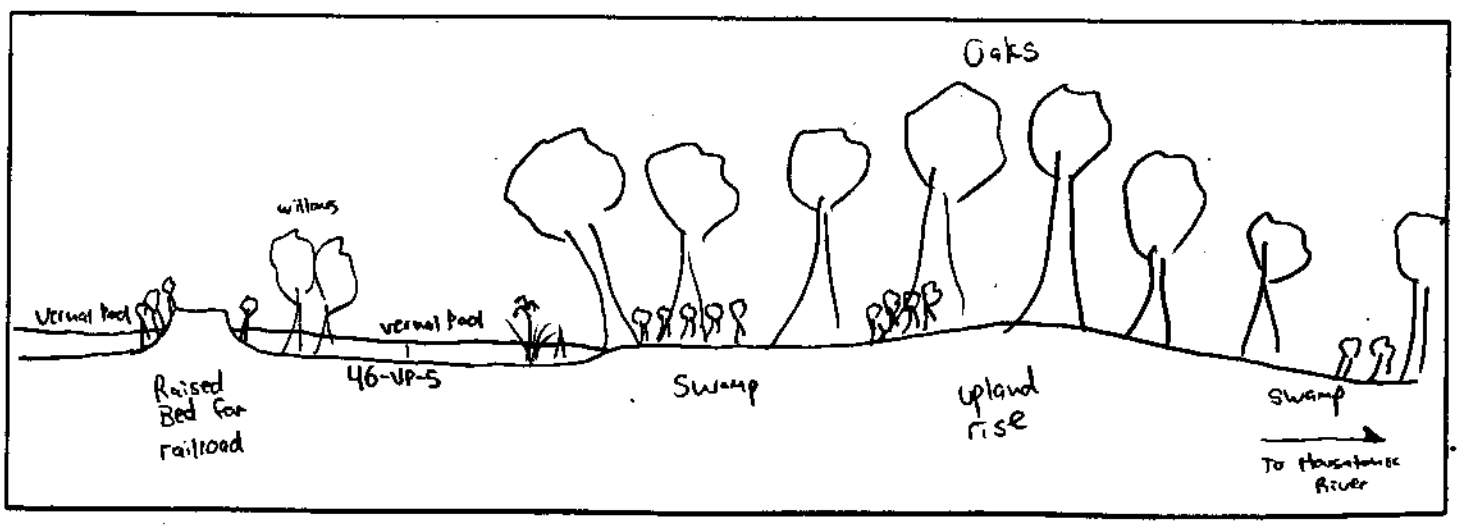
A - Excellent **B** - Good **C** - Marginal **D** - Poor

Comments:

EO Rank: (A summary of all factors listed above.) **A** - Excellent **B** - Good **C** - Marginal **D** - Poor

Comments:

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: 46-UP-5

5.Quad name(s): Pittsfield East 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Lenox 17.State: MA 10.~~Lat~~ UTM N 4693520 11.~~Long~~ 0644295 W E

12. Directions: _____

13.Sourcecode: FOGHAIOIMAUS 14.Survey date: 5 sep 2000 15.Last obs: _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Kurt Korwacky

B. Environmental Description

19.Transect / Observation point #

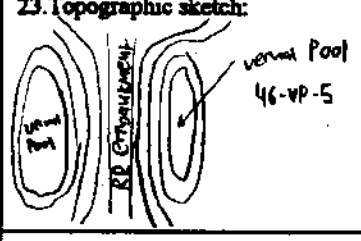
20.Image annotation #

21.Elevation: 295 m

22.Topographic position:

- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- ___High level
- ___Lowslope
- ___Midslope
- ___Toeslope
- X Low level
- ___Channel wall
- ___Channel bed
- ___Basin floor
- ___Other

23.Topographic sketch:



24.Slope degrees: 0-3

25.Slope aspect: East

26.Parent material:

unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:

- ___Extremely dry
- ___Somewhat wet
- ___Very dry
- X Wet
- ___Dry
- ___Very wet
- ___Somewhat moist
- X Moist

range

- ___Permanently inundated
- X Periodically inundated

32.Stoniness:

- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

unknown

33.Soil drainage:

- ___Rapidly drained
- ___Well drained
- ___Moderately well drained
- X Somewhat poorly drained
- ___Poorly drained
- ___Very poorly drained

34.Average texture:

- ___ sand
- ___sandy loam
- ___loam
- ___silt loam
- ___clay loam
- ___ clay
- ___ peat
- ___muck

other: _____

35.Unvegetated surface:

- ___ % Bedrock
- ___ % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Sand (0.1-2 mm)
- 5 % Bare soil
- 85 % Litter, duff
- 5 % Wood (> 1 cm)
- 5 % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Forested swamp varies between open understory, dense shrub understory, and vernal pools, upland area with Quercus rubra trees is small and anomalous

37.Plot representativeness: Representative of local area around pool only.

C. Vegetation 38.System: X Terrestrial ___ Palustrine ___ Estuarine 39.Plot number: ___ 40.Plot dimensions: 20 X 20 M

41.Leaf type:
- X Broad-leaf
- ___ Semi-broad-leaf
- ___ Semi-needle-leaf
- ___ Needle-leaf
- ___ Graminoid
- ___ Broad-leaf herbaceous
- ___ Pteridophyte

42.Leaf phenology:
- X Deciduous
- ___ Semi-deciduous
- ___ Semi-Evergreen
- ___ Evergreen
- ___ Perennial
- ___ Annual

43.Physiognomic type:
- X Forest
- ___ Sparse woodland
- ___ Shrubland
- ___ Dwarf shrubland
- ___ Sparse dwarf shrubland
- ___ Herbaceous
- ___ Sparsely vegetated
- ___ Woodland
- ___ Scrub thicket
- ___ Sparse shrubland
- ___ Dwarf scrub thicket
- ___ Non-vascular

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	25 M	50
T3 Tree sub- canopy	12 M	10
S1 Tall shrub	5 M	40
S2 Short shrub	1 M	5
H Herbaceous	1 M	65
N Non-vascular	0.001 M	5
E Epiphyte		
V Vine / liana	2 M	1

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

DS-7i [redacted]		SOLIDAGO PATULA	+.1	(Ranunculus hispidus)	
Quercus bicolor 23, 14, 5, 5,	2-2	SOLIDAGO GIGANTEA	+.1	C1-36	
Quercus rubra 24,	3.1	CORNUS AMMOMUM	r.1	Smilax herbacea	r.1
Fraxinus americanus 6, 11, 13	1.1	BRACHYELITRUM SEPTENTRIONALI	1.2		
Populus grandidentata 13,	r.1	VACCINIUM CORYMBOSUM	+.1		
Acer rubrum 8, 18, 16, 5	2+.1	HAMMEMELIS VIRG.	+.1		
Pinus strobus 5	r.1				
FAGUS GRANDIFOLIA 4	r.1	H3p			
D4p		THELYPTERIS NOV.-BOR.	2+.3		
CARPINUS CAROLINIANA	2+2	ARALIA NUDICAULIS	1.1		
VACCINIUM CORYMBOSUM	1.2	SOLIDAGO PATULA	+.1		
HAMMEMELIS VIRG.	1.2	ONOCLEA SENSIBILIS	+.1		
RHODODENDRON PRINOPHYLLUM	+.2	TSUGA CANADENSIS	r.1		
AMELANCHIER LAEVIS	+.1	LYCOPODIUM OBSCURUM	+.1		
VIBURNUM DENTATUM	+.1	MAIANTHEMUM CAN.	+.1		
POPULUS GRAND.	r.1	RUBUS HISPIDIS	+.2		
(Lindera benzoin, Cornus amomum)		RUBUS PUBESCENS	r.1		
H3p		PTERIDIUM AQUILINUM	+.1		
OSMUNDA CLAYTONIANA	2+3	UVULARIA SESS.	r.1		
OSMUNDA CINNAMOMEA	+.1	DIERVILLA LONICERA	r.1		
OSMUNDA REGALIS	1.2	BRACHYELITRUM SEPT.	+.1		

46-vp-5
Sch
4698
PIPELINE
Gravel
Sykes
25′
RIVER
Gravel Pit
4697
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
MOUNTAIN
Sykes
4696
Substation
CORPORATE
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
4695
New Lenox
BM 296.4
New Lenox Cem
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
4693
42° 22′ 30″
73° 15′
30 000 FEET
646
INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1988

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: WML-1

3. Quad name(s) East Lee (1:25,000) 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

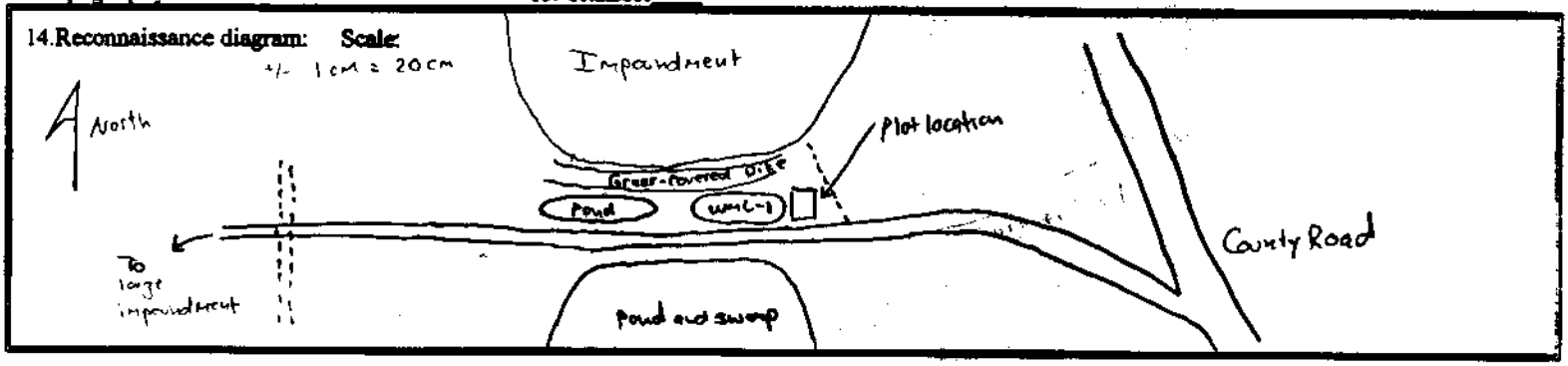
7. Town (LOCALJURIS): Washington 8. Directions: from the Woodland Road, drive east uphill on the October Mountain Road, which becomes the Felton Pond Road and then the County Road. Drive past a 4-way intersection with a field in the south corner to a sharp right (northwest) turn. Drive downhill through upland forest to the first open wetland on the right (north) Plot performed on east side of wetland in conifer/hardwood forest.

9. Sourcecode: _____ 10. Survey date 5 June 2004 11. State: MA

12. Surveyors: Arthur Haines and Kurt Karwosky

B. Topography **13. Transect**

14. Reconnaissance diagram: **Scale:** +/- 1cm = 20cm



C. Vegetation / Habitat

15. Observation point 1___	Observation point 2___	Observation point 3___
16. Community name: Spruce-fir-Northern hardwood forest 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form___ form 3___	Community name: _____ Additional data: Site form___ form 3___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Mixed conifer-hardwood forest with an overstay of Picea rubens, Acer rubrum, Prunus serotina, and Abies balsamea. Subcanopy trees are mostly conifer saplings (Abies balsamea) but Acer rubrum and Acer pensylvanicum also common. Shrubs include Corylus cornuta, Viburnum nudum, Viburnum dentatum, and Acer spicatum. Frequent herbs include Brachyelytrum septentrionale, Osmunda claytoniana, Dryopteris intermedia, and Coptis trifolia.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___	Community name:_____ Additional data: Site form___ form 3___
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 8 June 2000 Today's Date: 5 October 2000
Type of Communtiy: Spruce-fir-norther hardwood forest Code:
Town: Washington County: Berkshire Survey Site Name: WHL-1
Surveyor Name(s): Arthur Haines
Directions to site: see site survey form

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure): upland forest adjacent to deep emergent marsh. Forest overstory dominated by Picea rubens, Acer rubrum, Prunus serotina, and Abies balsamea. Shrubs include Abies balsamea, Viburnum nudum, Viburnum dentatum, and Acer pensylvanicum. The herb layer is dominated by Brachyelytrum septentrionale, Osmunda claytoniana, Dryopteris intermedia, Coptis trifolia, and Maianthemum canadense.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards): 4 Ponds/impoundments in close proximity within a highly modified watercourse system (Drinking Water supply for Pittsfield Area). Area is within October Mountain State forest, a somewhat scenic area containing gravel roads and trails on a primarily hardwood forested ridge/hill system.

Surrounding Land Use (physical structures and land use practices in the surrounding area): IMpoundments for Drinking water frequent the landscape, Area also extensively used by ATV drivers, hunters, and Anglers.

Are there any rare species at this site? Please specify: Equisetum variegatum, and roadside edge.

Management / Ownership

Is this area part of a managed conservationa area: yes Managed Area Name: October Mountain State forest

Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): Pool is occupying area an an altered landscape. Threats to pools existence would be those actions that alter local hydrology (eg., breaching dike, raising culvert).

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna): Grass-covered dike located on north side of pool. Single-lane gravel road passes close to south shore of pool.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Though pool occurs in altered landscape, surrounding area is relatively intact and with mature forest.

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Surrounding forests are of good quality.

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

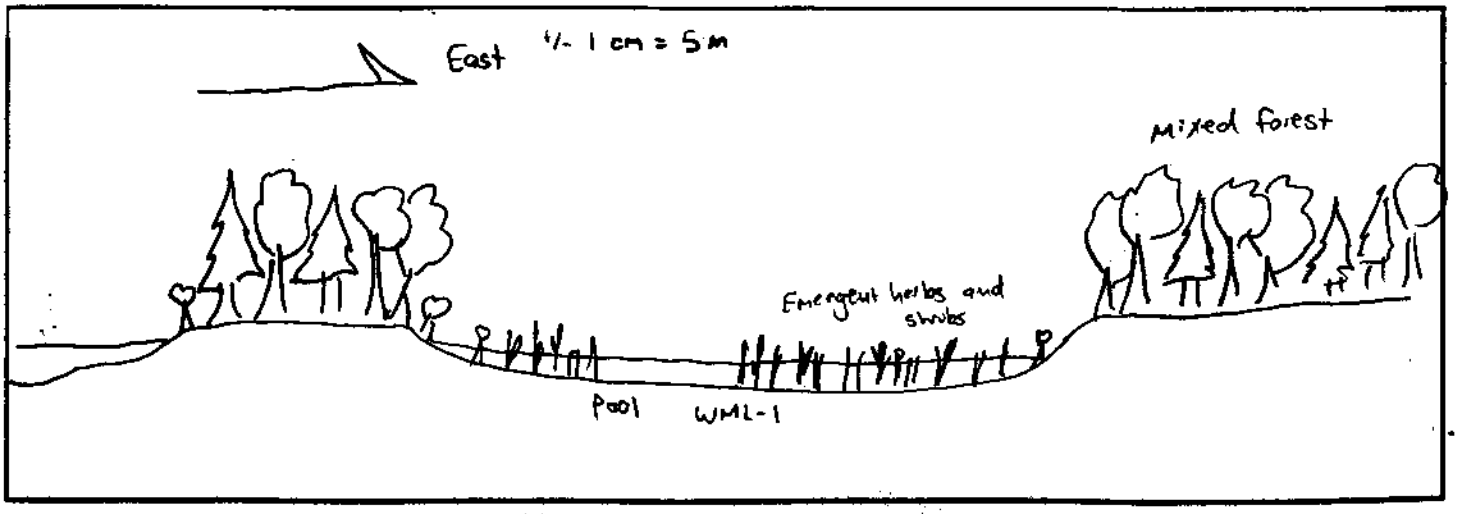
A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Rank: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: Pool, though home to several species of amphibians, is human-created.

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: WML-1

5.Quad name(s): East Lee 6.Quad code(s): _____ 7.County name(s): _____ 8.County code(s): _____

9.Town (LOCALJURIS): Washington 17.State: MA 10.~~Lat~~ UTM N 4689335 11.~~Long~~ 0649995 ~~W~~ E

12. Directions: See site survey form

13.Sourcecode: FOOHAIO1MAUS 14.Survey date 8 June 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Kurt Kerwacky

B. Environmental Description

19.Transect / Observation point # 1

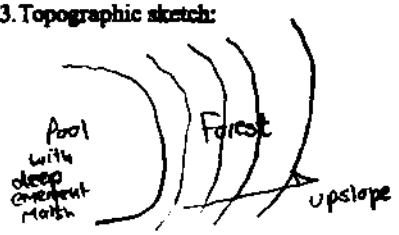
20.Image annotation #

21.Elevation: 541 meters

22.Topographic position:

- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- X High level
- ___Lowslope
- ___Midslope
- ___Toeslope
- ___Low level
- ___Channel wall
- ___Channel bed
- ___Basin floor
- ___Other

23.Topographic sketch:



24.Slope degrees: 0-3°

25.Slope aspect: WSW (toward pool)

26.Parent material:

Unknown

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:

- ___Extremely dry
- ___Somewhat wet
- ___Very dry
- ___Wet
- ___Dry
- ___Very wet
- ___Somewhat moist
- X Moist
- ___Permanently inundated
- ___Periodically inundated

32.Stoniness:

- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

Unknown, with some stones

33.Soil drainage:

- ___Rapidly drained
- ___Somewhat poorly drained
- ___Well drained
- ___Poorly drained
- X Moderately well drained
- ___Very poorly drained

34.Average texture: unknown

- ___ sand
- ___clay loam
- ___sandy loam
- ___ clay
- ___loam
- ___ peat
- ___silt loam
- ___muck

other _____

35.Unvegetated surface:

- ___ % Bedrock
- 94 % Litter, duff
- ___ % Large rocks (cobbles, boulders > 10 cm)
- 5 % Wood (> 1 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Water
- ___ % Sand (0.1-2 mm)
- 1 % Bare soil
- ___ % Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Most of surrounding forest is hardwood forest, however, this local area is frequented by spruce and fir interixed with hardwoods.

37.Plot representativeness: Fairly representative of surrounding forest.

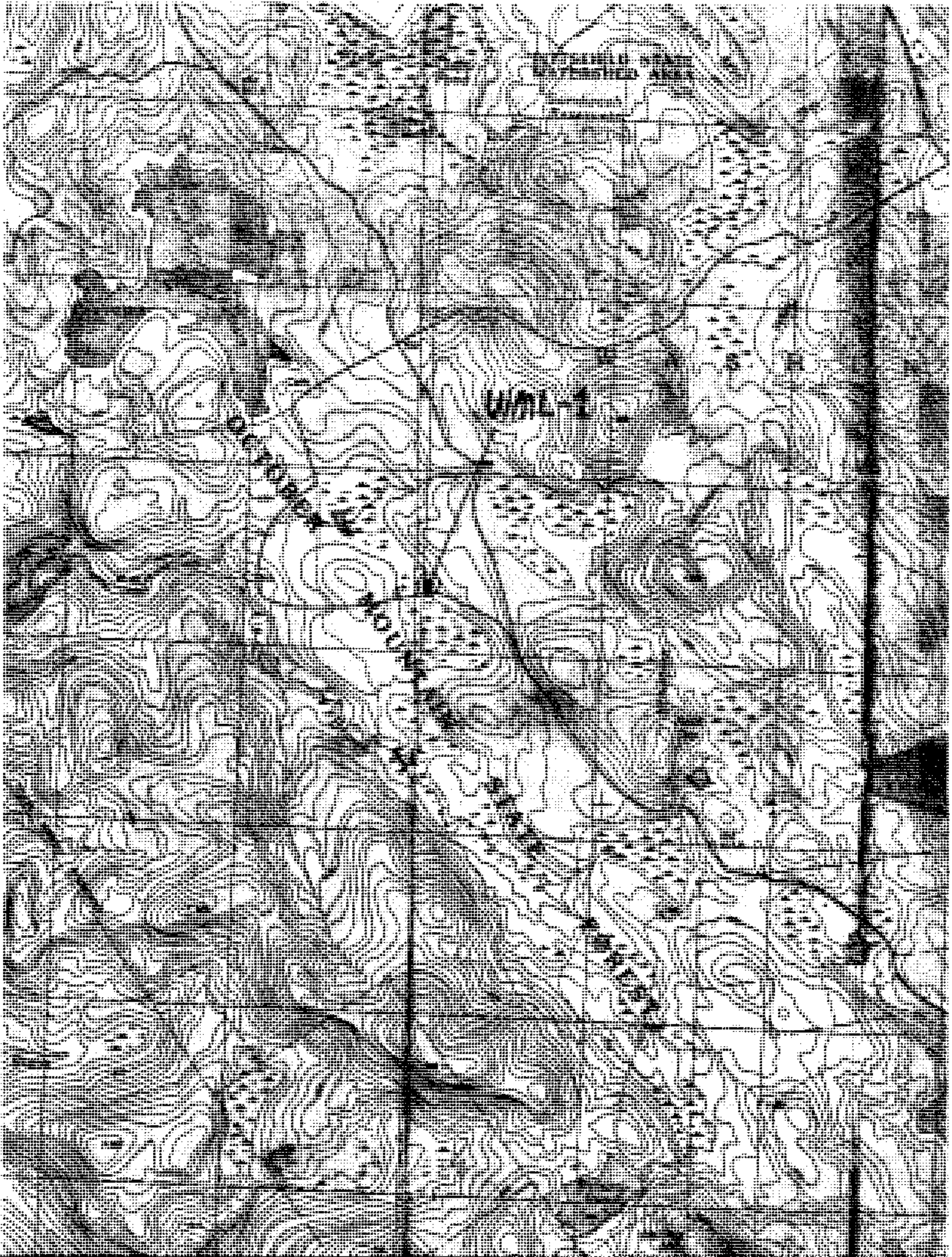
C. Vegetation 38.System: X Terrestrial ___ Palustrine ___ Estuarine 39.Plot number: ___ 40.Plot dimensions: 20 X 20 m

41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:	
X Broad-leaf	X Deciduous	X Forest	___ Woodland
___ Semi-broad-leaf	___ Semi-deciduous	___ Sparse woodland	___ Scrub thicket
___ Semi-needle-leaf	___ Semi-Evergreen	___ Shrubland	___ Sparse shrubland
X Needle-leaf	X Evergreen	___ Dwarf shrubland	___ Dwarf scrub thicket
___ Graminoid	___ Perennial	___ Sparse dwarf shrubland	
___ Broad-leaf herbaceous	___ Annual	___ Herbaceous	___ Non-vascular
___ Pteridophyte		___ Sparsely vegetated	

44.	height	% cover
T1 Emergent tree	absent	
T2 Tree canopy	20 metres	50
T3 Tree sub-canopy	10 m	40
S1 Tall shrub	5 m	10
S2 Short shrub	2 m	10
H Herbaceous	0.5 m	65
N Non-vascular	0.02 m	2
E Epiphyte vascular	absent	0
V Vine / liana	0.5	1

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

M6:		H1-2'		MICHELLA REPENS	+ .3
PICEA RUBENS 16, 11, 13	1 .1	BRACHYELETRUM SEPTENTRIONALE	2- .3	TRILLIUM ERECTUM	r .1
ACER RUBRUM 9, 5, 5, 9, 5, 9, 5, 7	2- .1	OSMUNDA REGALIS	R .2		
PRUNUS SERATINA 16, 7, 13, 6	r .1	OSMUNDA CLAYTONIANA	2-.2		
ABIES BALSAMEA 8, 6, 5	r .1	DRYOPTERIS INTERMEDEA	2+.2		
		MEDEOLA VIRGINIANA	+ .1		
M5:		CLINTONIA BOREALIS	1 .2		
ABIES BALSAMEA	2- .1	SMILAX HERBACEA	r .1		
ACER RUBRUM	1 .1	SORBUS AMERICANA	r .1		
ACER PENSYLVANICUM 6,	+ .2	CAREX INTUMESCENS	+ .2		
		CAREX ARCTATA	+ .2		
M3-4p		COPTIS TRIFOLIA	2- .3		
ABIES BALSAMEA	r .1	FAGUS GRANDIFOLIA	r .1		
ACER SPICATUM	r .1	MIANTHEMUM CANADENSE	2- .3		
CORYLUS CORNUTA	1 .2	ATHYRIUM FELIX-FEMINA	+ .2		
ACER RUBRUM	1 .1	UVULARIA SESSILIFOLIA	1 .2		
VIBURNUM NUDUM VAR. CASSINOIDES	2- .3	ARALIA NUDICAULIS	+ .1		
VIBURNUM DENTATUM VAR. LUCIDUM	2- .2	ACER SACCHARUM	r .1		
QUERCUS RUBRA	r .1	SOLIDAGO RUGOSA	r .1		
ACER SACCHARUM	r .1	OCLAMENA ACUMINATA	+ .1		
FAGUS GRANDIFOLIA	r .1	LYSIMACHIA TERRESTRIS	+.2		


UNL-1

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1. Site name: _____ 2. Survey site name: WML-2

3. Quad name(s): East Lee 4. Quad code(s): _____ 5. County name(s): Berkshire 6. County code(s): _____

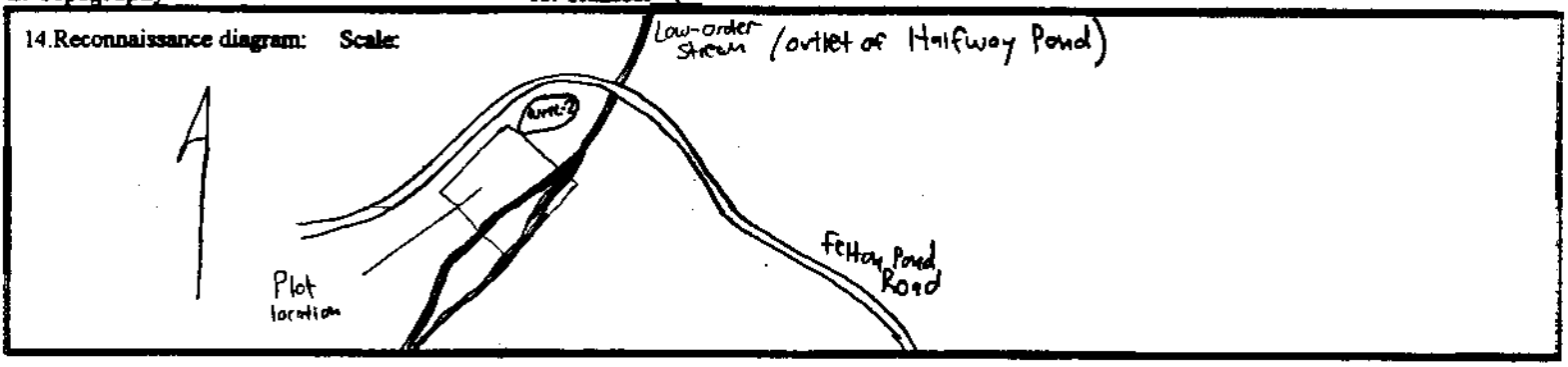
7. Town (LOCALJURIS): Washington 8. Directions: from New Lenox Road in Lenox, drive South on the Woodland Road (East side of Housatonic River) to a left (east) turn up the October Mountain Road. Site lies on southwest side of a small, permanent pond, ca. 0.5 miles east of where pavement ends (just above gate to Felton Lake), on south side of Road, on turn in road where stream passes under.

9. Sourcecode: FOOHAIO1MAUS 10. Survey date: 10 Oct 00 11. State: MA

12. Surveyors: Arthur Haines

B. Topography 13. Transect I

14. Reconnaissance diagram: Scale:



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: Northern hardwoods-hemlock	Community name:	Community name:
17. Additional data: Site form ___ White Pine Forest form 3 ___	Additional data: Site form ___ form 3 ___	Additional data: Site form ___ form 3 ___
18. General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) Upland forest trees: Tsuga canadensis Fraxinus americana Acer saccharum shrubs: Acer spicatum Viburnum lantanoides Herbs: Dryopteris intermedia Thelypteris noveboracensis Mitchela repens site abruptly transitions to forested swamp along narrow (10m) floodplain of small stream with different vegetation.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 10 October 2000 **Today's Date:** 12 October 2000
Type of Communtiy: northern hardwoods - hemlock - White Pine forest **Code:**
Town: Washington **County:** Berkshire **Survey Site Name:** WML-2
Surveyor Name(s): Arthur Haines
Directions to site: See Site Survey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure): Site lies in transition from an upland forest to a narrow forested swamp that borders a low-order stream. Dominant Trees include Tsuga canadensis, Fraxinus american, and Acer saccharum (upland) and Betula alleghaniensis and Acer rubrum (wetland). Common shrubs are Acer spicatum and Viburnum lantanoides (upland) and Sambucus canadensis and Ilex verticillata (wetland). Herbs include Dryopteris intermedia, Thelypteris noveboracensis, and Mitchella repens (upland) and Glyceria melicaria, Onoclea sensibilis, Solidago rugosa, and Hydrocotyle (wetland) americana.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards): Landscape along a bench of the October Mountain ridgeline. Ground is uneven, rocky and transitions to pit and mound topography as one moves downslope into forested swamp. Swamp occurs along narrow floodplain of a low-order stream. A small, permanent pool sits near road and stream. Ecotone between two communities relatively narrow (i.e., abrupt transition).

Surrounding Land Use (physical structures and land use practices in the surrounding area): Land used for forest industry at one time. Currently, hunting and fishing occur in local area. Much of landscape managed for Pittsfield water supply.

Are there any rare species at this site? Please specify:

Management / Ownership

Is this area part of a managed conservationa area: yes **Managed Area Name:** October Mountain State Forest
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): Road maintainence/expansion would fill or alter vernal pool; forestry activity.

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna): Evidence of cutting in area. Rosa multiflora and Tussilago farfara along roadside but not invading community.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Forest is intact, but only a small packet of moderate-sized, older trees occurs

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments:

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments:

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

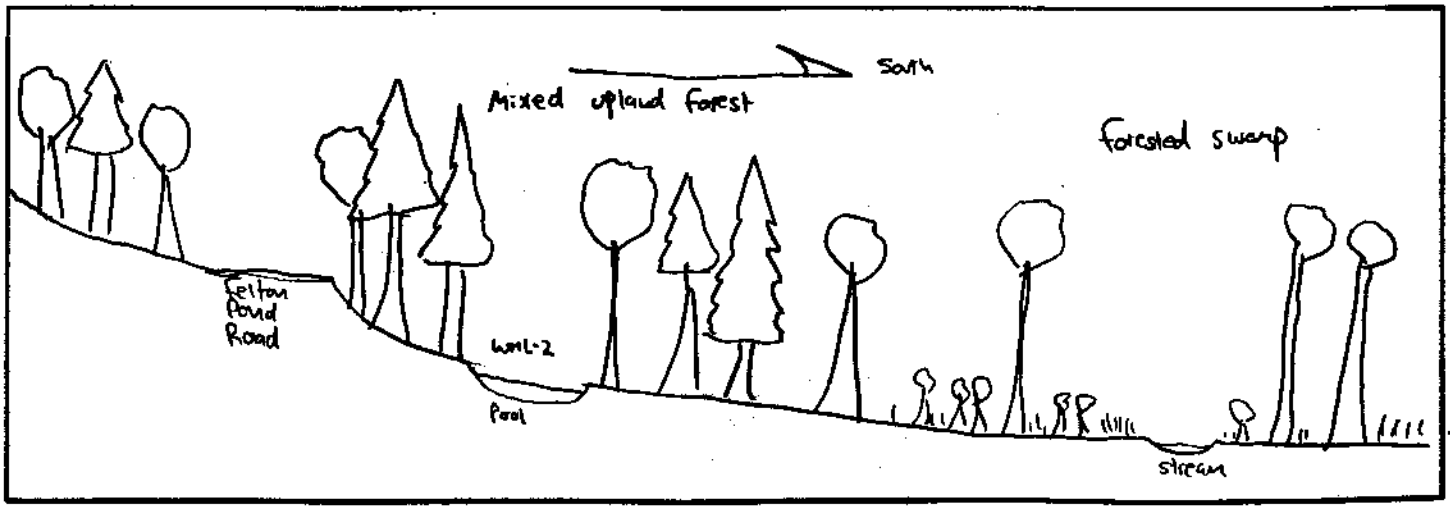
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership of property

EO Rank: (A summary of all factors listed above.) A - Excellent (B) Good C - Marginal D - Poor

Comments:

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: WML-2

5.Quad name(s): East lee 6.Quad code(s): _____ 7.County name(s): _____ 8.County code(s): _____

9.Town (LOCALJURIS): Washington 17.State: MA 10.~~Lat~~ UTM N 4691020 11.~~Long~~ 0647295 W E

12. Directions: See site survey summary

13.Sourcecode: FOOHAIO1MAUS 14.Survey date 11 October 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines

B. Environmental Description

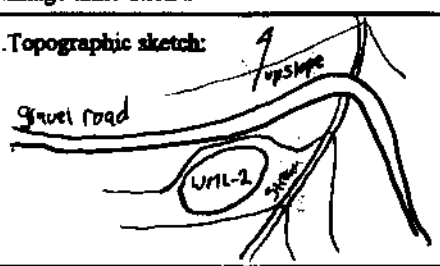
19.Transect / Observation point #

20.Image annotation #

21.Elevation: 551 M

22.Topographic position:
- ___Interfluve
- ___Backslope
- ___High slope
- ___Step in slope
- ___High level
- ___Lowslope
- X Midslope
- ___Toeslope
- ___Low level
- ___Channel wall
- ___Channel bed
- ___Basin floor
- ___Other

23.Topographic sketch:



24.Slope degrees: 0-10

25.Slope aspect: south

26.Parent material:

Gneiss and Quartzite bedrock (Weatherbee 1996)

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:
- ___Extremely dry
- X Somewhat wet
- ___Very dry
- ___Wet
- ___Dry
- X Very wet
- ___Somewhat moist
- X Moist
- X Permanently inundated (in stream channel only)
- ___Periodically inundated

32.Stoniness:
- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

Unknown

33.Soil drainage:
- ___Rapidly drained
- X Somewhat poorly drained
- X Well drained
- ___Poorly drained
- X Moderately well drained
- X Very poorly drained

34.Average texture:
- ___sand
- ___clay loam
- ___sandy loam
- ___clay
- ___loam
- ___peat
- ___silt loam
- ___muck

other _____

35.Unvegetated surface:
- ___% Bedrock
- ___% Large rocks (cobbles, boulders > 10 cm)
- ___% Small rocks (gravel, 0.2-10 cm)
- ___% Sand (0.1-2 mm)
- 30 % Bare soil
- 55 % Litter, duff
- 5 % Wood (> 1 cm)
- 10 % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

Local area diverse due to influences on vegetation of stream and associated wetland.

37.Plot representativeness: Somewhat representative of each community (upland forest and swamp)

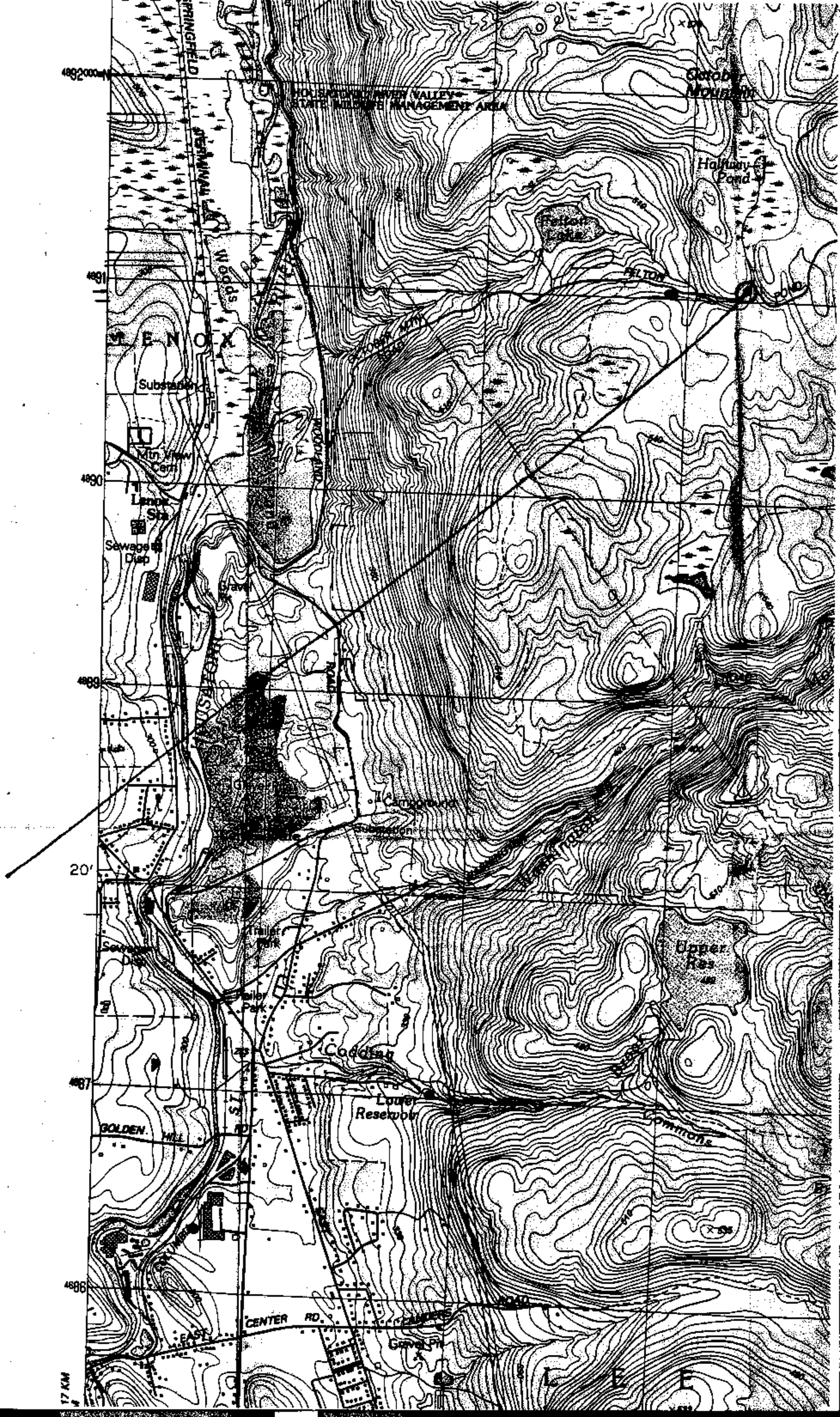
C. Vegetation 38.System: X Terrestrial X Palustrine ___ Estuarine 39.Plot number: 1 40.Plot dimensions: 20 x 20 m

41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:	
___Broad-leaf	___Deciduous	X Forest	___Woodland
___Semi-broad-leaf	___Semi-deciduous	___Sparse woodland	___Scrub thicket
___Semi-needle-leaf	___Semi-Evergreen	___Shrubland	___Sparse shrubland
X Needle-leaf	X Evergreen	___Dwarf shrubland	___Dwarf scrub
___Graminoid	___Perennial	___Sparse dwarf shrubland	thicket
___Broad-leaf herbaceous	___Annual	___Herbaceous	___Non-vascular
___Pteridophyte		___Sparsely vegetated	

44.	height	% cover
T1 Emergent tree	Absent	0
T2 Tree canopy	21 m	60
T3 Tree sub- canopy	15 m	5
S1 Tall shrub	5 m	5
S2 Short shrub	3 m	25
H Herbaceous	1 m	50
N Non-vascular	0.03 m	25
E Epiphyte	(vascular) Absent	0
V Vine / liana	Absent	0

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

E 6-7i		H 1-3p		Chelone glabra	r.1
Tsuga canadensis 11, 11, 10, 17, 12, 5, 8, 11	3.1	Dryopteris intermedia	2-.3	Thalictrum pubescens	r.1
Fraxinus americana 9, 7, 7, 6, 6, 5,	2-.1	Thelypteris noveboracensis	2-.3	Solidago rugosa	1.2
Acer saccharum 17, 7	2-.1	Mitchella repens	1.2	Hydrocotyle americana	t.2
Betula alleghaniensis 10, 18	2-.1	Glyceria melicaria	2-.3	Symphyotrichum puniceum	r.1
Fagus grandifolia 15	1.1	Osmunda cinnamomea	1.2	Rubus trifolia	r.1
		Onoclea sensibilis	2-.2	Equisetum arvense	r.1
DSr		Agrostis perennas	t.2	Chrysosplenium americanum	t.2
Acer pensylvanicum	t.1	Carex gracilis	t.1	Eupatorium perfoliatum	r.1
Betula alleghaniensis	t.1	Fagus grandifolia	t.1	Glyceria striata	r.1
		Tsuga canadensis	t.1	Vida cuculata	t.2
DHr		Viburnum lantanoides	t.1		
Viburnum lantanoides	t.2	Hyperia lucidula	t.2		
Acer spicatum	2-.2	Oclemena acuminata	t.1		
Sambucus canadensis	2-.3	Carex laxiflora	t.1		
Tsuga canadensis	2-.1	Scutellaria lateriflora	t.1		
Fagus grandifolia	2-1	Rubus pubescens	t.1		
Picea rubens	r.1	Symphyotrichum lateriflorum	t.1		
Ilex verticillata	2-.2	Impatiens capensis	t.1		
		Oxalis montana	t.1		
		Brachyelytrum septentrionale	r.1		


HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
October Mountain
Halfway Pond
Felton Lake
FELTON
POND
SPRINGFIELD
Woods
L E N O X
Substation
Mtn View Cem
Lenox Sta
Sewage Disp
Gravel
Substation
Trailer Park
Sewage Disp
Upper Res
Lower Reservoir
Commons
GOLDEN HILL RD
EAST CENTER RD
ROAD
Gravel Pit
L E E
20′
4890
4887
4886

WML-2

COMMUNITY FORM 1: TRANSECT, SITE SURVEY SUMMARY

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers

1.Site name: _____ 2.Survey site name: WML-3

3.Quad name(s) East Lee 1:25,000 4.Quad code(s): _____ 5.County name(s): Berkshire 6.County code(s): _____

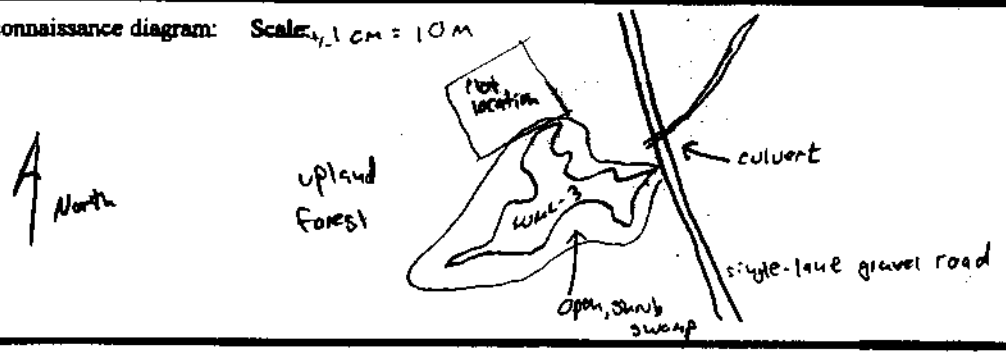
7.Town (LOCALJURIS): Washington 8.Directions: from the New Lenox Road, drive south on the Woodland Road (gravel road along west side of Housatonic River). Turn east (left) to drive up the October Mountain Road. (which becomes Felton Pond Road). Make a sharp left turn and drive downhill ca. 350 meters to a wetland adjacent to west side of Road. Community survey performed on north side of small wetland.

9.Sourcecode: F00HAI01MAVS 10.Survey date 9 June 2001 11.State: MA

12.Surveyors: Arthur Haines and Kurt Kanwacky

B. Topography **13. Transect**

14.Reconnaissance diagram: Scale: 1 cm = 10 m



C. Vegetation / Habitat

15. Observation point 1	Observation point 2	Observation point 3
16. Community name: spruce-fir-northern hardwood forest 17. Additional data: Site form X form 3 X	Community name: _____ Additional data: Site form ____ form 3 ____	Community name: _____ Additional data: Site form ____ form 3 ____
18.General description (physiognomy, char./dom spp. of tree, shrub, herb, bryophyte layers) upland mixed forest with Picea glauca and Acer rubrum as overstory dominants. Shrubs are mostly conifer saplings (Picea glauca, Picea rubens, Abies balsamea) Herbs include Maianthemum canadense, Coptis trifolia, Clintonia borealis, Lycopodium obscurum, Trillium undulatum, and Thelypteris noveboracensis. Bryophyte layer present but sparse.	General description	General description:

Reconnaissance Diagram: Scale:

Observation Point 4 ___	Observation Point 5 ___	Observation Point 6 ___	Observation Point 7 ___
Community name:_____ Additional data: Site form ___ form 3___	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____	Community name:_____ Additional data: Site form____ form 3____
General Description:	General Description:	General Description:	General Description:

Natural Heritage & Endangered Species Program

Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270, ext. 200

NATURAL COMMUNITY SITE REPORT FORM

A location map must accompany this form.

Survey Date: 9 June 2000 **Today's Date:** 9 June 2000
Type of Communtiy: Spruce-fir-northern hardwood forest **Code:**
Town: Washington **County:** Berkshire **Survey Site Name:** WML-3
Surveyor Name(s): Arthur Haines and Kurt Kanwacky
Directions to site: See Site survey summary

Vegetation Description (EODATA, vegetation, dominant or significant species, community structure): upland forest dominated by Picea glauca and Acer rubrum. Understory Trees include Picea glauca, Acer rubrum, and Sorbus americana. Shrubs largely comprised of conifer saplings (Picea glauca, Picea rubens, and Abies balsamea). Herbs are a mix of plants found in hardwood and conifer forests, such as Maianthemum canadense, Coptis trifolia, Clintonia borealis, Lycopodium obscurum, Trillium undulatum, and Thelypteris noveboracensis.

Physical Description (GENDESC, natural disturbances, aquatic features, notable landforms, scenic qualities, natural hazards): WML-3 is a small, open wetland along a small stream that passes over an area that is shallow to bedrock. This has created a widening of the seasonally flowing stream and has also created an associated stream-side fen and shrub swamp ca. 20 meters wide. A single lane gravel road passes along the streams east side. Adjacent forest with high proportion of conifers perhaps due to cold air sink.

Surrounding Land Use (physical structures and land use practices in the surrounding area): The land is part of the October Mountain State Forest.

Are there any rare species at this site? Please specify: no

Management / Ownership

Is this area part of a managed conservationa area: yes **Managed Area Name:** October Mountain State Forest.
Threats to Site/Management Recommendations (on-site and off-site threats to site and management implications; if applicable, discuss why the community may no longer exist here): Forestry activity,

Evidence of Disturbance (livestock grazing, structures, past logging, mining, plantations, orchards, exotic flora or fauna): Gravel Road and associated culvert. A stone wall and remnants of barb-wire fence indicate past agricultural use.

Owner Information

Owner's Name: Commonwealth of Massachusetts Telephone: ( )

Address:

Is Owner: Aware of EO? ___yes ___no ___unknown Protecting EO? ___yes ___no ___unknown

Owner Comments:

Element Occurrence (EO) Summary

EO Quality: (How does this occurrence compare with others you have seen? Consider such factors as acreage, maturity, "naturalness," and any unique or special biotic features.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Trees of moderate Age; community not large

EO Condition: (Consider disturbances which may have had a negative impact on this occurrence. Have exotics invaded? Can the community occurrence recover from past disturbances?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Community has recovered from past forestry activity

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: ↓ If forest cutting is prevented

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

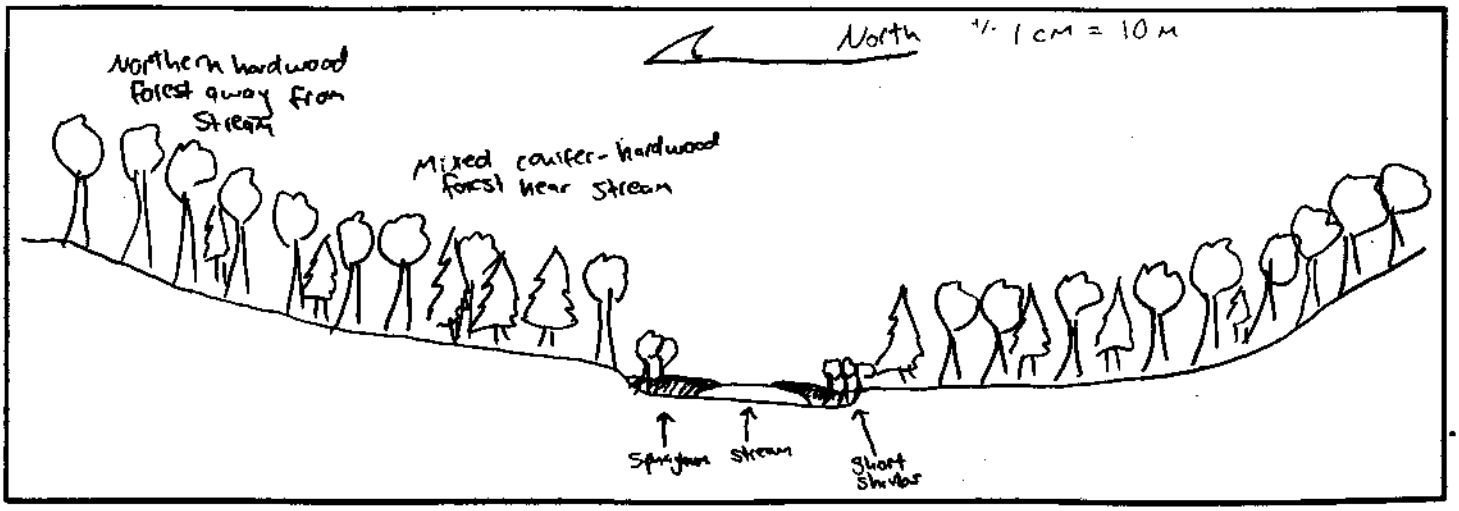
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership of property

EO Rank: (A summary of all factors listed above.) A - Excellent (B) - Good C - Marginal D - Poor

Comments:

Draw a cross section of the natural community, showing topographic and aquatic features, vegetation structure, and location of various plant communities or species. Include scale and direction.



Form 3: Quantitative Community Characterization

rev. May, 1998

MA Natural Heritage & Endangered Species Program

A. Identifiers (general EOR information)

Sci. name: 1.SNAME: _____ 2.GNAME: _____

3.Site name: _____ 4.Survey site name: WML-3

5.Quad name(s): East Lee 6.Quad code(s): _____ 7.County name(s): Berkshire 8.County code(s): _____

9.Town (LOCALJURIS): Washington 17.State: MA 10.~~Lat~~ UTM N 4692320 11.~~Long~~ 0 648410 ~~W~~ E

12. Directions: See Site Survey Summary

13.Sourcecode: _____ 14.Survey date 9 June 2000 15.Last obs _____ 16.First obs: _____

18 Surveyors: Arthur Haines and Kurt Konwacy

B. Environmental Description

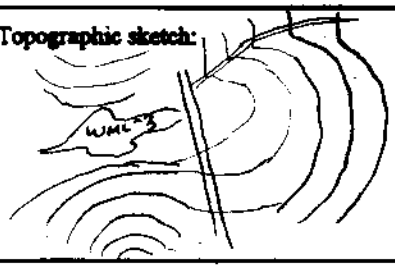
19.Transect / Observation point #

20.Image annotation #

21.Elevation:

22.Topographic position:
- ___Interfluve
- ___High slope
- ___High level
- ___Midslope
- ___Low level
- ___Channel bed
- ___Other
- ___Backslope
- ___Step in slope
- ___Lowslope
- X Toeslope
- ___Channel wall
- ___Basin floor

23.Topographic sketch:



24.Slope degrees: 0-5°

25.Slope aspect: South

26.Parent material:

Gneiss and Quartzite bedrock (weathered 1996)

27.Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth (SOILCOM)

28.Organic horizon depth: _____

29.Organic horizon type: _____

30.Average pH of mineral soil: _____

31.Soil moisture regime:
- ___Extremely dry
- ___Very dry
- ___Dry
- ___Somewhat moist
- X Moist
- ___Somewhat wet
- ___Wet
- ___Very wet
- ___Permanently inundated
- ___Periodically inundated

32.Stoniness:
- _____Stone free <0.1%
- _____Moderately stony 0.1-1%
- _____Stony 3-15%
- _____Very stony 15-50%
- _____Exceedingly stony 50-90%
- _____Stone piles >90%

unknown

33.Soil drainage:
- ___Rapidly drained
- ___Well drained
- ___Moderately well drained
- ___Somewhat poorly drained
- ___Poorly drained
- ___Very poorly drained

34.Average texture:
- ___ sand
- ___sandy loam
- ___loam
- ___silt loam
- ___clay loam
- ___ clay
- ___ peat
- ___muck

other: _____

35.Unvegetated surface:
- ___ % Bedrock
- 1 % Large rocks (cobbles, boulders > 10 cm)
- ___ % Small rocks (gravel, 0.2-10 cm)
- ___ % Sand (0.1-2 mm)
- 1 % Bare soil
- 88 % Litter, duff
- 10 % Wood (> 1 cm)
- ___ % Water
- ___% Other: _____

36.Environmental Comments: vegetation homogeneity, erosion / sedimentation, inundation, etc.

In area of stream, the upland forest is mixed conifer-hardwood as one moves away from the stream upslope it becomes more hardwood oriented.

37.Plot representativeness: The plot represents well the forest adjacent to the pool / stream.

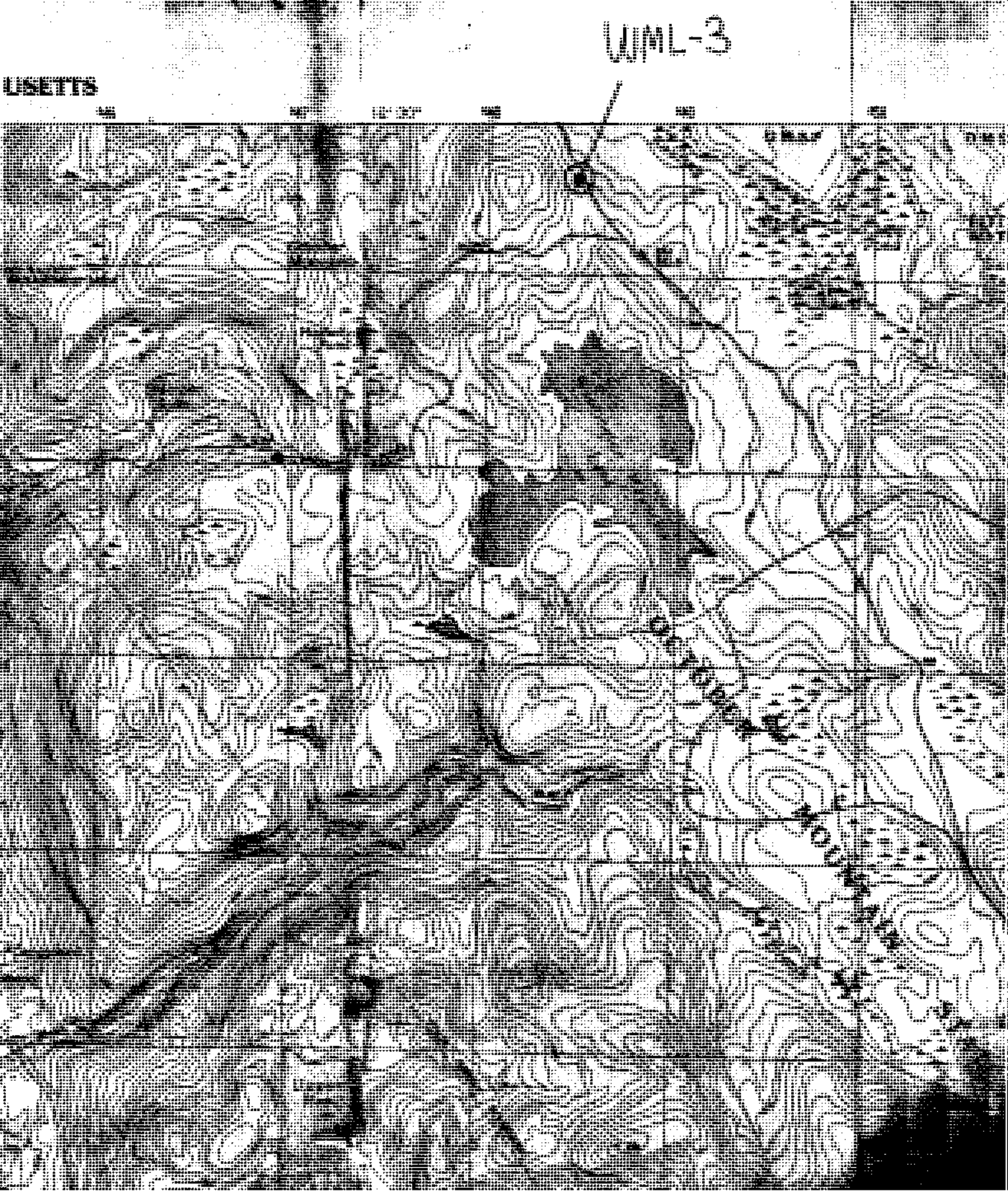
C. Vegetation 38.System: X Terrestrial ___ Palustrine ___ Estuarine 39.Plot number: 1 40.Plot dimensions: 20 x 20 meters

41.Leaf type:	42.Leaf phenology:	43.Physiognomic type:	
X Broad-leaf	X Deciduous	X Forest	___ Woodland
___ Semi-broad-leaf	___ Semi-deciduous	___ Sparse woodland	___ Scrub thicket
___ Semi-needle-leaf	___ Semi-Evergreen	___ Shrubland	___ Sparse shrubland
X Needle-leaf	X Evergreen	___ Dwarf shrubland	___ Dwarf scrub thicket
___ Graminoid	___ Perennial	___ Sparse dwarf shrubland	___ Non-vascular
___ Broad-leaf herbaceous	___ Annual	___ Herbaceous	
___ Pteridophyte		___ Sparsely vegetated	

44.	height	% cover
T1 Emergent tree		
T2 Tree canopy	20 m	65
T3 Tree sub- canopy	10 m	15
S1 Tall shrub	5 m	5
S2 Short shrub	2 m	5
H Herbaceous	0.5	50
N Non-vascular	0.02	5
E Epiphyte	NA	0
V Vine / liana	NA	0

45.Species / percent cover: starting with uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list on a separate line below each tree species the DBH of all trees above 10 cm diameter. Separate the measurements with a comma and note whether in cm or inches.

M6c		H1-2i		L1r	
Picea Glauca 8,6,9,6,9,12,8,6,14.5 (5,6)	3 .1	Thelypteris novaboracensus	+ .1	Leucobryum glaucum	r. 2
Acer Rubrum - 6, 12, 5, 6, 5, 5, 7, 15, 6 (5,9,7)	3 .1	Dennstaedtia punctilobula	+ .1	Sphagnum	r. 2
Fagus Grandifolia - 12	1 .1	Lycopodium dendroidium	+ .2	Polytrichum	r. 2
Amelanchier Lenuis - 5	r .1	Trillium undulatum	+ .1		
Betula papyrifera - 6	r. 1	Lycopodium obscurum	2- .3		
M5p Prunus serotina - 6, 8	r.1	Maianthemum canadense	2- .2		
Picea Glauca	1 .1	Aurilea nudicaulis	1 .1		
Betula alleghaniensis	r .1	Trientalis borealis	+ .1		
Acer Rubrum	1 .1	Diphasiastrum digitatum	1 .2		
Sorbis Americana	+ .1	Uvularia sessilifola	1 .2		
Amelanchier Leavus	r .1	Cypripedium acaule	r .1		
		Coptis trifolia	1 .3		
N3-4r		Mitchella repens	r .1		
Picea Glauca	2- .1	Osmunda cinnamomea	r .2		
Abies Balsamea	r .1	Carex trisperma	+ .2		
Amelanchier Levus	r .2	Viburnum nudum	r .1		
Sorbis Americana	r .1	Acer Rubrum	r .1		
Picea Rubens	+ .2	Clintonia borealis	+ .2		
		Lycopodium clavatum	r .2		
		Acer pensylvanicum	r .1		


WML-3

Common Name	Scientific Name
alfalfa	*Medicago sativa*
alga pondweed	*Potamogeton confervoides*
alternate-leaved dogwood	*Cornus alternifolia*
American bur-reed	*Sparganium americanum*
American beech	*Fagus grandifolia*
American elm	*Ulmus americana*
American hazelnut	*Corylus americana*
American hornbeam	*Carpinus caroliniana*
American willow-herb	*Epilobium leptophyllum*
autumn willow	*Salix serissima*
awned nutsedge	*Cyperus squarrosus*
balsam fir	*Abies balsamea*
barnyard grass	*Echinochloa crus-galli*
basswood	*Tilia americana*
beaked hazelnut	*Corylus cornuta*
beaked sedge	*Carex utriculata*
beaked willow	*Salix bebbiana*
bellwort	*Uvularia sessilifolia*
black ash	*Fraxinus nigra*
black bulrush	*Scirpus hattorianus*
black cherry	*Prunus serotina*
black maple	*Acer nigrum*
black willow	*Salix nigra*
bloodroot	*Sanguinaria canadensis*
blue-bead lily	*Clintonia canadensis*
bottlebrush grass	*Elymus hystrix*
box-elder	*Acer negundo*
bracken fern	*Pteridium aquilinum*
bristly crowfoot	*Ranunculus pensylvanicus*
broad-leaved cattail	*Typha latifolia*
brome-like sedge	*Carex bromoides*
buckbean	*Menyanthes triofoliata*
bulblet-bearing water-hemlock	*Cicuta bulbifera*
bur oak	*Quercus macrocarpa*
buttonbush	*Cephalanthus occidentalis*
calico aster	*Symphyotrichum lateriflorum*
Canada bluegrass	*Poa compressa*
Canada bluejoint	*Calamagrostis canadensis*
Canada elder	*Sambucus canadensis*
Canada goldenrod	*Solidago canadensis*
Canada lovegrass	*Eragrostis pectinacea*
Canada mayflower	*Maianthemum canadense*
Canada waterweed	*Elodea canadensis*
Carrion flower	*Smilax herbacea*
cherry birch	*Betula lenta*
Chinese spindle-tree	*Euonymus fortunei*
choke cherry	*Prunus virginiana*
Christmas fern	*Polystichum acrostichoides*
cinnamon fern	*Osmunda cinnamomea*
clearweed	*Pilea pumila*
cluster sanicle	*Sanicula odorata*

Common Name	Scientific Name
common arrowhead	*Sagittaria latifolia*
common bladderwort	*Utricularia macrorhiza*
common buckthorn	*Rhamnus cathartica*
common cocklebur	*Xanthium strumarium*
common evening primrose	*Oenothera biennis*
common flat-topped goldenrod	*Euthamia graminifolia*
common hornwort	*Ceratophyllum demersum*
common horsetail	*Equisetum arvense*
common milkweed	*Asclepias syriaca*
common mullein	*Verbascum thapsus*
common pipewort	*Eriocaulon aquaticum*
common privet	*Ligustrum vulgare*
common reed	*Phragmites australis*
common scouring rush	*Equisetum hyemale*
common St. Johnswort	*Hypericum perforatum*
common water-nymph	*Najas flexilis*
common water-purslane	*Ludwigia palustris*
common yellow wood-sorrel	*Oxalis stricta*
cow vetch	*Vicia cracca*
creeping bentgrass	*Agrostis stolonifera*
creeping crowfoot	*Ranunculus repens*
crisped pondweed	*Potamogeton crispus*
crooked-stem aster	*Symphyotrichum prenanthoides*
cuckoo-flower	*Cardamine pratensis* var. *pratensis*
Culver's root	*Veronicastrum virginicum*
cypress-spurge	*Euphorbia cyparissias*
dames-rocket	*Hesperis matronalis*
devil's beggar ticks	*Bidens vulgata*
ditch-stonecrop	*Penthorum sedoides*
dock-leaved smartweed	*Persicaria lapathifolia*
dotted hawthorn	*Crataegus punctata*
downy wild-rye	*Elymus villosus*
drooping woodreed	*Cinna latifolia*
Dutchman's breeches	*Dicentra cucullaria*
early blue cohosh	*Caulophyllum giganteum*
early goldenrod	*Solidago juncea*
eastern black currant	*Ribes americanum*
eastern cottonwood	*Populus deltoides*
eastern hemlock	*Tsuga canadensis*
eastern white pine	*Pinus strobus*
Eurasian milfoil	*Myriophyllum spicatum*
European spindle-tree	*Euonymus europaea*
evening nightshade	*Solanum dulcamara*
evergreen wood fern	*Dryopteris intermedia*
false hellebore	*Veratrum viride*
false nutsedge	*Cyperus strigosus*
false pimpernel	*Lindernia dubia* var. *dubia*
false Solomon's seal	*Maianthemum racemosum*
false water-pepper	*Persicaria hydropiperoides*
false-nettle	*Boehmeria cylindrica*
flatstem pondweed	*Potamogeton zosteriformis*

Common Name	Scientific Name
floating pondweed	*Potamogeton natans*
fox sedge	*Carex vulpinoidea*
foxtail sedge	*Carex alopecoidea*
fringed gentian	*Gentianopsis crinita*
garlic-mustard	*Alliaria petiolata*
giant bur-reed	*Sparganium eurycarpum*
glaucous king devil	*Hieracium piloselloides*
gold thread	*Coptis trifolia*
golden Alexanders	*Zizia aurea*
golden saxifrage	*Chrysosplenium americanum*
goutweed	*Aegopodium podagraria*
grass-leaved arrowhead	*Sagittaria graminea*
grass-of-Parnassus	*Parnassia glauca*
gray birch	*Betula populifolia*
Gray's sedge	*Carex grayi*
green ash	*Fraxinus pennsylvanica*
green-fruited bur-reed	*Sparganium emersum*
ground-pine	*Lycopodium obscurum*
hard-stem bulrush	*Schoenoplectus acutus*
hay-scented fern	*Dennstaedtia punctilobula*
heart-leaved willow	*Salix eriocephala*
hemlock-parsley	*Conioselinum chinense*
highbush blueberry	*Vaccinium corymbosum*
hoary willow	*Salix candida*
hobblebush	*Viburnum lantanoides*
horse-nettle	*Solanum carolinense*
interrupted fern	*Osmunda claytoniana*
Japanese barberry	*Berberis thunbergii*
jointed rush	*Juncus articulatus*
jumpseed	*Persicaria virginiana*
Kentucky bluegrass	*Poa pratensis*
lady fern	*Athyrium filix-femina*
lakeside sedge	*Carex lacustris*
large-leaved pondweed	*Potamogeton amplifolius*
larger straw sedge	*Carex normalis*
leatherleaf	*Chamaedaphne calyculata*
lemon thyme	*Thymus pulegioides*
lesser duckweed	*Lemna minor*
little bluestem	*Schizachyrium scoparium*
long-beaked sedge	*Carex sprengelii*
long-beaked water crowfoot	*Ranunculus aquatilis* var. *diffusus*
long-stalked monkey flower	*Mimulus ringens*
long-stalked sedge	*Carex pedunculata*
lopseed	*Phryma leptostachya*
lurid sedge	*Carex lurida*
maidenhair fern	*Adiantum pedatum*
male-berry	*Lyonia ligustrina*
maple-leaved viburnum	*Viburnum acerifolium*
marginal wood fern	*Dryopteris marginalis*
marsh cinquefoil	*Comarum palustre*
marsh fern	*Thelypteris palustris*

Common Name	Scientific Name
marsh St. Johnswort	*Triadenum virginicum*
meadowsweet	*Spiraea alba* var. *latifolia*
moneywort	*Lysimachia nummularia*
Morrow's honeysuckle	*Lonicera morrowii*
mountain ash	*Sorbus americana*
mountain laurel	*Kalmia latifolia*
mountain maple	*Acer spicatum*
mudflat spikesedge	*Eleocharis intermedia*
narrow-leaved bur-reed	*Sparganium angustifolium*
needle spikesedge	*Eleocharis acicularis*
New York fern	*Thelypteris noveboracensis*
northern arrowwood	*Viburnum dentatum* var. *lucidum*
northern bladderwort	*Utricularia intermedia*
northern three-lobed bedstraw	*Galium trifidum*
northern water-horehound	*Lycopus uniflorus*
northern water-plantain	*Alisma triviale*
Oakes's pondweed	*Potamogeton oakesianus*
oak-leaved goosefoot	*Chenopodium glaucum*
oblong bulrush	*Schoenoplectus acutus* X *S. tabernaemontanii*)
old-field cinquefoil	*Potentilla simplex*
ostrich fern	*Matteuccia struthiopteris*
painted trillium	*Trillium undulatum*
palmate hop-clover	*Trifolium aureum*
paper birch	*Betula papyrifera*
partridgeberry	*Mitchella repens*
pendulous bulrush	*Scirpus pendulus*
Pennsylvania sedge	*Carex pensylvanica*
Pennsylvania smartweed	*Persicaria pensylvanica*
pickerelweed	*Pontederia cordata*
pigweed	*Chenopodium album*
pitcher plant	*Sarracenia purpurea*
plantain-leaved sedge	*Carex plantaginea*
pointed broom sedge	*Carex scoparia*
poverty grass	*Danthonia spicata*
pubescent sedge	*Carex hirtifolia*
purple avens	*Geum rivale*
purple loosestrife	*Lythrum salicaria*
purple lovegrass	*Eragrostis spectabilis*
purple trillium	*Trillium erectum*
purple-stemmed aster	*Symphyotrichum puniceum*
pussy willow	*Salix discolor*
quaking aspen	*Populus tremuloides*
red clover	*Trifolium pratense*
red maple	*Acer rubrum*
red oak	*Quercus rubra*
red pondweed	*Potamogeton alpinus*
red raspberry	*Rubus idaeus* var. *strigosus*
red spruce	*Picea rubens*
red-osier dogwood	*Cornus sericea*
reed canarygrass	*Phalaris arundinacea*
reed fescue	*Lolium arundinaceum*

Common Name	Scientific Name
ribbonleaf pondweed	*Potamogeton epihydrus*
rice cut-grass	*Leersia oryzoides*
river grape	*Vitis riparia*
rough bedstraw	*Galium asprellum*
rough-leaved goldenrod	*Solidago patula*
rough-stemmed goldenrod	*Solidago rugosa* ssp. *rugosa*
round-lobed hepatica	*Anemone americana*
royal fern	*Osmunda regalis*
sensitive fern	*Onoclea sensibilis*
shining ground-fir	*Huperzia lucidula*
shrubby-cinquefoil	*Pentaphylloides floribunda*
silky dogwood	*Cornus amomum*
silky willow	*Salix sericea*
silver maple	*Acer saccharinum*
slender mannagrass	*Glyceria melicaria*
smooth creeping lovegrass	*Eragrostis hypnoides*
smooth shadbush	*Amelanchier laevis*
snail-seed pondweed	*Potamogeton spirillus*
soft rush	*Juncus effusus*
southern running-pine	*Diphasiastrum digitatum*
southern water-plantain	*Alisma subcordatum*
speckled alder	*Alnus incana* ssp. *rugosa*
spiny-spored quillwort	*Isoetes echinospora*
spotted joe-pye weed	*Eupatorium maculatum*
spotted knapweed	*Centaurea maculosa*
spotted touch-me-knot	*Impatiens capensis*
spreading dogbane	*Apocynum androsaemifolium*
spring beauty	*Claytonia caroliniana*
squarrose white aster	*Symphyotrichum ericoides*
squirrel-corn	*Dicentra canadensis*
staghorn sumac	*Rhus hirta*
star duckweed	*Lemna trisulca*
steeplebush	*Spiraea tomentosa*
stinging nettle	*Urtica dioica*
stream bank wild-rye	*Elymus riparia*
striped maple	*Acer pensylvanicum*
sugar maple	*Acer saccharum*
swamp crowfoot	*Ranunculus hispidus*
swamp dewberry	*Rubus hispidus*
swamp milkweed	*Asclepias incarnata*
swamp saxifrage	*Saxifraga pensylvanica*
swamp white oak	*Quercus bicolor*
Swan's sedge	*Carex swanii*
sweet gale	*Myrica gale*
sweet-clover	*Melilotus officinalis*
sweet-flag	*Acorus calamus*
tall flat-topped white aster	*Doellingeria umbellata*
tall goldenrod	*Solidago altissima*
tall meadow-rue	*Thalictrum pubescens*
tapegrass	*Vallisneria americana*
three-way sedge	*Dulichium arundinaceum*

Common Name	Scientific Name
Timothy	*Phleum pratense*
tiny pondweed	*Potamogeton pusillus*
toothwort	*Cardamine diphylla*
tower-mustard	*Turritus glabra*
trout lily	*Erythronium americanum*
tuckahoe	*Peltandra virginica*
tussock sedge	*Carex stricta*
variegated scouring-rush	*Equisetum variegatum*
virgin's bower	*Clematis virginiana*
Virginia waterleaf	*Hydrophyllum virginianum*
wapato	*Sagittaria cuneata*
water lobelia	*Lobelia dortmanna*
water shield	*Brasenia schreberi*
water stargrass	*Zosterella dubia*
water-parsnip	*Sium suave*
water-pepper	*Persicaria hydropiper*
water-willow	*Decodon verticillatus*
white ash	*Fraxinus americana*
white bedstraw	*Galium mollugo*
white birch	*Betula papyrifera*
white snakeroot	*Ageratina altissima*
white spruce	*Picea glauca*
white water-lily	*Nymphaea odorata*
white wood aster	*Aster divaricatus*
wide-leaved sedge	*Carex platyphylla*
wild cucumber	*Echinocystis lobata*
wild ginger	*Asarum canadense*
wild leek	*Allium tricoccum*
wild sarsaparilla	*Aralia nudicaulis*
wild strawberry	*Fragaria virginiana*
wild-carrot	*Daucus carota*
wild-morning glory	*Calystegia spithamaea*
winged burning bush	*Euonymus alatus*
winterberry	*Ilex verticillata*
wintergreen	*Gaultheria procumbens*
wire sedge	*Carex lasiocarpa*
wirestem muhly	*Muhlenbergia frondosa*
witch-hazel	*Hamamelis virginiana*
wood bluegrass	*Poa nemoralis*
wood-nettle	*Laportea canadensis*
wool-grass	*Scirpus cyperinus*
yarrow	*Achillea millefolium*
yellow birch	*Betula alleghaniensis*
yellow iris	*Iris pseudacorus*
yellow water-lily	*Nuphar variegatum*
zig-zag goldenrod	*Solidago flexicaulis*

www.woodlotalt.com

Attachment G Rare Plant Forms

acer_nigrum_1999-1.pdf	272 KB
carex_alopecoidea_2000-1.pdf	218 KB
carix_grayi_1998-1.pdf	252 KB
caulophyllum_giganteum_2000-1.pdf	178 KB
caulophyllum_giganteum_2000-2.pdf	84 KB
caulophyllum_giganteum_2000-3.pdf	199 KB
caulophyllum_giganteum_2000-4.pdf	215 KB
conioselinum_chinense_1998-1.pdf	243 KB
eleocharis intermedia_1999-1.pdf	238 KB
eleocharis_intermedia_1998-1.pdf	242 KB
Eleocharis_intermedia_1999-2.pdf	268 KB
eleocharis_intermedia_1999-3.pdf	239 KB
elymus_villosus_2000-1.pdf	237 KB
equisetum_variegatum_1998-1.pdf	226 KB
equisetum_variegatum_1999-1.pdf	222 KB
equisetum_variegatum_2000-1.pdf	212 KB
gentionpsis_crinita_2000-1.pdf	239 KB
qurecus_macrocarpa_1998-1.pdf	347 KB
ranunculus_pensylvanicus_1999-1.pdf	261 KB
ribes_americanum_1998-1.pdf	228 KB
ribes_americanum_1998-2.pdf	249 KB
ribes_americanum_1998-3.pdf	228 KB
ribes_americanum_1998-4.pdf	230 KB
ribes_americanum_1998-5.pdf	186 KB
ribes_americanum_1998-6.pdf	183 KB
ribes_americanum_1998-7.pdf	236 KB
sagirreria_cuneata_1999-2.pdf	247 KB
sagittaria_cuneata_1998-1.pdf	223 KB
sagitteria_cuneata_1999-1.pdf	225 KB

salix_caudida_2000-1.pdf	246 KB
salix_serrisima_1999-1.pdf	307 KB
saniecula_odorata_2000-1.pdf	307 KB
schoenopiectus_acutusXtabernaemontanni_2000-1.pdf	205 KB
schoenopiectus_acutusXtabernaemontanni_2000-2.pdf	326 KB
scirpus_pendulus_1999-1.pdf	366 KB
scirpus_pendulus_2000-1.pdf	184 KB
symphyotrichum_prenathoides_1998-1.pdf	241 KB

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION

Observer's Name, Address, and Phone:

Arthur Haines
Woodlot Alternatives, Inc. 207-729-1199
122 Main Street, Number 3
Topsham, ME 04086

Species Scientific Name:

Acer nigrum

NHESP Element Occurrence Number (if known):

Observation Date:

27 May 1999

Today's Date:

22 June 1999

LOCATIONAL INFORMATION

a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East (1:25,000)

County: Berkshire

Town: Pittsfield

b) Directions to location of observations (please attach USGS map):

West side of Housatonic River, south of Holmes Road, on Cauce Meadows Property, off the Sacred Way Trail. After junction with cross-over trail about 50 meters before reaching open area/bench. A single tree, toward river on sloping bank before floodplain, next to an Immense Fraxinus americana (with 1.0m dbh). Approximate UTM Coordinates - 4698250 N - 0644950 E

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)

Mesic hardwood forest on bank above floodplain. Growing with Acer saccharum, Fraxinus americana, Veratrum viride, Allium tricoccum, Sanguinaria canadensis, Solidago flexicaulis, Lonicera morrowii, Athyrium felix-femina, and Carex pensylvanicum.

POPULATION INFORMATION: Single Tree observed (~50 cm dbh)

Population found? (Y/N):

If No, is population presumed extirpated and why?

NA

If Yes,

Number of mature plants: 1

Number of immature plants:

Number of plants age unknown:

Population area (give unit of measurement):

Single individual

Percent of population:

in leaf: 100%

in bud:

in flower:

with immature fruit:

mature fruit:

senescent:

Observations of floral visitors, fruit dispersers:

None observed

Vigor of individuals and population:

Apparently healthy and vigorous

Evidence of expansion or decline:

none observed

Have you observed this species at this site in previous years? No

Please give details:

SITE PHYSIOGRAPHY

Elevation:

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

Mid Slope

Aspect (north, south, east, west, flat?):

Slope (0-20 degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light (open, (filtered) shade?):

Moisture (inundated, wet, (mesic) dry, xeric?):

Soil types: Mineral

Surficial rock types (with percent of ground covered): NA

Bedrock/parent material:

Surficial water (distance away and source):
Housatonic River (Across floodplain).

MANAGEMENT/OWNERSHIP: Canoe Meadows (Audubon)

MNHESP Site Name (if any):

Managed Area (if any):

Comments/Management recommendations: Further survey effort to locate more individuals.

Disturbance or threats (natural or unnatural) to population:

none observed

Land Owner's Name, Address, and Phone:

Canoe Meadows (Audubon)

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY

(Circle one choice in each category)

EO Quality

How representative is this occurrence? Consider the size and

reproductivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good C - Marginal (D) - Poor

Comments: Single individual

EO Condition

Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Many Agricultural fields in Area (growing in with shrubs) from historic farming activities. Only a thin strip of intact vegetation between trail and river.

EO Viability

What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Defensibility

Can this occurrence be protected from extrinsic human factors?

A - Excellent (B) - Good C - Marginal D - Poor

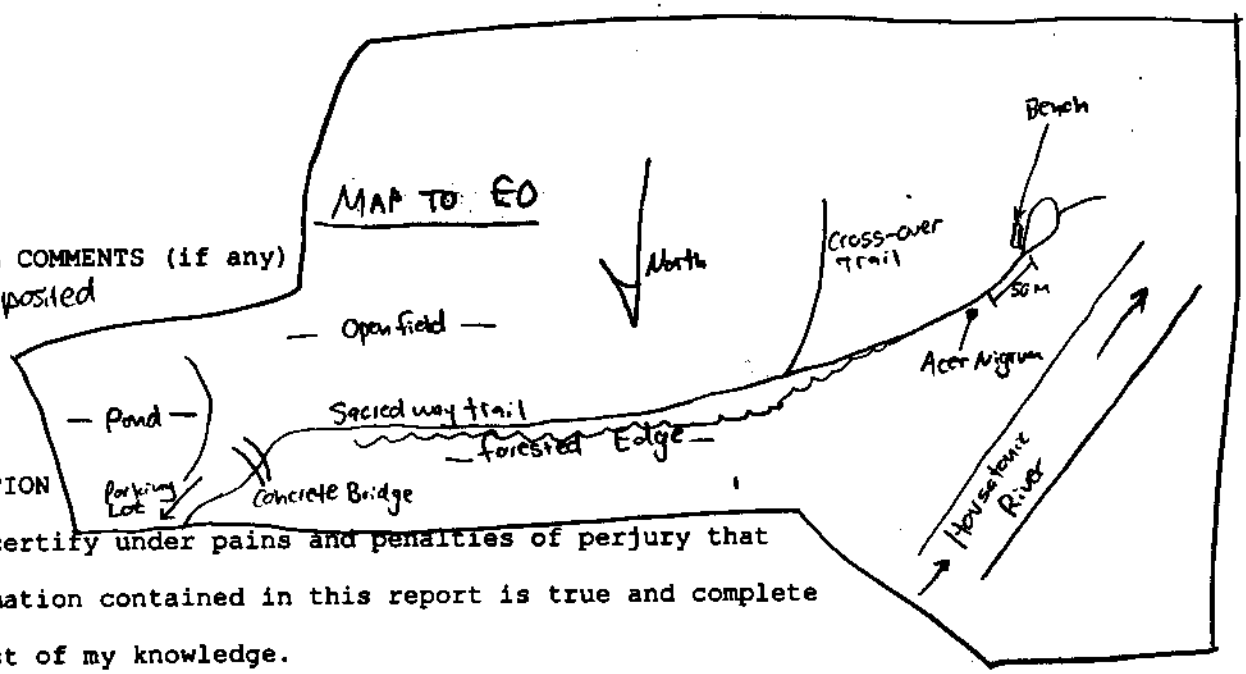
Comments: Land under ownership of Conservation Oriented Association.

EO RANK

A summary of all factors listed above.

A - Excellent B - Good (C) - Marginal D - Poor

Comments:



ADDITIONAL COMMENTS (if any)

Specimen to be deposited at the Harvard Herbaria.

CERTIFICATION

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Arthur Haines

Date: 22 June 1999

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife

Westborough, MA 01581

(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

Acer nigrum
Court Hill
Sackett
Gravel Pit
PIPELINE
Sykes Brook
RIVER
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
East Part Cem
Brook
Sackett Brook Park
Ashley Reservoir
Gravel Pit
CORPORATE
BOUNDARY
Substation
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Mill Brook Reservoir
New Lenox
New Lenox Cem
Mill
HOUSATONIC
L E N O X
Farnham Reservoir
Dewey Hill
OCTOBER MOUNTAIN
STATE FOREST
OCTOBER
STATE
W A S H I N G T O N

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Carex alopecoidea

NHESP Element Occurrence Number (if known):

Observation Date(s): 26 August 1998, and summers of 1999 and 2000

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East (1:25,000)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): From the New Lenox Road follow a single-lane road through a cable gate on the west side of the Housatonic River ca. 280 meters until the road passes close to the river channel. The plants are located in the open under dense Matteuccia Struthiopteris (with a small Powerline right-of-way), 9 meters NW of second pole counting downstream from 90° turn in river (turns to east traveling upstream).

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) habitat is a disturbed Major River Floodplain forest. Acer saccharinum, Salix nigra, and Acer negundo are common canopy trees where forest is intact to north. Herbaceous community largely intact and overwhelming dominated by Matteuccia Struthiopteris. Other herbs in area include Urtica dioica, Fallopia scandens, Asclepias, and Asclepias syriaca. Plants are growing in deep fluvial silt.

Areal Distribution, Numbers, Phenology

Population found: yes
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: Two
No. of immature plants:
No. of plants age unknown:

Population area: 1 X 2 m²

Percent of population in leaf: with immature fruit: bud: mature fruit: 100 flower: senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: apparently healthy

Evidence of expansion or decline: None observed

Have you observed this species at this site in previous years? Please give details: Population has remained relatively constant over three years of observation.

Site Physiography

Elevation: 294 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ____	0-20 X	open ____	inundated ____
upper slope ____	E X	20-45 ____	filtered X	wet ____
mid slope ____	S ____	45-75 ____	shade ____	mesic X
lower slope ____	W ____	vert. ____		dry ____
bottom X	Flat ____			xeric ____

Soil types: fluvial silt

Surficial rock types (with percent of ground covered): none observed

Bedrock/parent material: Presumably limestone

Surficial water (distance away): +/- 6 meters Source: Housatonic River

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: Housatonic River Valley - SWMA

Comments/Management recommendations: Powerline right-of-way does not appear to be in use. However, if community succeeds, plants will likely be extirpated. Maintain opening by winter cutting of woody vegetation.

Disturbance or threats (natural or unnatural) to population: Powerline right-of-way maintenance/renewal

Owner's Name: Common Wealth of Massachusetts Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc., 122 Main St., Number 3, Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: Harvard University Herbaria

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.)

A - Excellent B - Good C - Marginal (D) - Poor

Comments: very small, though persistent, population

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent B - Good (C) - Marginal D - Poor

Comments: Overstory has been removed, herb stratum largely intact

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

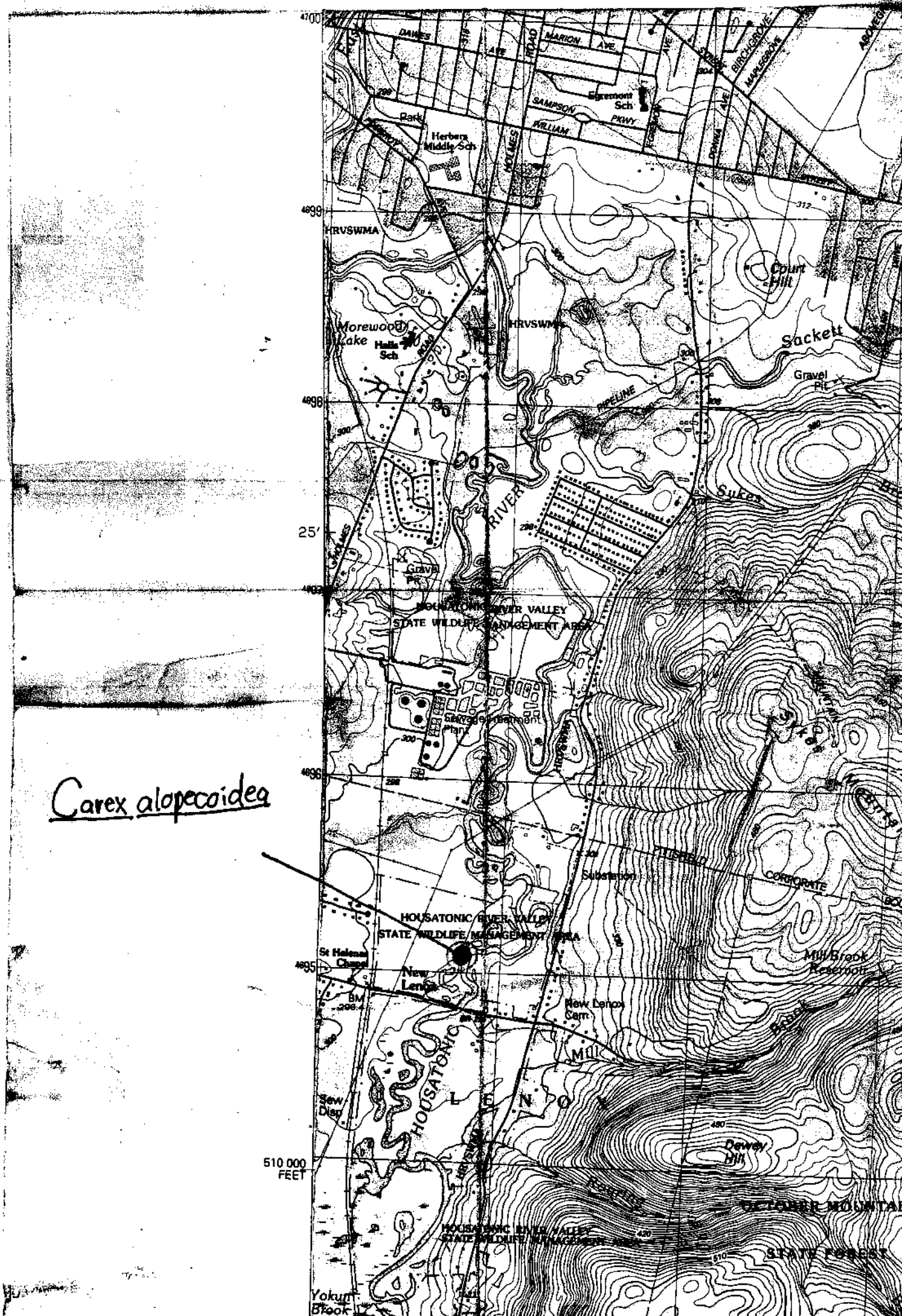
A - Excellent B - Good (C) Marginal D - Poor

Comments: Public ownership of property but EO in cleared right-of-way.

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 3 January 2001


Carex alopecoidea
4700
4699
4698
4697
4696
4695
25'
510 000 FEET
HRVSWMA
Morewood Lake
Hall's Sch
Herbert Middle Sch
Belmont Sch
Park
Count Hill
Sackett
Gravel Pit
PIPELINE
Sykes
RIVER
Gravel Pit
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Substation
PITTSFIELD
CORRORATE
St Helena Chapel
New Lenox
BM 296
New Lenox Cem
Mill Brook Reservoir
Mill
Sew Disp
HOUSATONIC
L E N O X
Dewey Hill
Yokum Brook
STATE FOREST

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Carex grayi

NHESP Element Occurrence Number (if known):

Observation Date(s): 27-28 August, 2 September

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): East Lee 1:25,000

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): Bur Oak Floodplain forest on west side of Housatonic River, north of Woods Pond and east of RR tracks, 1.25 km north of substation (Approximate UTM 4691950 x 0644670).

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Bur Oak Floodplain forest, canopy dominated by Acer rubrum, Quercus macrocarpa and Fraxinus nigra, with Carpinus caroliniana understory trees, and Carex cf. bromoides, Onoclea sensibilis, and Symphyotrichum lateriflorum herb layer. This community lies between the red maple - black ash swamp (which runs along east side of RR) and shrub swamp and emergent marsh communities that border the west side of the Housatonic River backwater ponds. In the community can be found scattered, large Quercus macrocarpa (DBH-18-28 inches).

Areal Distribution, Numbers, Phenology

Population found: yes
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: +/- 25
No. of immature plants: none observed
No. of plants age unknown:

Population area: 100 X 50 meters

Percent of population in leaf:
with immature fruit:
bud:
mature fruit: 95%
flower:
senescent: 5%

Observations of floral visitors, fruit dispersers: none observed

Vigor of individuals and population: Apparently normal vigor

Evidence of expansion or decline: Unable to determine

Have you observed this species at this site in previous years? Please give details: NO

Site Physiography

Elevation: 295 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ___	N ___	0-20 X	open ___	inundated ___
upper slope ___	E ___	20-45 ___	filtered X	wet ___
mid slope ___	S ___	45-75 ___	shade ___	mesic X (wet-mesic)
lower slope ___	W ___	vert. ___		dry ___
bottom X	Flat X			xeric ___

Soil types: unknown

Surficial rock types (with percent of ground covered): none

Bedrock/parent material: unknown

Surficial water (distance away): 75 meters Source: Housatonic River

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: Housatonic River Valley State WMA Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines, Woodlot Alternatives Telephone: (207) 729-1199

Address: 122 Main Street, Number 3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: Will be deposited at the Harvard Herbaria

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the virality and vigor of the individuals.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Not a large number of individuals and many widely scattered from others.

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent (B) - Good C - Marginal D - Poor

Comments: Community appears unimpacted by recent human activity but is not particularly large.

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent (B) - Good C - Marginal D - Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Good Defensibility only if water levels are not raised by impoundment at Woods Pond.

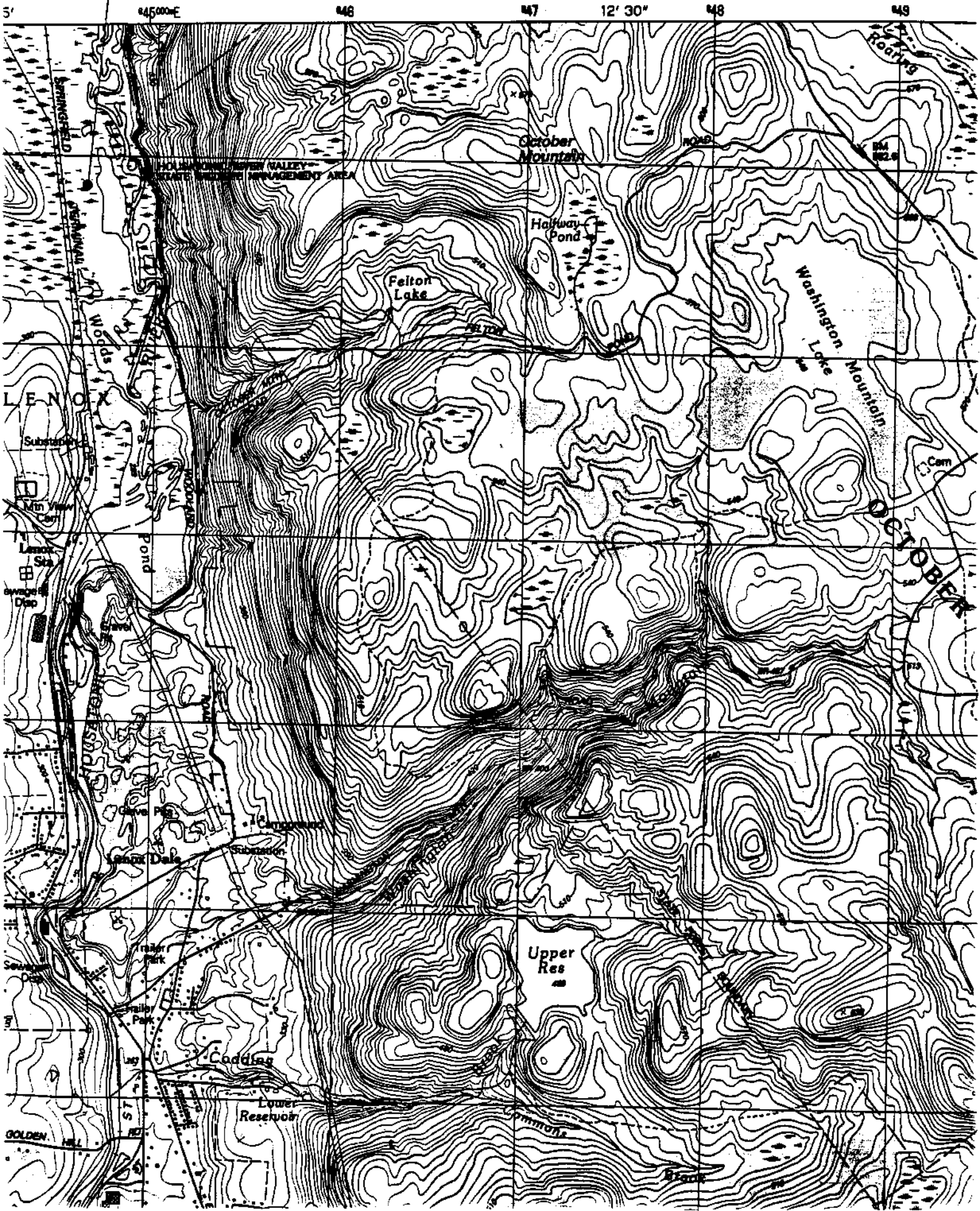
EO RANK: (A summary of all factors listed above.) A - Excellent (B) - Good C - Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 2 September 1998

Carex grayi

AST LEE, MASSACHUSETTS



Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION
Observer's Name, Address, and Phone:
Arthur Haines Woodlot Alternatives, Inc. 122 Main St., Number 3 Topsham, ME 04086 (207-729-1199)

Species Scientific Name: Caulophyllum giganteum

NHESP Element Occurrence Number (if known):

Observation Date: 19 April 2000

Today's Date: 27 April 2000

LOCATIONAL INFORMATION
a) USGS Quad Name and Series (7.5"x7.5" or 7.5"x15"): Pittsfield East (1:25,000)
County: Berkshire
Town: Pittsfield

b) Directions to location of observations (please attach USGS map):
West side of Housatonic River, along floodplain terrace, upstream of waste water Treatment Plant, within a narrow strip of floodplain forest, east of open pool (pool located at east edge of agricultural field).

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)
Floodplain forest on terrace — rich fluvial soil, associated species: Canopy = Acer Saccharum, Prunus serotina, Tilia americana; shrub = Carpinus caroliniana, Berberis thunbergii, Lonicera morrowii; herb = Erythronium americanum, Allium tricoccum, Dicentra cucullaria, and Ulmus virginicus.

POPULATION INFORMATION:

Population found? (Y/N): yes

If No, is population presumed extirpated and why?

If Yes,
Number of mature plants:
Number of immature plants:
Number of plants age unknown: ca. 50 stems — Just beginning to flower, the flowers are subpierocious and appear before leaves are fully formed.

Population area (give unit of measurement): 50 X 30 M

Percent of population:
in leaf: 50%
in bud: 25%
in flower: 25%
with immature fruit:
mature fruit:
senescent:

Observations of floral visitors, fruit dispersers:

None observed

Vigor of individuals and population:

Apparently vigorous

Evidence of expansion or decline:

None observed

Have you observed this species at this site in previous years?
Please give details:

NO

SITE PHYSIOGRAPHY
Elevation: 295 meters

Topographic position (crest, upper slope, mid slope, lower slope, (bottom)):

Aspect (north, south, (east) west, flat?):

Slope ((0-20 degrees,) 20-45 degrees, 45-75 degrees, vertical?):

Light (open, (filtered), shade?): Filtered light at this time as canopy not fully leafed out.

Moisture (inundated, wet, (mesic), dry, xeric?):

Soil types: fluvial

Surficial rock types (with percent of ground covered): none observed

Bedrock/parent material: Presumably limestone

Surficial water (distance away and source):
Housatonic River, ca. 30 meters

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any): Housatonic River Valley Wildlife Management Area.

Managed Area (if any):

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY
(Circle one choice in each category)

EO Quality
How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good (C - Marginal) D - Poor

Comments:

EO Condition
Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good (C - Marginal) D - Poor

Narrow strip of mid-age overstory trees; heavy exotic species influence in stretches

Comments:

EO Viability
What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent (B - Good) C - Marginal D - Poor

Comments:

EO Defensibility
Can this occurrence be protected from extrinsic human factors?

A - Excellent (B - Good) C - Marginal D - Poor

Comments: Public ownership

EO RANK
A summary of all factors listed above.

A - Excellent B - Good (C - Marginal) D - Poor

Comments:

ADDITIONAL COMMENTS (if any) Though community is reduced in size, it forms a relatively continuous corridor for many km. Other rich forest species in vicinity such as Carex hirtifolia, Carex sprengelii, Adiantum pedatum, and Elymus hystrix.

CERTIFICATION
I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Anita Haines

Date: 27 April 2000

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext 200

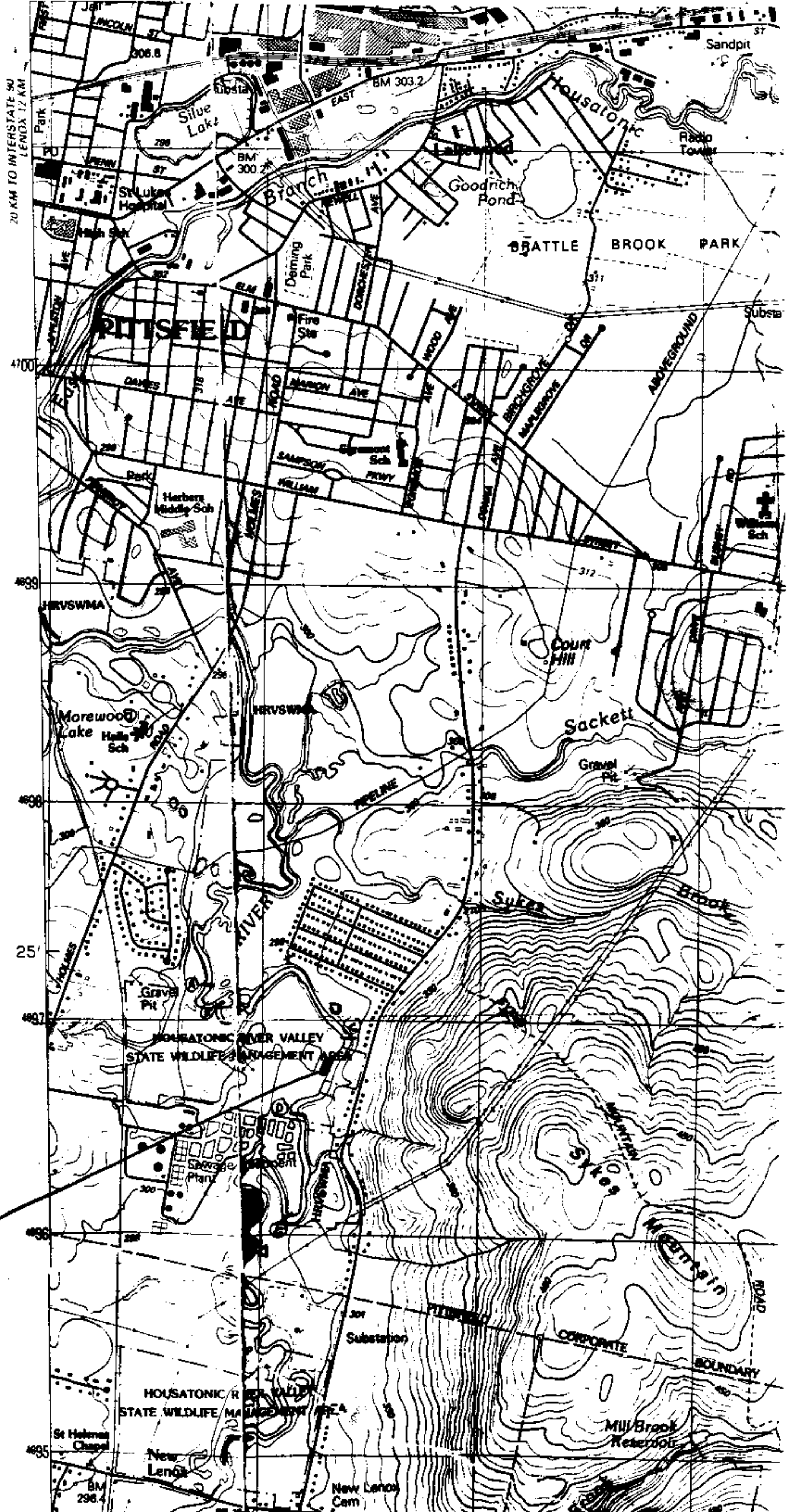
Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

✱ - Cobble / Sand bottom
Backpack fishing

□ = Sand bottom,
Shallow
Backpack fishing

Δ = Deep fishing,
good area for
Gill net

Caulophyllum giganteum



Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION
Observer's Name, Address, and Phone:
Arthur Haines Woodlot Alternatives, Inc.
122 Main St., Topsham, ME 04086

Species Scientific Name: Caulophyllum giganteum

NHESP Element Occurrence Number (if known):

Observation Date: 27 June 2000 (and several times in late April during the flowering period).

Today's Date: 28 June 2000

LOCATIONAL INFORMATION
a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield West (1:25,000)
County: Berkshire
Town: Pittsfield

b) Directions to location of observations (please attach USGS map):
Off west side of Routes 20 and 7, north of South Mountain Regional headquarters — Division of Forests and Parks and South of Golf Course, In a mature rich-mesic forest. Plants are concentrated near Southern ledge outcrops of forest.

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)
Rich-mesic forest on ledge outcrops and sloped land below ledges. Overstory dominated by Acer Saccharum and fraxinus americanus. Understory Most Acer Saccharum saplings. Herbs include Allium tricoccum, Impatiens, Polystichum acrostichoides, Dryopteris Goldiana, Dicentra canadensis, and Deparia acrostichoides.

POPULATION INFORMATION:

Population found? ((Y)/N):

If No, is population presumed extirpated and why?

If Yes,
Number of mature plants: +/- 300 total Plants, each comprised of 1-5 aerial stems, about
Number of immature plants: 40% with ripening seeds.
Number of plants age unknown:

Population area (give unit of measurement): 50 x 75 meters

Percent of population:
in leaf: 60%
in bud:
in flower:
with immature fruit: 40%
mature fruit:
senescent:

Observations of floral visitors, fruit dispersers:
None observed

Vigor of individuals and population:
vigorous, some with damaged and wilting leaves (small portion of population)

Evidence of expansion or decline:
none observed

Have you observed this species at this site in previous years?
Please give details:
NO

SITE PHYSIOGRAPHY
Elevation:

Topographic position (crest, upper slope, (mid slope) lower slope, bottom?):

Aspect (north, south, (east) west, flat?):

Slope ((0-20 degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light (open, filtered, (shade?):

Moisture (inundated, wet, (mesic) dry, xeric?):

Soil types: Rich silt-loam

Surficial rock types (with percent of ground covered): Dunham bedrock type, 15% of community with exposed rock

Bedrock/parent material:

Surficial water (distance away and source): 20 meters, small, ephemeral stream (1st order)

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any):

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population: forestry activity; invasive plants (Alliaria petiolata common on edge of community)

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY
(Circle one choice in each category)

EO Quality
How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.

A - Excellent (B) - Good C - Marginal D - Poor

Comments:

EO Condition
Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent (B) - Good C - Marginal D - Poor

Habitat is in excellent condition, but not extensive in size.

Comments:

EO Viability
What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent (B - Good) C - Marginal D - Poor

Comments:

EO Defensibility
Can this occurrence be protected from extrinsic human factors?

A - Excellent (B - Good) C - Marginal D - Poor

Comments:

EO RANK
A summary of all factors listed above.

A - Excellent (B - Good) C - Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any)
Overstory Trees in community normally 40-70 cm dbh.

CERTIFICATION
I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Arthur Haines

Date: 28 June 2000

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION
Observer's Name, Address, and Phone:
Arthur Haines Woodlot Alternatives 122 Main St., Number 3, Topsham, ME 04086 (207-729-1199)

Species Scientific Name: Caulophyllum giganteum

NHESP Element Occurrence Number (if known):

Observation Date: 25 April 2000

Today's Date: 27 April 2000

LOCATIONAL INFORMATION
a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): East Lee, MA (1:25,000)
County: Berkshire
Town: Lee

b) Directions to location of observations (please attach USGS map):
Woodland Road (south from New Lenox Road), 0.1 miles south of outlet of Felton Lake, 0.2 miles north of October Mountain Road (Paved uphill Road). West side of Woodland Road, near upper edge of floodplain terrace.

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)
Rich mesic forest at upper edge of floodplain terrace, canopy — Fraxinus americana, Prunus serotina; Shrub — Prunus virginiana, Hamamelis virginiana, Lonicera morrowii; herb layer — Hydrophyllum virginianum, Erythronium americanum, Polystichum acrostichoides, Trillium erectum, Carex pedunculata, Asarum canadense, Uvularia sessilifolia, Maianthemum racemosum.

POPULATION INFORMATION:

Population found? (Y/N): yes

If No, is population presumed extirpated and why?

If Yes, (about ¼ number actual individuals).
Number of mature plants: 876 flowering stems, plants subprecocious and flowering before
Number of immature plants: leaves fully developed (numbers of mature vs. immature not reported
Number of plants age unknown: as unknown how maturity is defined by [flower, fruit?]) NHESP.)

Population area (give unit of measurement): 8 x 40m

Percent of population:
in leaf: 50% immature
in bud: 10%
in flower: 40%
with immature fruit:
mature fruit:
senescent:

Observations of floral visitors, fruit dispersers:

None observed

Vigor of individuals and population:

apparently vigorous

Evidence of expansion or decline:

None observed

Have you observed this species at this site in previous years?
Please give details: NO

SITE PHYSIOGRAPHY
Elevation: 295 metas

Topographic position (crest, upper slope, mid slope, (lower slope) bottom?):

Aspect (north, south, east, (west) flat?):

Slope ((0-20) degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light (open, (filtered) shade?): filtered at this time as canopy in process of leaf-out.

Moisture (inundated, wet, (mesic) dry, xeric?):

Soil types: Rich, fluvial and Colluvial

Surficial rock types (with percent of ground covered): None in immediat area

Bedrock/parent material: Presumably limestone

Surficial water (distance away and source): Housatonic River, ca. 70 metas

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any): Housatonic River Valley State Wildlife Management Area

Managed Area (if any):

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:
Population adjacent to Road (Gravel).

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY
(Circle one choice in each category)

EO Quality
How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.

A - Excellent (B - Good) C - Marginal D - Poor

Comments:

EO Condition
Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent (B - Good) C - Marginal D - Poor

Although Lonicera morrowii and other alien taxa are prevalent.

Comments:

EO Viability
What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent (B) Good C - Marginal D - Poor

Comments:

EO Defensibility
Can this occurrence be protected from extrinsic human factors?

A - Excellent (B) Good C - Marginal D - Poor

Comments:

EO RANK
A summary of all factors listed above.

A - Excellent (B) Good C - Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any)
Large areas of suitable habit along Woodland Road and likely more common than numbers reported on this form. Photographs taken and specimen collected (to be deposited at NEBC).

CERTIFICATION
I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Anita Haines

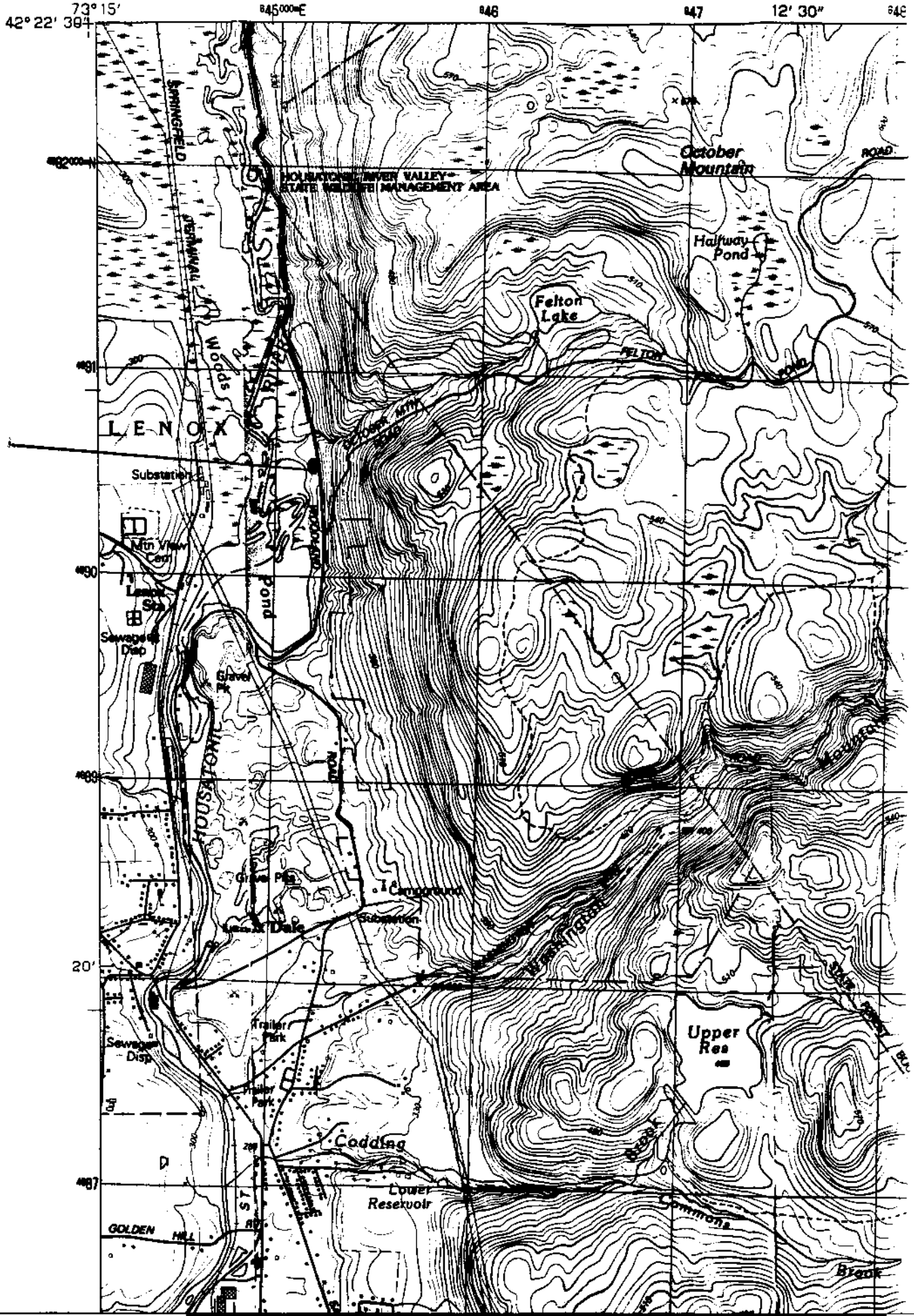
Date: 27 April 2000

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

EAST LEE, MASSACHUSETTS



Caulophyllum giganteum

25 April 2000

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION
Observer's Name, Address, and Phone:
Arthur Haines
Woodlot Alternatives, Inc, 122 Main Street, Topsham, ME 04086 207-729-1199
Species Scientific Name: Caulophyllum giganteum

NHESP Element Occurrence Number (if known):

Observation Date: 2 May 2000

Today's Date: 5 January 2001

LOCATIONAL INFORMATION
a) USGS Quad Name and Series (7.5"x7.5" or (15"x15")): East Lee (1:25,000)
County: Berkshire
Town: Washington

b) Directions to location of observations (please attach USGS map):
Approximately 2 km southeast of Washington Mountain Lake, the County Road forks. Down the left-hand fork (north-west) 0.1 miles, on the northeast side of the road. Plants are within hardwood forest and essentially border the road.

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)
Mesic hardwood forest dominated by Acer saccharum, Betula papyrifera, and Fraxinus americana. Shrubs include Acer saccharum and Abies balsamea seedlings. Herbs include Erythronium americanum, Polystichum acrostichoides, Dryopteris marginalis, Allium tricoccum, and Aster divaricatus.

POPULATION INFORMATION:

Population found? (Y)(N):

If No, is population presumed extirpated and why?

If Yes,
Number of mature plants: 158 aerial stems (fewer actual genets)
Number of immature plants:
Number of plants age unknown:

Population area (give unit of measurement): 20 x 6 meters

Percent of population:
in leaf: +/- 75 %
in bud:
in flower: +/- 25 %
with immature fruit:
mature fruit:
senescent:

Observations of floral visitors, fruit dispersers:
None observed

Vigor of individuals and population:
apparently healthy

Evidence of expansion or decline:

None observed

Have you observed this species at this site in previous years?
Please give details:

NO

SITE PHYSIOGRAPHY
Elevation: 558 meters

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

Aspect (north, south, east, (west), flat?):

Slope ((0-20) degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light (open, filtered, (shade)): filtered during flowering as trees have not completely expanded leaves.

Moisture (inundated, wet, (mesic), dry, xeric?):

Soil types: Mineral

Surficial rock types (with percent of ground covered): not measured but present

Bedrock/parent material: Unknown

Surficial water (distance away and source):
300 meters, Small pond

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any): October Mountain State Forest

Comments/Management recommendations:
Inform forest managers of occurrence location.

Disturbance or threats (natural or unnatural) to population: forestry activity, Road widening. Population is adjacent to a road

Land Owner's Name, Address, and Phone:
Division of Forests and Parks, Commonwealth of Massachusetts
Office Located in Pittsfield, MA

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY
(Circle one choice in each category)

EO Quality
How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Condition
Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent (B) - Good C - Marginal D - Poor

Canopy trees are not large, but relatively large area of contigious forest present with little occupation of invasive species in close area.

Comments:

EO Viability
What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Defensibility
Can this occurrence be protected from extrinsic human factors?

A - Excellent B - Good (C) - Marginal D - Poor

Comments: located in out of way area, but region subject to forestry activity, ATV Traffic, and road maintenance.

EO RANK
A summary of all factors listed above.

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any)

CERTIFICATION
I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Arthur Haines

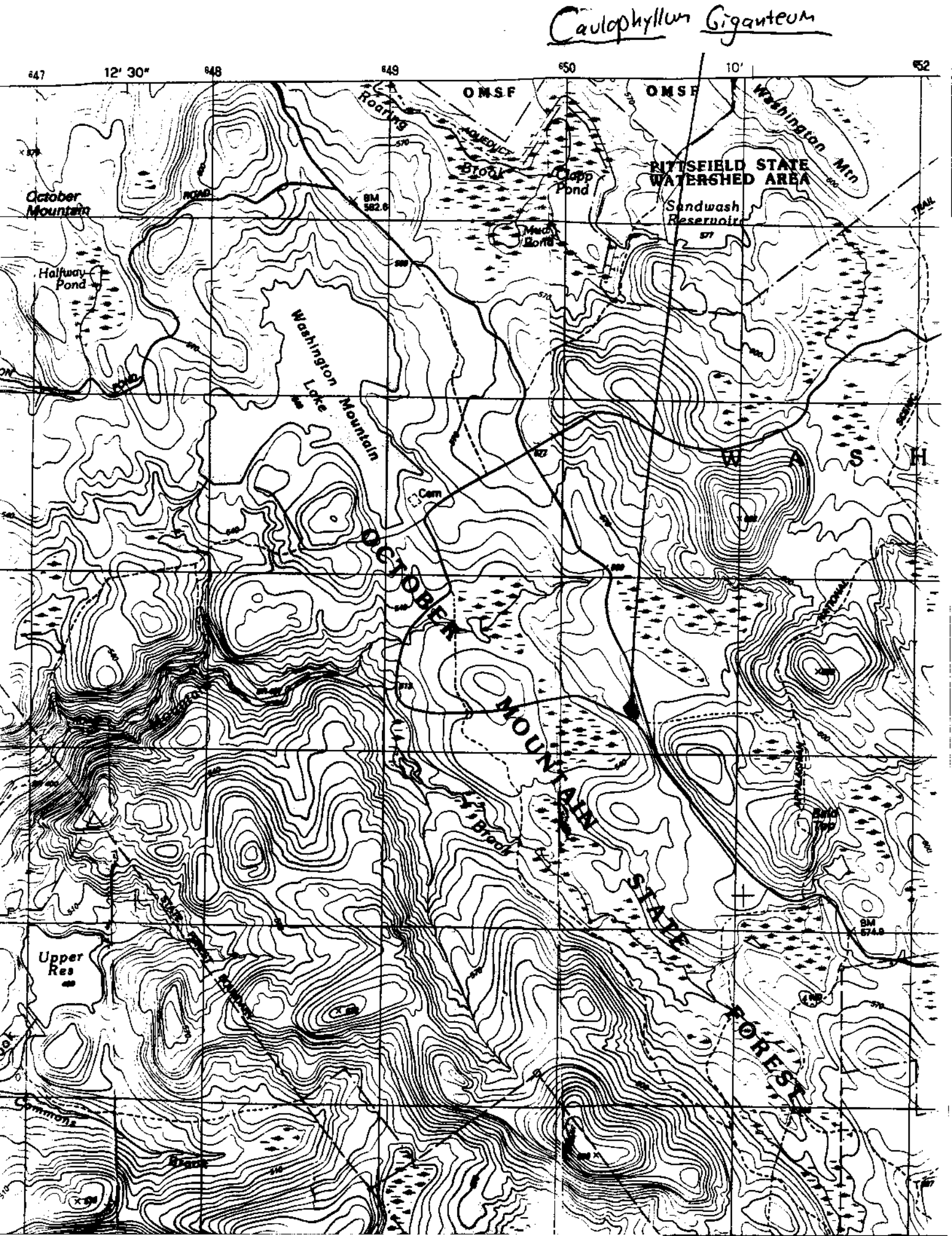
Date: 5 January 2000

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

Caulophyllum Giganteum



Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Conioselinum Chinense

NHESP Element Occurrence Number (if known):

Observation Date(s): 9 September 1998

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15"): East Lee and Pittsfield East (1:25,000)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map):

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Red Maple - Black Ash Swamp (with a small component of Quercus Macrocarpa), understory shrubs were Carpinus caroliniana, Ilex verticillata, and Kalmia latifolia. Dominant herbs include: Osmunda cinnamomea, Thelypteris palustris, Symphyotrichum puniceum [= Aster p.], Pit and Mound topography, with low wet areas and high mounds with characteristically upland vegetation on them such as Rubus strobus. Site sits on a low plain (to the Housatonic River) at base of a shallow sloping ridge.

Areal Distribution, Numbers, Phenology

Population found: X
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: 7
No. of immature plants:
No. of plants age unknown:

Population area: 15 X 10 M

Percent of population in leaf: 72 bud: flower: 28 (flowers and fruits present in inflorescence)
with immature fruit: mature fruit: senescent:

Observations of floral visitors, fruit dispersers: None

Vigor of individuals and population: few plants (only 7 observed), most (5) vegetative but appearing healthy.

Evidence of expansion or decline: none observed

Have you observed this species at this site in previous years? Please give details: no

Site Physiography

Elevation: _____

Topographic position	Aspect	Slope	Light	Moisture
crest ___	N ___	0-20 X	open ___	inundated ___
upper slope ___	E ___	20-45 ___	filtered ___	wet X
mid slope ___	S ___	45-75 ___	shade X	mesic ___
lower slope ___	W ___	vert ___		dry ___
bottom X	Flat X			xeric ___

Soil types: Silt muck

Surficial rock types (with percent of ground covered): _____

Bedrock/parent material: _____

Surficial water (distance away): Small pools throughout community Source: water apparent at base of slope

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: _____ Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc. 122 Main St., Number 3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: _____

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: few individuals observed and only a small percentage reproductive

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent (B) - Good C - Marginal D - Poor

Comments: Size has been limited by powerline clearing

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent (B) - Good (C) - Marginal D - Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

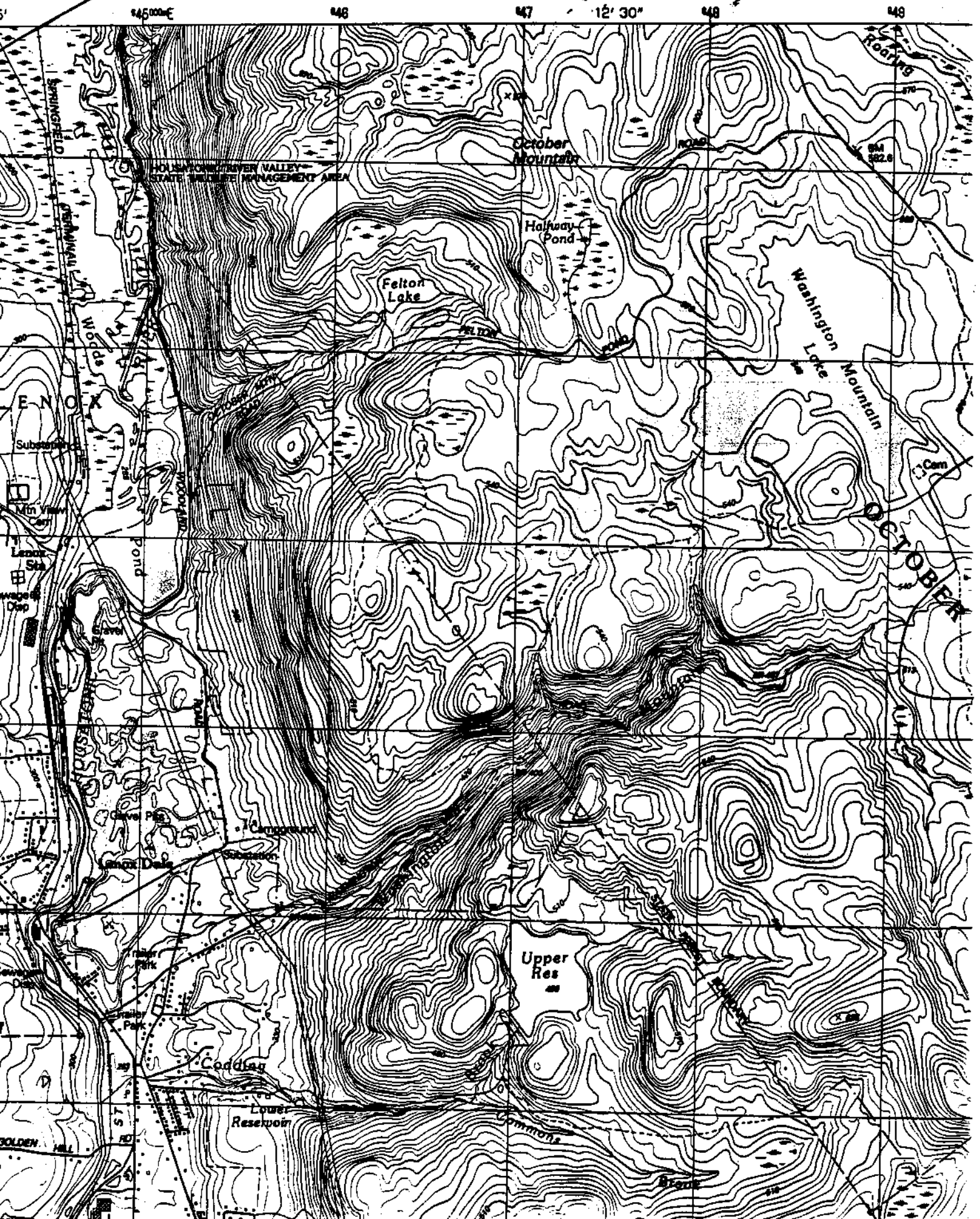
EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 27 October 1998

Conioselinum chinense

AST LEE, MASSACHUSETTS



Natural Heritage & Endangered Species Program

MA Division of Fisheries & Widllife

Route 135, Westborough, MA 01581

(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION

Observer's Name, Address, and Phone:

Arthur Haines
Woodlot Alternatives, Inc.
122 Main Street, Number 3 207-729-1199
Topsham, ME 04086

Species Scientific Name:

Eleocharis intermedia

NHESP Element Occurrence Number (if known):

Observation Date:

25 August 1999

Today's Date:

8 November 1999

LOCATIONAL INFORMATION

a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East

County: Berkshire

Town: Pittsfield

b) Directions to location of observations (please attach USGS map):

North Shore of Housatonic River, along an East to West flowing section, north of Waste Water Treatment Plan, South of Sackett Brook and Pipeline Crossing, East of T-shaped backwater, and east 30 m of Sewage/waste water concrete structure at end of gravel drive.

Approximate UTM coordinate - 4697640 N - 0644940 E

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)
Wet silt/muck shore of low gradient stream. Growing with Ludwigia palustris, Lindernia dubia, Persicaria lapathifolia, Verbena hastata, Cyperus strigosus, Myosotis scopioides, Eragrostis pectinacea, Alisma subcordatum, and Lythrum salicaria.

POPULATION INFORMATION:

Population found? (Y/N): Y

If No, is population presumed extirpated and why?

If Yes,

Number of mature plants: 8 (a conservative count due to silt deposits on shoreline).

Number of immature plants:

Number of plants age unknown:

Population area (give unit of measurement):

2 X 10 meters

Percent of population:

in leaf:

in bud:

in flower:

with immature fruit:

mature fruit: 100

senescent:

Observations of floral visitors, fruit dispersers:

Vigor of individuals and population:

Appently vigorous

Evidence of expansion or decline:

none observed

Have you observed this species at this site in previous years?

Please give details:

NO

SITE PHYSIOGRAPHY

Elevation: 293 m

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

Edge of Stream Channel

Aspect (north, (south), east, west, flat?):

Slope ((0-20 degrees,) 20-45 degrees, 45-75 degrees, vertical?):

Light ((open), filtered, shade?):

Moisture (inundated, (wet), mesic, dry, xeric?):

Soil types: Wet silt with organic material

Surficial rock types (with percent of ground covered):

NA

Bedrock/parent material:

Unknown

Surficial water (distance away and source):

Housatonic River, 1 meter

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any): Housatonic River Valley Wildlife Management Area

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:

Weed species colonization; Changes in water level

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY

(Circle one choice in each category)

EO Quality

How representative is this occurrence? Consider the size and

productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good (C - Marginal) D - Poor

Comments: Small population area, low numbers

EO Condition

Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good (C - Marginal) D - Poor

Comments: Lythrum Salicaria growing on shoreline.

EO Viability

What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C - Marginal) D - Poor

Comments: A single, scour event of river could eliminate the small section of silt/sand shoreline.

EO Defensibility

Can this occurrence be protected from extrinsic human factors?

A - Excellent (B - Good) C - Marginal D - Poor

Comments: Public ownership of land

EO RANK

A summary of all factors listed above.

A - Excellent B - Good (C - Marginal) D - Poor

Comments:

ADDITIONAL COMMENTS (if any)

CERTIFICATION

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Ruth Haines

Date: 8 November 1999

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife

Route 135

Westborough, MA 01581

(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

27' 30"
4702
Adams Junction
Sandpit
Substa
Silver Lake
BM 303.2
BM 300.2
Branch
Housatonic
Radio Tower
Goodrich Pond
BRATTLE BROOK PARK
Brattle
Gravel Pits
Substation
PITTSFIELD
Deming Park
Fire Sta
UNDERGROUND
20 KM TO INTERSTATE 90
LENOX 12 KM
4700
4699
HRVSWMA
Herberg Middle Sch
Williams Sch
Substa
East Part Cem
Morewood Lake
Court Hill
Sackett
Gravel Pit
Sackett Brook Park
4698
PIPELINE
Sukes Brook
RIVER
25'
Gravel Pit
4697
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Ashley Reservoir
Sewage Treatment Plant
4696
Substation
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY

[redacted]

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Eleocharis intermedia

NHESP Element Occurrence Number (if known):

Observation Date(s): 26 August 1998

USGS Quad Name and Series (7.5"x7.5" or 7.5"x15"): Pittsfield East (1:25000 scale)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): from the New Lenox Road, Go downstream (Housatonic River) to the third prominent left turn (downstream of tall eroded bank on east side of River) to a flat wet sand shelf on east side of River.

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Low gradient stream with wet sand/muck shelf at edge of river with Eragrostis pectinacea, Cyperus strigosus, Lindernia dubia, Peuthorum sedoides, Eleocharis erythropoda, Bidens cernua, and Persicaria hydropiper. Upland of stream system are agricultural (often wet) fields.

Areal Distribution, Numbers, Phenology

Population found: yes
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: uncounted, not more than 25
No. of immature plants: unknown
No. of plants age unknown: unknown

Population area: Approximately 5 x 2 meters

Percent of population in leaf: ____ bud: ____ flower: ____
with immature fruit: ____ mature fruit: ____ senescent: ____

not measured, mature fruits were present on observed plants

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently vigorous

Evidence of expansion or decline: None observed

Have you observed this species at this site in previous years? Please give details: no

Site Physiography

Elevation: 295 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ___	0-20 X	open X	inundated ___
upper slope ____	E ___	20-45 ___	filtered ___	wet X
mid slope ____	S ___	45-75 ___	shade ___	mesic ___
lower slope ____	W X	vert. ___		dry ___
bottom X	Flat ___			xeric ___

sometimes inundated during high water events.

Soil types: Fine sand with some organic material

Surficial rock types (with percent of ground covered): ____

Bedrock/parent material: ____

Surficial water (distance away): 1 meter Source: Housatonic River

Management / Ownership

NHESP Site Name (if any): ____ Managed Area: ____

Comments/Management recommendations: ____

Disturbance or threats (natural or unnatural) to population: ____

Owner's Name: ____ Telephone: (___) ____

Address: ____

Owner Comments: ____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, 122 Mainsheet, Number 3, Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: NA

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Small size of EO

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent (B) - Good C - Marginal D - Poor

Comments: River course unaltered in this section.

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent B - Good (C) - Marginal D - Poor

Comments: ____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

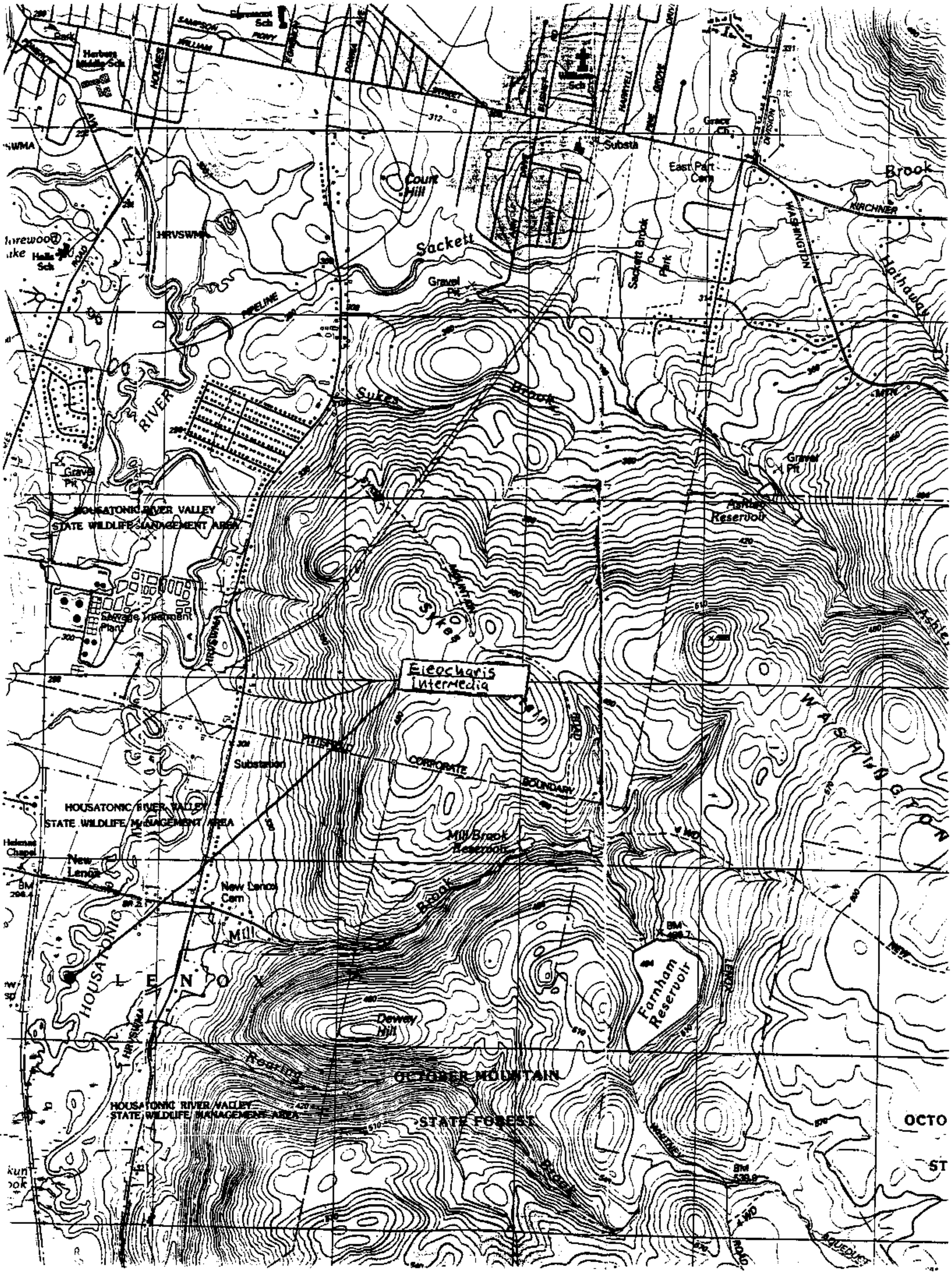
A - Excellent B - Good (C) Marginal D - Poor

Comments: Stormwater runoff from Pittsfield likely affects water quality at site

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments: ____

Signature: Arthur Haines Date: 22 March 1999



Egremont Sch
Herberg Middle Sch
Sackett
Brook
Court Hill
HRVSWMA
Substa
Grace Ch
East Part Cem
KIRCHNER
WASHINGTON
Sackett Brook Park
PIPELINE
Gravel Pit
Sykes
Brook
RIVER
Gravel Pit
Ashley Reservoir
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes
Eleocharis intermedia
Substation
CORPORATE
BOUNDARY
W A S H I N G T O N
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Mill Brook Reservoir
New Lenox
New Lenox Cem
Mill
Brook
L E N O X
HOUSATONIC
Farnham Reservoir
Dewey Hill
Roaring
OCTOBER MOUNTAIN
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
STATE FOREST
OCTO
ST

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION

Observer's Name, Address, and Phone:

Arthur Haines
Woodlot Alternatives, Inc.
122 Main Street, Number 3
Topsham, ME 04086
207-729-1199

Species Scientific Name:

Eleocharis intermedia

NHESP Element Occurrence Number (if known):

Observation Date:

8 September 1999

Today's Date:

8 November 1999

LOCATIONAL INFORMATION

a) USGS Quad Name and Series (7.5"x7.5" or 7.5"x15"): Pittsfield East

County: Berkshire

Town: Pittsfield

b) Directions to location of observations (please attach USGS map):

Upstream of Waste Water Treatment Plant, Downstream of Sackett Brook and pipeline crossing, on east shore of a short north→south flowing section of River, east of a Gravel Pit noted on Topo Map. A smaller population exists upstream on West bank (2x5 meter Area).

Approximate UTM Coordinates – 4697030 N - 0644790

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)

Wet silt/sand bar of Low gradient Stream. Growing with Linderuia dubia, Ludwigia palustris, Xanthium strumarium, Persicaria sagittata, Bidens cernua, Eragrostis pectinacea, Persicaria pensylvanica, Persicaria lapathifolia, Bidens frondosa, Panicum dichotomiflorum.

POPULATION INFORMATION:

Population found? (Y/N): Y

If No, is population presumed extirpated and why?

If Yes,

Number of mature plants: 25

Number of immature plants:

Number of plants age unknown:

Population area (give unit of measurement):

2 X 15 meters

Percent of population:

in leaf:

in bud:

in flower:

with immature fruit:

mature fruit: 100

senescent:

Observations of floral visitors, fruit dispersers:

None observed

Vigor of individuals and population:

Apparently vigorous

Evidence of expansion or decline:

none observed

Have you observed this species at this site in previous years?

Please give details: NO

SITE PHYSIOGRAPHY

Elevation: 293 m

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

Edge of Stream Channel

Aspect (north, south, east, (west), flat?):

Slope ((0-20 degrees), 20-45 degrees, 45-75 degrees, vertical?):

Light (open), filtered, shade?):

Moisture (inundated, (wet,) mesic, dry, xeric?):

Soil types: Fluvial silt with organic material mixed in.

Surficial rock types (with percent of ground covered):

NA

Bedrock/parent material:

Unknown

Surficial water (distance away and source):

Housatonic River, 1 meter

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any): Land appears to be part of Housatonic River Valley State Wildlife Management Area.

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:

Changes in water level; weed species invading site

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY

(Circle one choice in each category)

EO Quality

How representative is this occurrence? Consider the size and

productivity of the population and the vitality and vigor of the individuals.

A - Excellent (B - Good) C - Marginal D - Poor

Comments:

EO Condition

Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent (B - Good) C - Marginal D - Poor

Comments: Though floodplain is contaminated by PCB's

EO Viability

What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C - Marginal) D - Poor

Comments: Area is surrounded by Agriculture/developed lands that contain abundant sources of non-native plants. Lythrum salicaria is present in high density in vernal pools adjacent to this shoreline.

EO Defensibility

Can this occurrence be protected from extrinsic human factors?

A - Excellent (B - Good) C - Marginal D - Poor

Comments: Public Land.

EO RANK

A summary of all factors listed above.

A - Excellent (B - Good) C - Marginal D - Poor

Comments:

Relatively good site, likely that stem count is very conservative, as recent flooding and silt deposition has covered vegetation.

ADDITIONAL COMMENTS (if any)

- Each plant with many (ca. 20-50) fruiting stems.
- Specimen to be deposited at the Harvard Herbaria.

CERTIFICATION

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Cathy Haines

Date: 8 November 1999

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife

Route 135

Westborough, MA 01581

(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

Court Hill
Sackett
Sackett Brook Park
Gravel Pit
HRVSWMA
Morewood Lake
RIVER
Brook
Gravel Pit
Ashley Reservoir
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Substation
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Mill Brook Reservoir
New Lenox
New Lenox Cem
HOUSATONIC
L E N O
Farnham Reservoir
Dewey Hill

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION

Observer's Name, Address, and Phone:

Arthur Haines
Woodlot Alternatives, Inc.
122 Main St., Number 3
Topsham, ME 04086

Species Scientific Name:

Eleocharis intermedia

NHESP Element Occurrence Number (if known):

Observation Date:

1 September 1999

Today's Date:

22 september 1999

LOCATIONAL INFORMATION

a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East, 1:25,000

County: Berkshire

Town: Lenox

b) Directions to location of observations (please attach USGS map):

Downstream of New Lenox Road, on a prominent silt-muck bar on North shore of river (on a west to East flowing portion of the river), upstream of the large backwater channel/pond on the west side of the river.

Approximate UTM coordinates: 4694340N – 0644510E

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)

Low Gradient Stream, A wet silt-muck bank adjacent to the river channel, growing with Eragrostis hypnoides, Eragrostis pectinacea, Cyperus bipartitus, Lindernia dubia, Persicaria hydropiper, Urtica dioica, and Echinochloa muricata.

POPULATION INFORMATION:

Population found? ((Y)/N):

If No, is population presumed extirpated and why?

If Yes,

Number of mature plants: unknown, concealed under dense vegetation

Number of immature plants:

Number of plants age unknown:

Population area (give unit of measurement):

2 x 10 meters

Percent of population:

in leaf:

in bud:

in flower:

with immature fruit:

(mature fruit:) All observed

senescent:

Observations of floral visitors, fruit dispersers:

none observed

Vigor of individuals and population:

Apparently vigorous

Evidence of expansion or decline:

none observed

Have you observed this species at this site in previous years?

Please give details: yes, observed during initial floristic surveys (1998), but details, such as population number, were not recorded.

SITE PHYSIOGRAPHY

Elevation:

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

Edge of river channel

Aspect (north, south, east, west, flat?):

Slope (0-20 degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light (open, filtered, shade?):

Moisture (inundated, wet, mesic, dry, xeric?):

Soil types: fluvial silt with organic particles

Surficial rock types (with percent of ground covered):

N/A

Bedrock/parent material: unknown

Surficial water (distance away and source): 1 meter, Housatonic River

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any):

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:
impoundment, river cause changes, Invasive plants

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY

(Circle one choice in each category)

EO Quality

How representative is this occurrence? Consider the size and

productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good (C) - Marginal D - Poor

Small population area

Comments:

EO Condition

Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good (C) - Marginal D - Poor

Comments: PCB contamination, land adjacent has been cleared for agriculture, presence of Lythrum Salicaria.

EO Viability

What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent (B) - Good C - Marginal D - Poor

Comments:

EO Defensibility

Can this occurrence be protected from extrinsic human factors?

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO RANK

A summary of all factors listed above.

A - Excellent B - Good (C) - Marginal D - Poor

Comments: May perhaps want to consider the upstream portion of the Housatonic River as a singe, large fragmented Population (confluence in Pittsfield to Woods Pond). If this is the case, "EO Rank would be considerably higher (A or B).

ADDITIONAL COMMENTS (if any)

Specimen to be deposited at Harvard Herbaria.

CERTIFICATION

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Arthur Haines

Date: 22 September 1999

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife

Route 135

Westborough, MA 01581

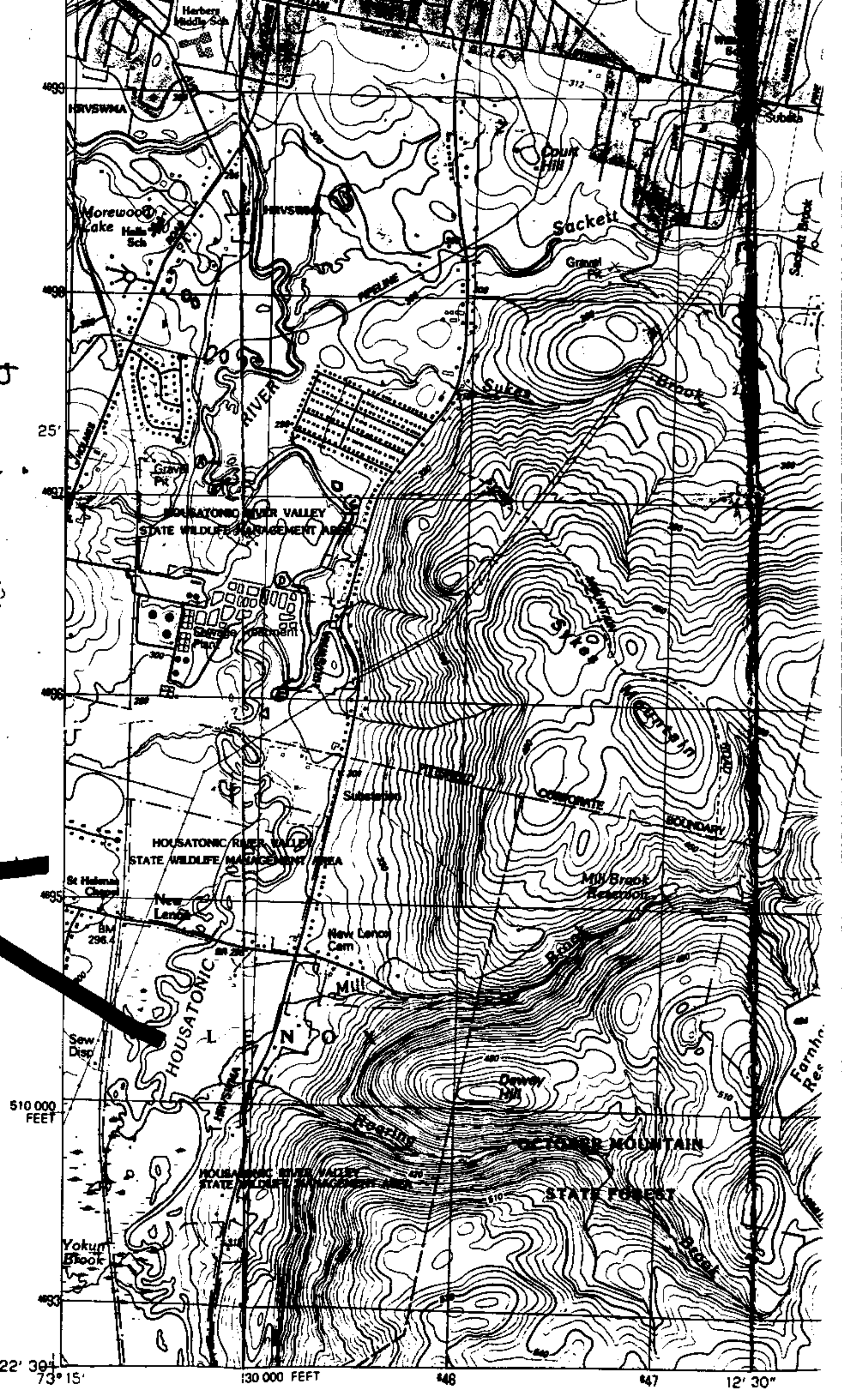
(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

*: cobble/sand bottom Backpack fishing

□: Sand bottom, Shallow Backpack fishing

Δ: Deep stretch good site for ... net



(Northeast Shore)

Pittsfield East (1:25,000)

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Elymus villosus

NHESP Element Occurrence Number (if known):

Observation Date(s): 16 and 17 August 2000

USGS Quad Name and Series (7.5"x7.5" or 7.5"x15"): Pittsfield East (1:25,000)

County: Berkshire Town: Pittsfield

Directions to location of observations (please attach USGS map): from Holmes Road, Drive down Utility Drive, and pass through a yellow gate on left before reaching Waste wate treatment Plant Buildings. Follow gravel road 0.1 Miles to open borrow pit. Turn right (east) and travel across Corn field to floodplain forest on west side of Housatonic River. Plants are found upstream in rich forest between large, semi-permiant Pool and River channel. Approximate UTM (N 4696800 E 0645985)

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Floodplain forest on high terrace, dominated in overstory by Tilia americana, Fraxinus americana, and Prunus serotina. Additional Associates include Caulophyllum Giganteum, Ageratina altissima, Allium tricoccum, Carex sprengelii, Elymus riparius, Elymus hystrix, and Carpinus caroliniana. Floodplain forest is reduced and occurs as a narrow strip of forest along river's edge. Agriculture and gravel mining have taken much of the forest in the local area.

Areal Distribution, Numbers, Phenology

Population found: X
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: 55
No. of immature plants:
No. of plants age unknown:

Population area: +- 110 X 15 meters

Percent of population in leaf: with immature fruit: bud: mature fruit: 100 flower: senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: apparently vigorous, insect larvae found within the leaf of one individual.

Evidence of expansion or decline: none observed

Have you observed this species at this site in previous years? Please give details: no

Site Physiography

Elevation: 295 M

Topographic position	Aspect	Slope	Light	Moisture
crest ___	N ___	0-20 X	open ___	inundated ___
upper slope ___	E X	20-45 ___	filtered ___	wet ___
mid slope ___	S ___	45-75 ___	shade X	mesic X
lower slope ___	W ___	vert. ___		dry ___
bottom X	Flat ___			xeric ___

Soil types: rich fluvial silt-loam

Surficial rock types (with percent of ground covered): none observed

Bedrock/parent material: Limestone

Surficial water (distance away): 10 meters Source: Housatonic River

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: Housatonic River Valley SWMA

Comments/Management recommendations: Protect floodplain from further clearing

Disturbance or threats (natural or unnatural) to population: non-native species abundant in some areas of forest, Berberis thunbergii, Deschampsia cespitosa—introduced form, Celastrus orbiculata, and Rhamnus cathartica

Owner's Name: Commonwealth of Massachusetts Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc., 122 Main Street, Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: Harvard Herbaria

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the virality and vigor of the individuals.)

A - Excellent B - Good (C) Marginal D - Poor

Comments: _____

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent B - Good (C) Marginal D - Poor

Comments: Habitat fragmented and with abundant non-native species

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent (B) Good C - Marginal D - Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

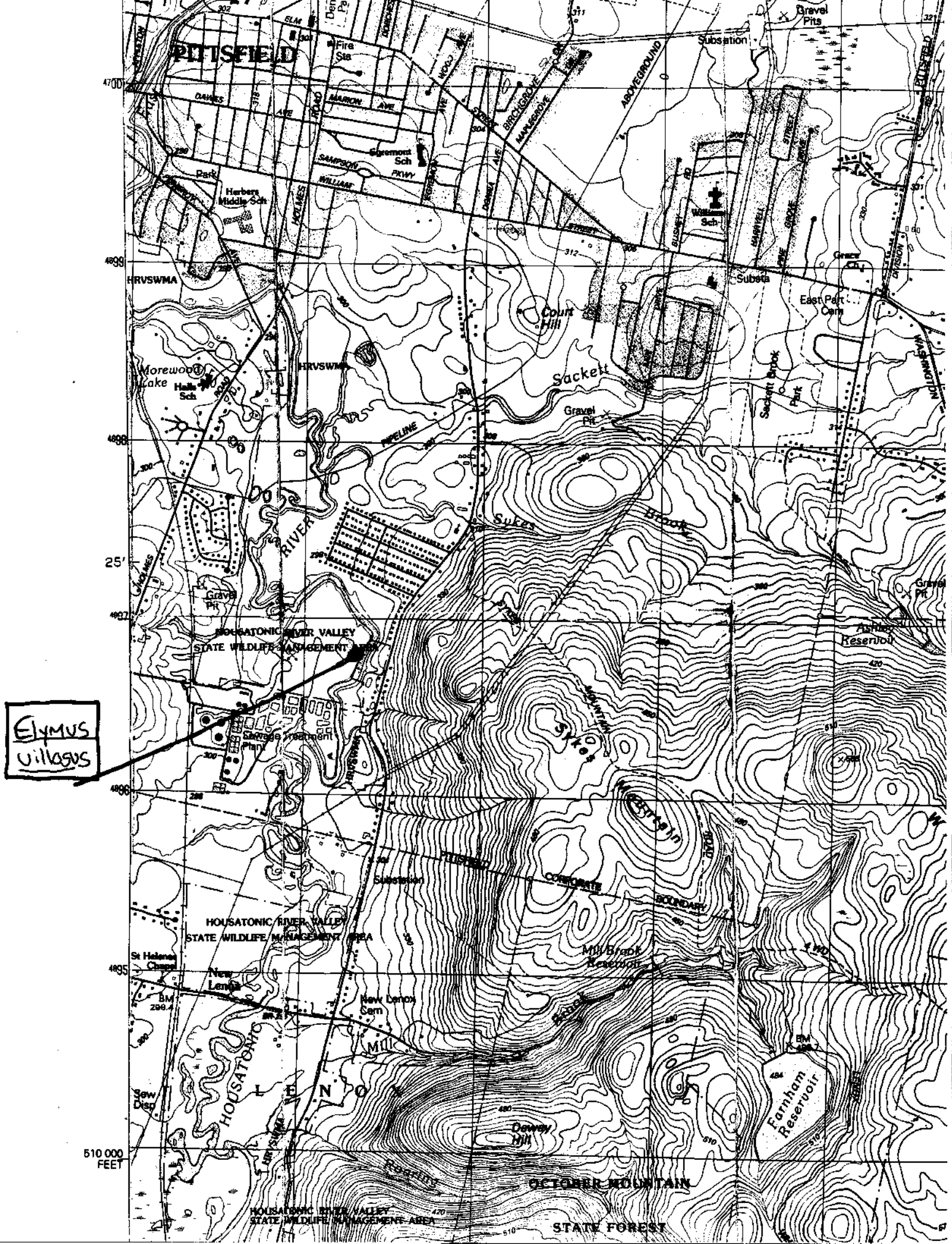
A - Excellent (B) Good C - Marginal D - Poor

Comments: State Ownership

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 28 August 2000



Elymus villosus

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Equisetum variegatum

NHESP Element Occurrence Number (if known):

Observation Date(s): 25 August 1998

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East (1:25,000)

County: Berkshire Town: Pittsfield

Directions to location of observations (please attach USGS map): Utility drive, Pass under RR bridge and Park at yellow Gate on left (before entering Wastewater treatment facility straight ahead) Walk along gravel road into gravel pit, and pass over small rise to find 2 pools (one on each side of the road). At the west shore of the left hand (north) pool.

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Population is found in a gravel pit on a bank and extends downslope into small pool. Part of the population is inundated during periods of high water. Substrate is sand. Growing with Lythrum Salicaria, Cornus Amomum, and Euthamia graminifolia. Area is used by motocross motorcyclists.

Areal Distribution, Numbers, Phenology

Population found: yes
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: >1000
No. of immature plants:
No. of plants age unknown:

Population area: 14 X 9 meters

Percent of population in leaf: 50 (vegetative) -bud: flower:
with immature fruit: mature fruit: 50 senescent:

Observations of floral visitors, fruit dispersers: Not applicable

Vigor of individuals and population: Apparently healthy

Evidence of expansion or decline: none observed

Have you observed this species at this site in previous years? Please give details: NO

Site Physiography

Elevation: 300 M

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N___	0-20 X	open___	inundated *
upper slope___	E X	20-45___	filtered___	wet *
mid slope___	S___	45-75___	shade___	mesic *
lower slope X	W___	vert.___		dry X
bottom X	Flat___			xeric ___

Depending on time of year and location of plants.

Soil types: Fine to Coarse Sand

Surficial rock types (with percent of ground covered): ____

Bedrock/parent material: ____

Surficial water (distance away): 0 meters Source: Small Pool

Management / Ownership

NHESP Site Name (if any): ____ Managed Area: ____

Comments/Management recommendations: ____

Disturbance or threats (natural or unnatural) to population: ____

Owner's Name: ____ Telephone: (___) ____

Address: ____

Owner Comments: ____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc. 122 Main Street, Number 3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: Will be deposited at the Harvard Herbarium

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.)

(A) - Excellent B - Good C - Marginal D - Poor

Comments: ____

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent B - Good (C) - Marginal D - Poor

Comments: Though community is degraded, E. variegatum commonly occurs in habitats like these (roadside ditches, etc.

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent (B) - Good C - Marginal D - Poor

Comments: ____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent B - Good (C) Marginal D - Poor

not likely to be trampled or driven over due to location

Comments: Further Mining activity or ditching to drain water level would affect population;

EO RANK: (A summary of all factors listed above.) A - Excellent (B) - Good C - Marginal D - Poor

Comments: ____

Signature: Arthur Haines Date: 5 November 1998


Equisetum variegatum
HRVSWMA
Morewood Lake
Hall's Sch
Gravel Pit
PIPELINE
RIVER
Sykes
Brook
Sackett
Court Hill
Substa
East Part Cem
Sackett Brook Park
WASHINGTON
Gravel Pit
Ashley Reservoir
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Mountain
Spring
Substation
TUBULAR
CORPORATE BOUNDARY
Mill Brook Reservoir
St Helena Chapel
New Lenox
BM 294.4
New Lenox Cem
Mill
Brook
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
Farnham Reservoir
OCTOBER MOUNTAIN
STATE FOREST
Yokun Brook
Brook
BM 529.8
25'
510 000 FEET
42° 22' 30"
73° 15'
130 000 FEET
46
47

MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION

Observer's Name, Address, and Phone:

Arthur Haines (Site discovered by John Lortie)
Woodlot Alternatives, Inc,
122 Main St., Number 3
Topsham, ME 04086

Species Scientific Name:

Equisetum variegatum

NHESP Element Occurrence Number (if known):

Observation Date:

22 June 1999

Today's Date:

23 June 1999

LOCATIONAL INFORMATION

a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East (1:25,000)

County: Berkshire

Town: Pittsfield

b) Directions to location of observations (please attach USGS map):

Open field behind Elm Street Car Wash and Samel's, south side of East Branch Housatonic River, upstream of Elm Street Bridge, near west end of field, on north side of clump of Cottonwood saplings (western on 2 clumps), in a depression in field.

Approximate UTM Coordinates - 4700630N - 0644720E

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)

Anthropogenic field, much of it wet in Spring and with hydrophytic vegetation, growing with Equisetum arvense, Potentilla simplex, Salix eriocephala, Lolium arundinaceum, Onoclea sensibilis, Solidago altissima, Carex vulpinoidea, and Carex normalis.

POPULATION INFORMATION:

Population found? (Y/N):

If No, is population presumed extirpated and why?

If Yes,

Number of mature plants: Approximately 1000

Number of immature plants: Unknown

Number of plants age unknown:

Population area (give unit of measurement):

5 x 3 meters

Percent of population:

in leaf: 30%

in bud:

in flower: Spore cones (new and old) 70% of stems

with immature fruit:

mature fruit:

senescent:

Observations of floral visitors, fruit dispersers:

None observed (nor would any be expected).

Vigor of individuals and population:

Apparently vigorous

Evidence of expansion or decline:

None observed

Have you observed this species at this site in previous years?

Please give details:

NO

SITE PHYSIOGRAPHY

Elevation:

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

Aspect (north, south, east, west, flat?):

Flat

Slope (0-20) degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light (open, filtered, shade?):

Largely open, but some taller herbs offer shade.

Moisture (inundated, wet, mesic, dry, xeric?): spring summer

Soil types: unknown

Surficial rock types (with percent of ground covered):

None

Bedrock/parent material: Unknown

Surficial water (distance away and source):
Housatonic River, ca. 50-75 meters

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any): NO

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:
- Changes to hydrology, grading/excavation

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY

(Circle one choice in each category)

EO Quality

How representative is this occurrence? Consider the size and

[illegible] individuals.

A - Excellent B - Good (C - Marginal) D - Poor

Comments: Population relatively small for this species, and occupying a small area.

EO Condition

Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good C - Marginal (D - Poor)

Comments: Habitat is entirely converted from hardwood floodplain to an open field with a high proportion of non-native species. However, this species normally occurs in disturbed areas (ditches, ruts, excavated banks, etc.).

EO Viability

What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent (B - Good) C - Marginal D - Poor

Comments: Many individuals, high percentage of material reproductive

EO Defensibility

Can this occurrence be protected from extrinsic human factors?

A - Excellent B - Good (C - Marginal) D - Poor

Comments: Land privately owned

EO RANK

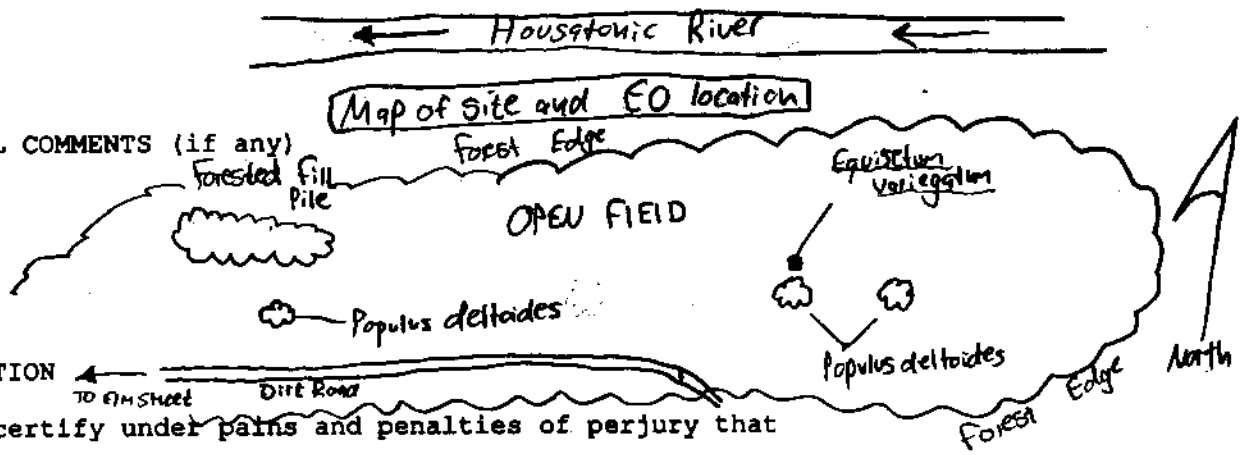
A summary of all factors listed above.

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any)

Specimen to be deposited at the Harvard Herbaria.



CERTIFICATION

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Arthur Haines

Date: 23 June 1999

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

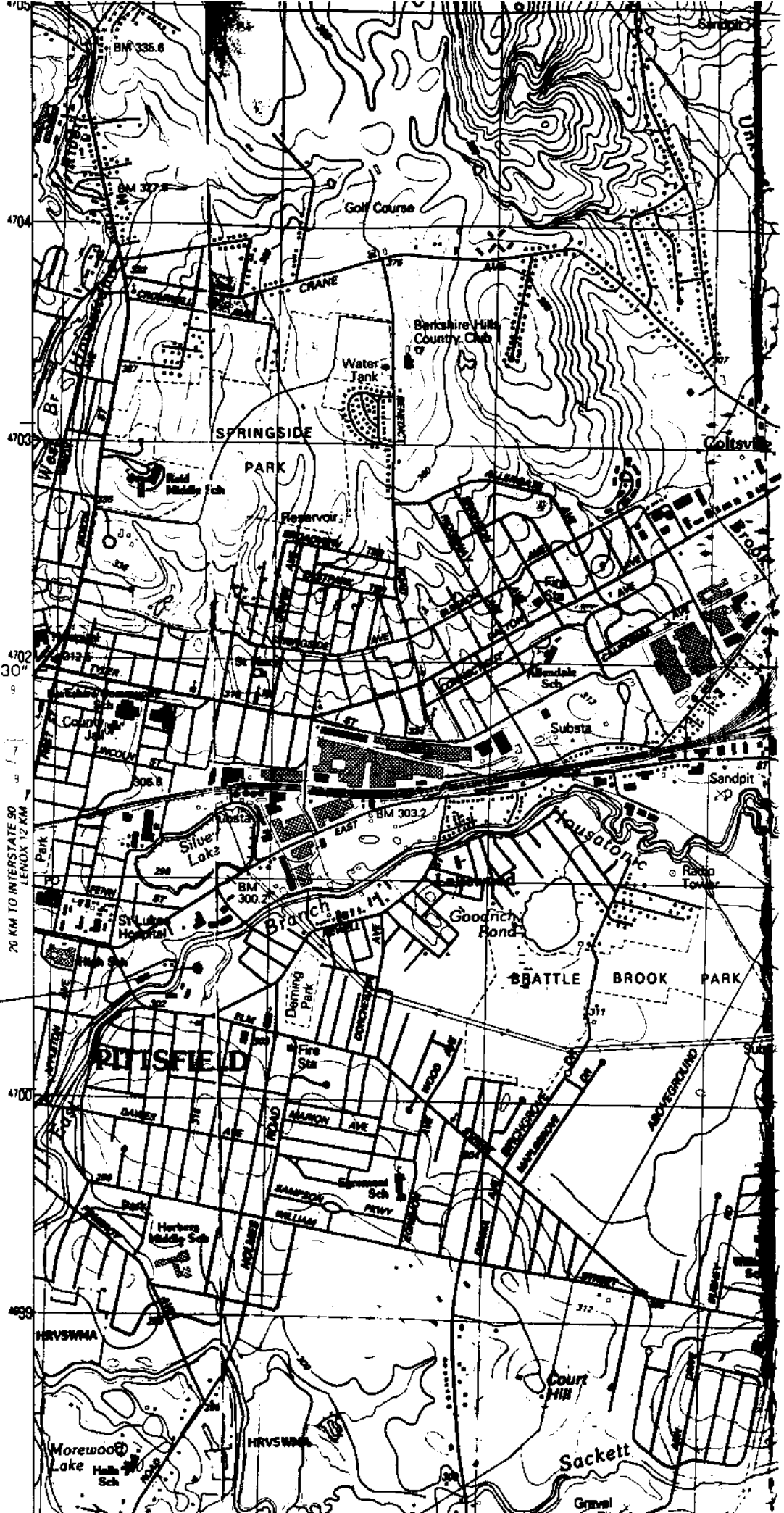
Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife

Route 135

Westborough, MA 01581

(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.



Equisetum variegatum

Pittsfield East
(1:25,000)

* - Cobble / Sand bar in OM

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION
Observer's Name, Address, and Phone: Woodlot Alternatives, Inc.
Arthur Haines

Species Scientific Name: Equisetum variegatum

NHESP Element Occurrence Number (if known):

Observation Date: 3 April 2000

Today's Date: 2 January 2001

LOCATIONAL INFORMATION
a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): East Lee (1:25,000)
County: Berkshire
Town: Washington

b) Directions to location of observationa (please attach USGS map):
From New Lenox Road, drive south on Woodland Road to October Mountain Road (Paved uphill Road, continue straight through four-way intersection (now on the county Road), then turn left. On north side of Road at east end of small Pond (also on north side of road) along grassy/gravely shoulder of road. See Detail of site on page 3 of this form.

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)
Plants intermixed with species occuring along shoulder of a gravel road. Associated plants includes Fragaria virginiana, Zizea aurea, Salix bebbiana, Salix eriocephala, Equisetum variegatum, Solidago canadensis, Trifolium pratense, and Galium mollugo.

POPULATION INFORMATION:

Population found? (Y)N):

If No, is population presumed extirpated and why?

If Yea,
Number of mature plants: >1000 stems
Number of immature plants:
Number of plants age unknown:

Population area (give unit of measurement): 8 x 2 meters

Percent of population:
in leaf:
in bud:
in flower:
with immature fruit:
mature fruit: ——— spore cones +/- 70%
senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently healthy

Evidence of expansion or decline: none observed

Have you observed this species at this site in previous years? NO
Please give details:

SITE PHYSIOGRAPHY
Elevation:

Topographic position (crest, upper slope, mid slope, lower slope, (bottom?): low area in the hills

Aspect (north, south, east, west, (flat?):

Slope (0-20 degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light (open, (filtered, shade?): — filtered through grass-like and broad-leaved herbs and shrubs.

Moisture (inundated, wet, (mesic) dry, xeric?):

Soil types:

Surficial rock types (with percent of ground covered): unknown

Bedrock/parent material:

Surficial water (distance away and source): 2.5 meters, permanent pool

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any): October Mountain State Forest

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:

Land Owner's Name, Address, and Phone:
Commonwealth of Massachusetts

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY
(Circle one choice in each category)

EO Quality
How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Fair population size.

EO Condition
Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Plants are occurring along a cleared, disturbed edge of road that passes between two ponds.

EO Viability
What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Future road maintenance or succession of community may eliminate plants.

EO Defensibility
Can this occurrence be protected from extrinsic human factors?

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Located in a low-traffic area.

EO RANK
A summary of all factors listed above.

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any)

CERTIFICATION
I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Cathy Haines

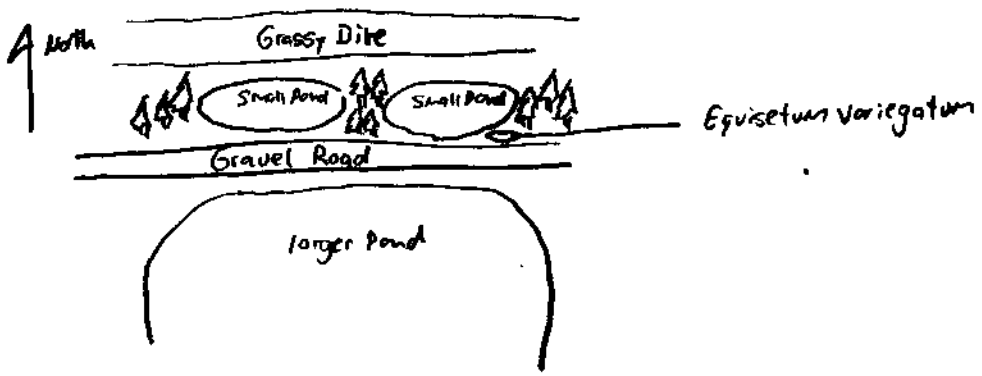
Date: 2 January 2001

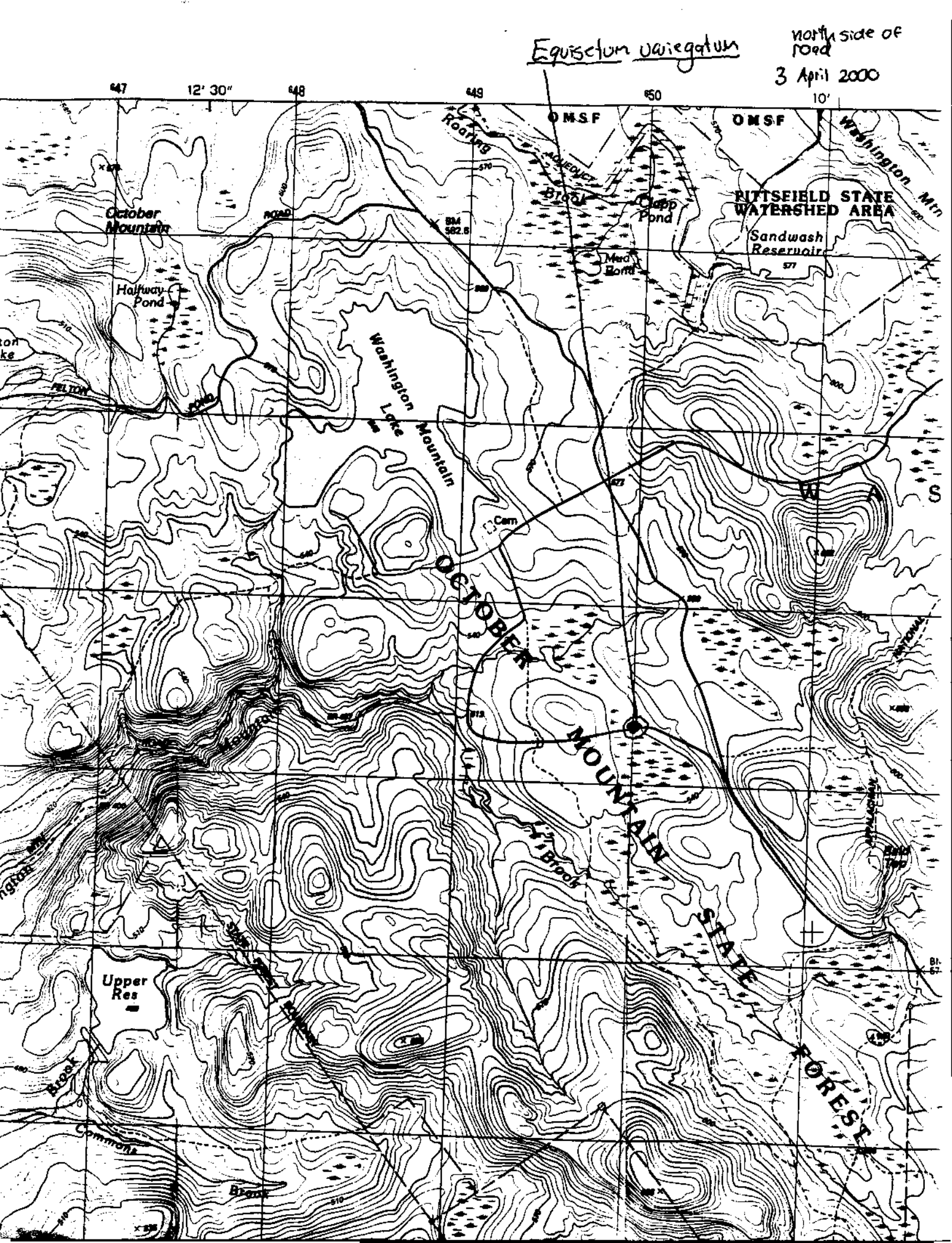
Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

Detail of Site




Equisetum variegatum
north side of road
3 April 2000
647
12' 30"
648
649
650
10'
OMSF
OMSF
Roaring
Aqueduct
Brook
Clapp Pond
Washington Mtn
PITTSFIELD STATE WATERSHED AREA
Sandwash Reservoir
October Mountain
Halfway Pond
Mud Pond
Washington Lake
Mountain
OCTOBER MOUNTAIN STATE FOREST
Upper Res
Brook
Commons
Brook

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION
Observer's Name, Address, and Phone:
Arthur Haines

Species Scientific Name: Gentianopsis crinita

NHESP Element Occurrence Number (if known):

Observation Date: 20 April 2000

Today's Date: 28 June 2000 and 7 September 2000 (5 plants observed in flower to confirm ID from early summer)

LOCATIONAL INFORMATION
a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Great Barrington (1:25,000)
County: Berkshire
Town: Sheffield

b) Directions to location of observations (please attach USGS map):
Follow Brush Hill Road (travels along west side of Threemile Pond) to its end at gate across road. Beyond gate, lies open agricultural fields with a hydric circumneutral meadow on either side of road. About 100 meters north of gate, on left (west) side of road, in open field (within 15 meters of road).

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)
Juxtaposed Agricultural field, Circumneutral Meadow, and Circumneutral Shrub Swamp. Plants sit in field with Podophyllum peltatum.

POPULATION INFORMATION:
Population found? (Y/N): Occurrence based on discovery of remnant fruiting stems discovered in spring.

If No, is population presumed extirpated and why?

If Yes,
Number of mature plants: 10
Number of immature plants:
Number of plants age unknown:

Population area (give unit of measurement):

Percent of population:
in leaf:
in bud:
in flower:
with immature fruit:
mature fruit:
senescent: 100%

Observations of floral visitors, fruit dispersers:
None observed

Vigor of individuals and population:
Unknown, but fruiting stems produced the previous season.

Evidence of expansion or decline:
Population shifted from within field to in and along single lane road and decreased in size about 50%. This observation made by examining previous years fruiting stems to flowering individuals in the same year.
Have you observed this species at this site in previous years?
Please give details:

NO

SITE PHYSIOGRAPHY
Elevation: 286 m

Topographic position (crest, upper slope, mid slope, (lower slope), bottom?):

Aspect (north, south, east, west, (flat?)):

Slope ((0-20 degrees), 20-45 degrees, 45-75 degrees, vertical?):

Light ((open), filtered, shade?):

Moisture (inundated, wet, (mesic), dry, xeric?):

Soil types:

Surficial rock types (with percent of ground covered): none observed

Bedrock/parent material: unknow

Surficial water (distance away and source):
10 meters, wetland complex north of Threemile Pond.

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any): Site may occur on private property adjacent to Threemile Pond State WMA.

Comments/Management recommendations:
Contact landowner to make him/her aware of plants.

Disturbance or threats (natural or unnatural) to population:
Disturbance to soil or site hydrology.

Land Owner's Name, Address, and Phone:
unknown

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY
(Circle one choice in each category)

EO Quality
How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good C - Marginal (D) Poor

Comments: Small population

EO Condition
Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good (C) - Marginal D - Poor

Much of immediate are has been cleared for agricultural purposes.

Comments:

EO Viability
What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Population small and demonstrating large fluctuations in location and numbers

EO Defensibility
Can this occurrence be protected from extrinsic human factors?

A - Excellent B - Good C - Marginal (D) - Poor

Comments: Population occurs in mowed field and along single lane road.

EO RANK
A summary of all factors listed above.

A - Excellent B - Good C - Marginal (D) - Poor

Comments:

ADDITIONAL COMMENTS (if any)

CERTIFICATION
I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

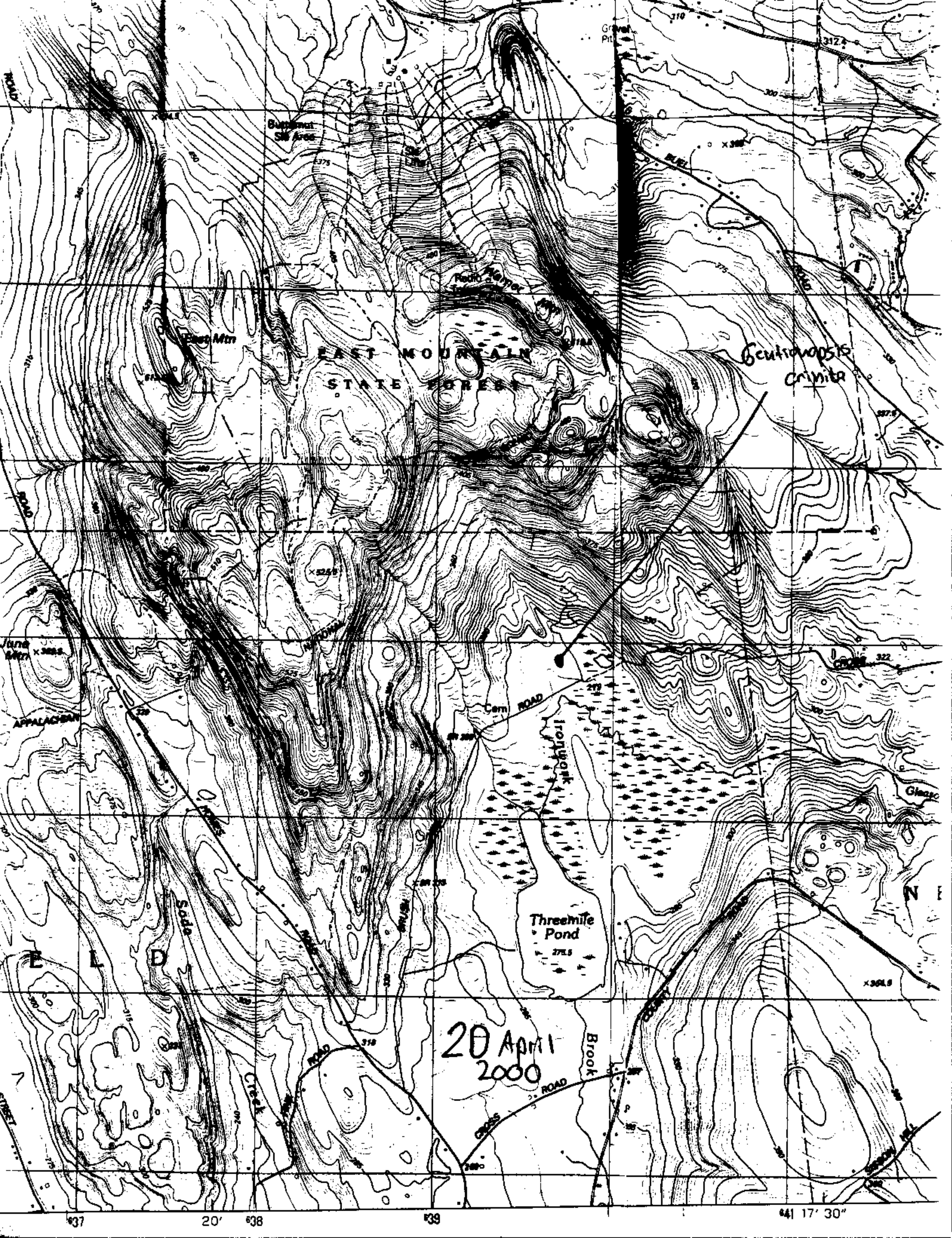
Signature: Anita Haines

Date: 4 January 2001

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.



Gravel Pit
Butternut Ski Area
Ski Lifts
BUEL
East Mtn
EAST MOUNTAIN
STATE FOREST
crinita
June Mtn
APPALACHIAN
Cem
ROAD
Threemile Pond
Soda
Creek
Brook
CROSS
20 April 2000
E L D
N
637
20'
638
639
641 17' 30"

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Quercus Macrocarpa

NHESP Element Occurrence Number (if known):

Observation Date(s): 26, 27 August ; 1, 9 September

USGS Quad Name and Series (7.5"x7.5" or 7.5"x15"): Pittsfield East and East Lee (1:25,000 scale)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): See attached topo maps, most sites best (and relatively easily) accessed from Railroad.

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Sites 1, 2, 3, 5, 7, 8 are relatively wet areas with saturated soils and are best described as Red Maple Swamps or Red Maple–black ash swamps. In these areas, the Quercus Macrocarpa are infrequent, small (<12 inch dbh) trees that rarely form major parts of the canopy. Sites 4 and 6 are somewhat drier, and would be best described as Bur Oak floodplain forests. At these two sites, the Quercus Macrocarpa are much larger and older and form major portions of the canopy. Some trees from site 6 (near open backwater) were >25 inches dbh and >100 years old.

Areal Distribution, Numbers, Phenology

Population found: yes
not found:
Presumed extirpated: no
(give reasons under "Comments")

No. of mature plants: unknown, >100
No. of immature plants: unknown, seedlings observed
No. of plants age unknown:

Population area: 3.5 X 0.5 km

Percent of population in leaf: +/- 60 -bud: flower:
with immature fruit: mature fruit: +/- 40 senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently healthy

Evidence of expansion or decline: Non observed

Have you observed this species at this site in previous years? Please give details: NO

Site Physiography

Elevation: ca. 294 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ___	0-20 X	open ____	inundated X
upper slope ____	E ___	20-45 ____	filtered ____	wet X
mid slope ____	S ___	45-75 ____	shade X	mesic ____
lower slope ____	W ___	vert. ____		dry ____
bottom X	Flat X			xeric ____

Soil types: Alluvial silt and mucky silt

Surficial rock types (with percent of ground covered): NA

Bedrock/parent material: none

Surficial water (distance away): usually within 50 meters Source: Housatonic River or standing water in swamp

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: Clearing of land; changes in water level

Owner's Name: Housatonic River Valley state WMA (largely owned, some private) Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc. 122 Main Street, Number 3, Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: Harvard Herbaria (NEBC) —from site 6—

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.)

(A) Excellent B - Good C - Marginal D - Poor

Comments: In areas with large individuals and relatively many individuals

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent (B) - Good C - Marginal D - Poor

Comments: In many places the remaing community is is good shape except for exotic plants

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) (A) Excellent B - Good C - Marginal D - Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Hydrological changes due to further impoundment at u/s Pond could be detrimental.

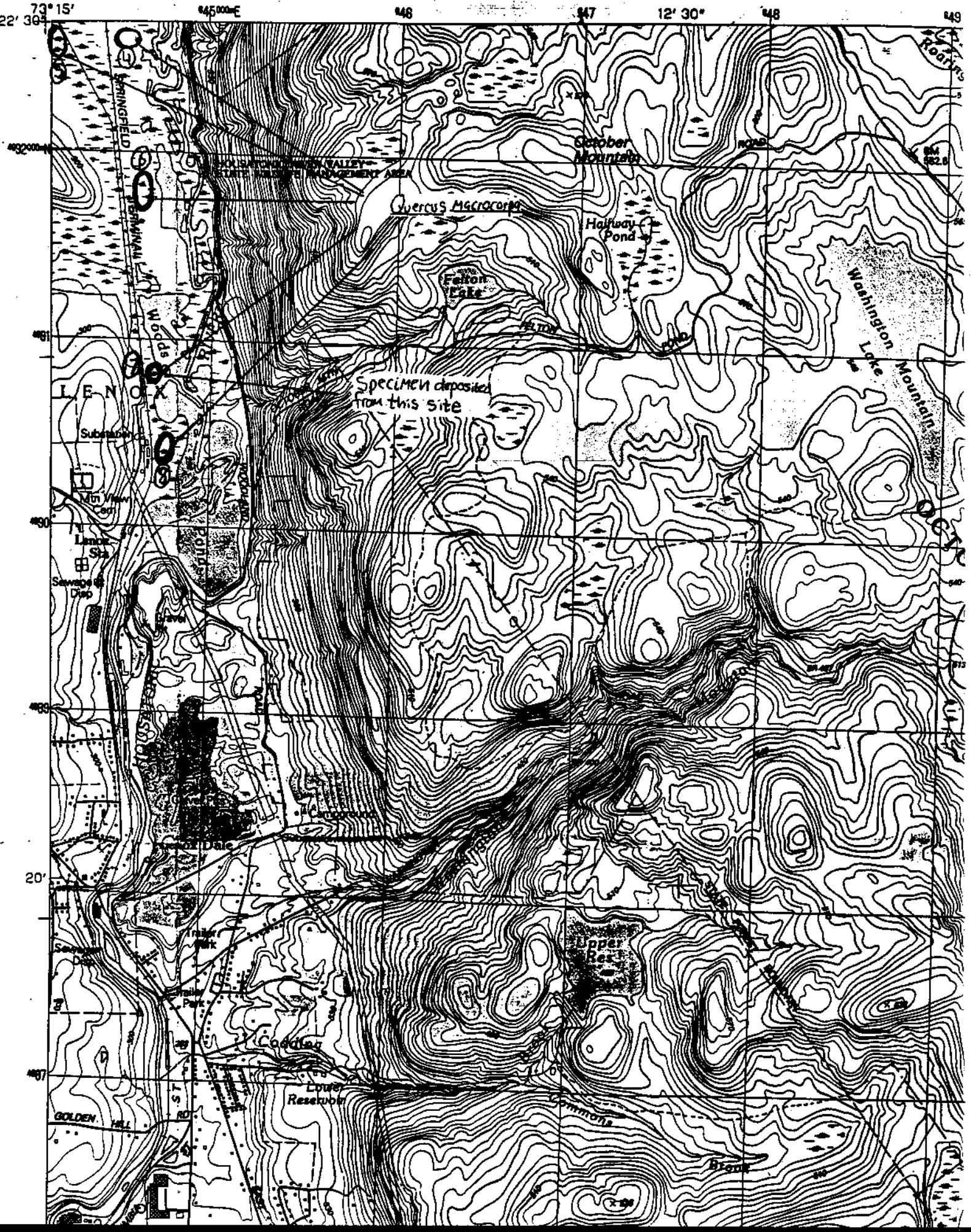
EO RANK: (A summary of all factors listed above.) (A) Excellent (B) - Good C - Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 24 November 1998

Quercus
Macrocarpa

EAST LEE, MASSACHUSETTS



Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION

Observer's Name, Address, and Phone:

Arthur Haines
Woodlot Alternatives, Inc. 207-729-1199
122 Main Street, Number 3
Topsham, ME 04086

Species Scientific Name:

Ranunculus pensylvanicus

NHESP Element Occurrence Number (if known):

Observation Date:

5 August 1999

Today's Date:

1 September 1999

LOCATIONAL INFORMATION

a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): East Lee (1:25,000)

County: Berkshire

Town: Lenox

b) Directions to location of observations (please attach USGS map):

New Lenox Road to October Mountain Road, Third cul-de-sac on right (west), to river channel (an East-west portion of river), Across channel to north shore.

Approximate UTM coordinates: 4691300N - 0644950E

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)

Circumneutral Shrub swamp along Housatonic River (Dominant shrubs in immediate area include Cornus sericea, Corylus americana, and Carpinus caroliniana). Small, open rocky spot on shore with Onoclea sensibilis, Galium trifidum, Lycopus virginus, Pilea pumila, Clematis virginiana, Thalictrum pubescens, Sium suave, and Lysimachia hybrida.

POPULATION INFORMATION:

Population found? (Y)/N):

If No, is population presumed extirpated and why?

If Yes,

Number of mature plants: 6

Number of immature plants: 0

Number of plants age unknown: 0

Population area (give unit of measurement):

2 x 1 meters

Percent of population:

in leaf:

in bud:

in flower: 4

with immature fruit:

mature fruit: 2

senescent:

Observations of floral visitors, fruit dispersers:

None observed

Vigor of individuals and population:

Apparent vigorous

Evidence of expansion or decline:

none observed

Have you observed this species at this site in previous years?

Please give details:

NO

SITE PHYSIOGRAPHY

Elevation: 290 meters

Topographic position (crest, upper slope, mid slope, lower slope, (bottom)?):

Adjacent to River channel

Aspect ((north), south, east, west, flat?):

Slope ((0-20) degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light ((open), filtered, shade?):

at least during mid-day

Moisture (inundated, wet, (mesic), dry, xeric?):

except during high water events

Soil types:

Alluvial silt to silt-loam

Surficial rock types (with percent of ground covered):

Unknown rock type, several large cobbles visible on shore (unusual for this portion of the river)

Bedrock/parent material:

Surficial water (distance away and source):

Less than 1 meter, Housatonic River

MANAGEMENT/OWNERSHIP: Housatonic River Valley State Wildlife Management Area

MNHESP Site Name (if any):

Managed Area (if any):

Comments/Management recommendations:

Shrub encroachment could eliminate rare plants in near future, therefore, careful and strategic pruning could maintain open area without changing site shading, temperature, etc.

Disturbance or threats (natural or unnatural) to population:

Shrub encroachment; changes in water level at Woods Pond Dam

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY

(Circle one choice in each category)

EO Quality

How representative is this occurrence? Consider the size and

productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Small population – only 6 individuals

EO Condition

Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent (B) - Good C - Marginal D - Poor

Comments:

EO Viability

What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Small Area, a single scour event or debris pile could eliminate rare plant occurence.

EO Defensibility

Can this occurrence be protected from extrinsic human factors?

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Land is publicly owned.

EO RANK

A summary of all factors listed above.

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any)

Specimens to be deposited at the Harvard Herbaria.

CERTIFICATION

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Christa Haines

Date: 1 september 1999

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife

Route 135

Westborough, MA 01581

(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

Ranunculus pensylvanicus
(south shore)

East Lee (1:25,000)

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Ribes americanum

NHESP Element Occurrence Number (if known):

Observation Date(s): 21 September 1998

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East 1:25,000

County: Berkshire Town: Pittsfield

Directions to location of observations (please attach USGS map): (N 4699353 - E 0643951) west from the end of the Brunswick Road, within 6 meters of east edge of powerline clearing.

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Area is largely vegetated by a floodplain forest, with Acer saccharinum and Acer negundo as the canopy dominants. Ribes is growing in area with abundant understory shrubs (Cornus sericea), near a powerline clearing (open and shrub filled field).

Areal Distribution, Numbers, Phenology

Population found:
not found: X
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: 4
No. of immature plants:
No. of plants age unknown:

Population area: 1 X 1 meter

Percent of population in leaf: 100 bud: flower:
with immature fruit: mature fruit: senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently healthy

Evidence of expansion or decline: NO

Have you observed this species at this site in previous years? Please give details: NO

Site Physiography

Elevation: 294 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ___	0-20 X	open ____	inundated ____
upper slope ____	E ___	20-45 ____	filtered X	wet ____
mid slope ____	S ___	45-75 ____	shade ____	mesic X
lower slope ____	W ___	vert. ____		dry ____
bottom X	Flat X			xeric ____

Soil types: unknown

Surficial rock types (with percent of ground covered): none

Bedrock/parent material: unknown

Surficial water (distance away): 100 m Source: Vernal Pools in floodplain

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: Inform utility Company of EO so population is not impacted during clearing of Powerline Strip.

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: Housatonic River Valley State WMA Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc., 122 Main St., #3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: NEBC, Harvard Herbaria

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the virality and vigor of the individuals.)

A - Excellent B - Good C - Marginal (D) - Poor

Comments: few number of individuals

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent B - Good (C) - Marginal D - Poor

Comments: Powerline clearing passes through community; floodplain with some exotic species

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent B - Good (C) - Marginal D - Poor

Comments: Competition from Cornus sericea and other shrubs at clearing edge

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

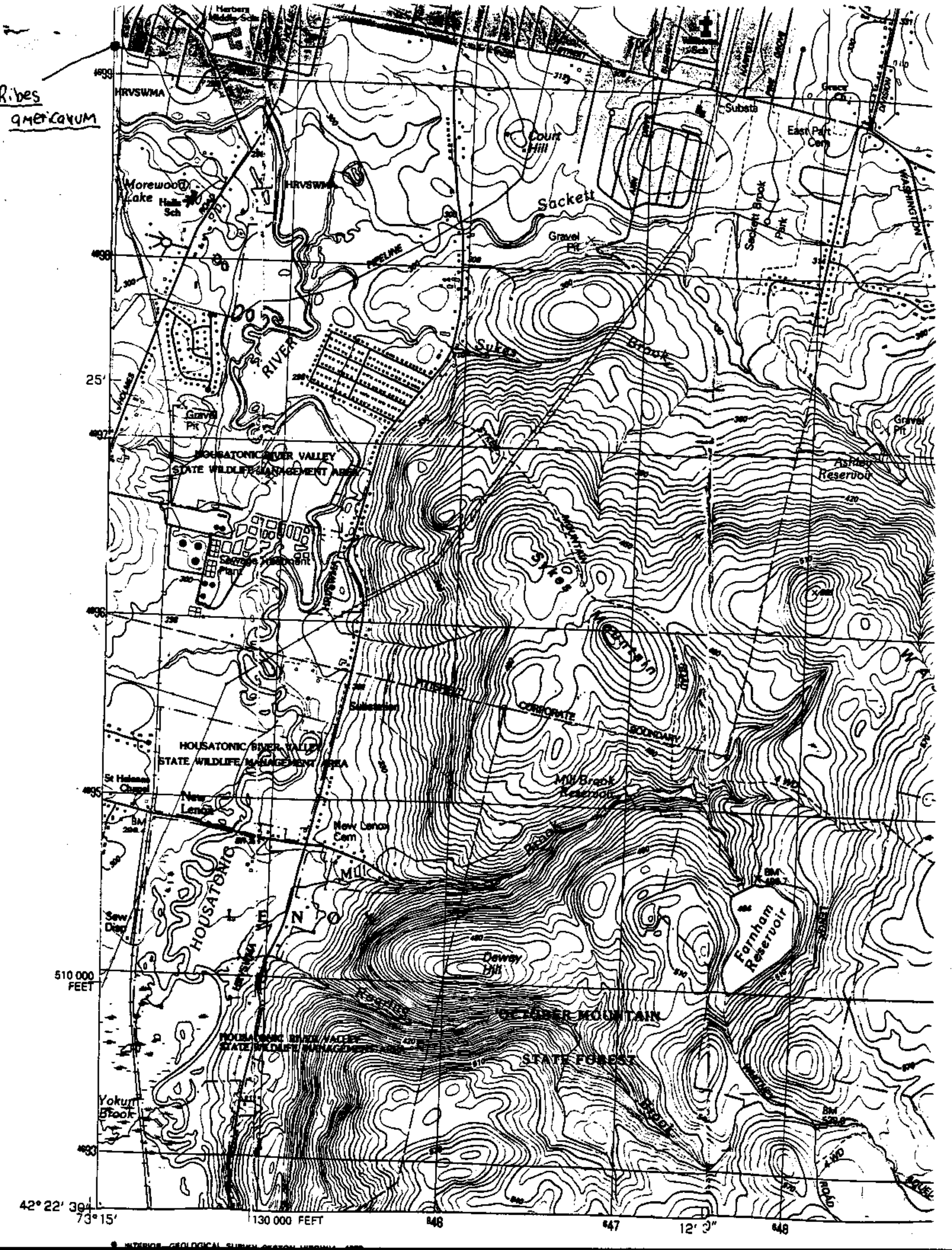
A - Excellent B - Good (C) Marginal D - Poor

Comments: _____

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 9 November 1998



Ribes americanum
HRVSWMA
Court Hill
Substa
East Part Cem
Grace Ch
Morewood Lake
Halls Sch
Sackett
Gravel Pit
Sackett Brook Park
WASHINGTON
PIPELINE
RIVER
Sykes Brook
Gravel Pit
Ashley Reservoir
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes Mountain
CORPORATE BOUNDARY
Substation
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
Mill Brook Reservoir
New Lenox Cem
Mill Brook
HOUSATONIC
L E N O X
Farnham Reservoir
Sew Disp
Dewey Hill
OCTOBER MOUNTAIN STATE FOREST
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Roaring Brook
Yokun Brook
25′
510 000 FEET
42° 22′ 30″
73° 15′
130 000 FEET
12′ 30″

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at
Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Ribes americanum

NHESP Element Occurrence Number (if known):

Observation Date(s): 3 September 1998

USGS Quad Name and Series (7.5"x7.5" or 7.5"x15"): East Lee (1:25,000)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): West of large backwater from Housatonic River, 2.0 KM north of Lenox Station at Woods Pond; East of RR 20 Meters (N 4692100 – E 0644522)

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Growing in a Red Maple-Black Ash Swamp with occasional, small Quercus macrocarpa. Understory plants include Carex bromoides, Symphyotrichum puniceum, Spiraea alba, Eupatorium maculatum, Hamamelis virginiana, and Vaccinium corymbosum. Railroad and Powerline Clearing Pass through community to west.

Areal Distribution, Numbers, Phenology

Population found: ____ No. of mature plants: 6
not found: ____ No. of immature plants: ____
Presumed extirpated: ____ No. of plants age unknown: ____
(give reasons under "Comments")

Population area: 3 X 5 meters

Percent of population in leaf: 100 bud: ____ flower: ____
with immature fruit: ____ mature fruit: ____ senescent: ____

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently healthy

Evidence of expansion or decline: None

Have you observed this species at this site in previous years? Please give details: NO

Site Physiography

Elevation: 294 m

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ___	0-20 X	open ____	inundated ____
upper slope ____	E ___	20-45 ____	filtered ____	wet X
mid slope ____	S ___	45-75 ____	shade X	mesic ____
lower slope ____	W ___	vert ____		dry ____
bottom X	Flat X			xeric ____

Soil types: unknown

Surficial rock types (with percent of ground covered): none

Bedrock/parent material: unknown

Surficial water (distance away): 10 meters Source: small pools and lowareas in swamp

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: Housatonic River Valley SWMA Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc. 122 Main St., #3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: NEBC, Harvard Herbaria

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the virality and vigor of the individuals.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: few individuals

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent (B) - Good C - Marginal D - Poor

Comments: Community relatively pristine on interior; exotic species minimal

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent (B) - Good C - Marginal D - Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Water level rise at Woods Pond will change hydrology of site; Proximity to RR

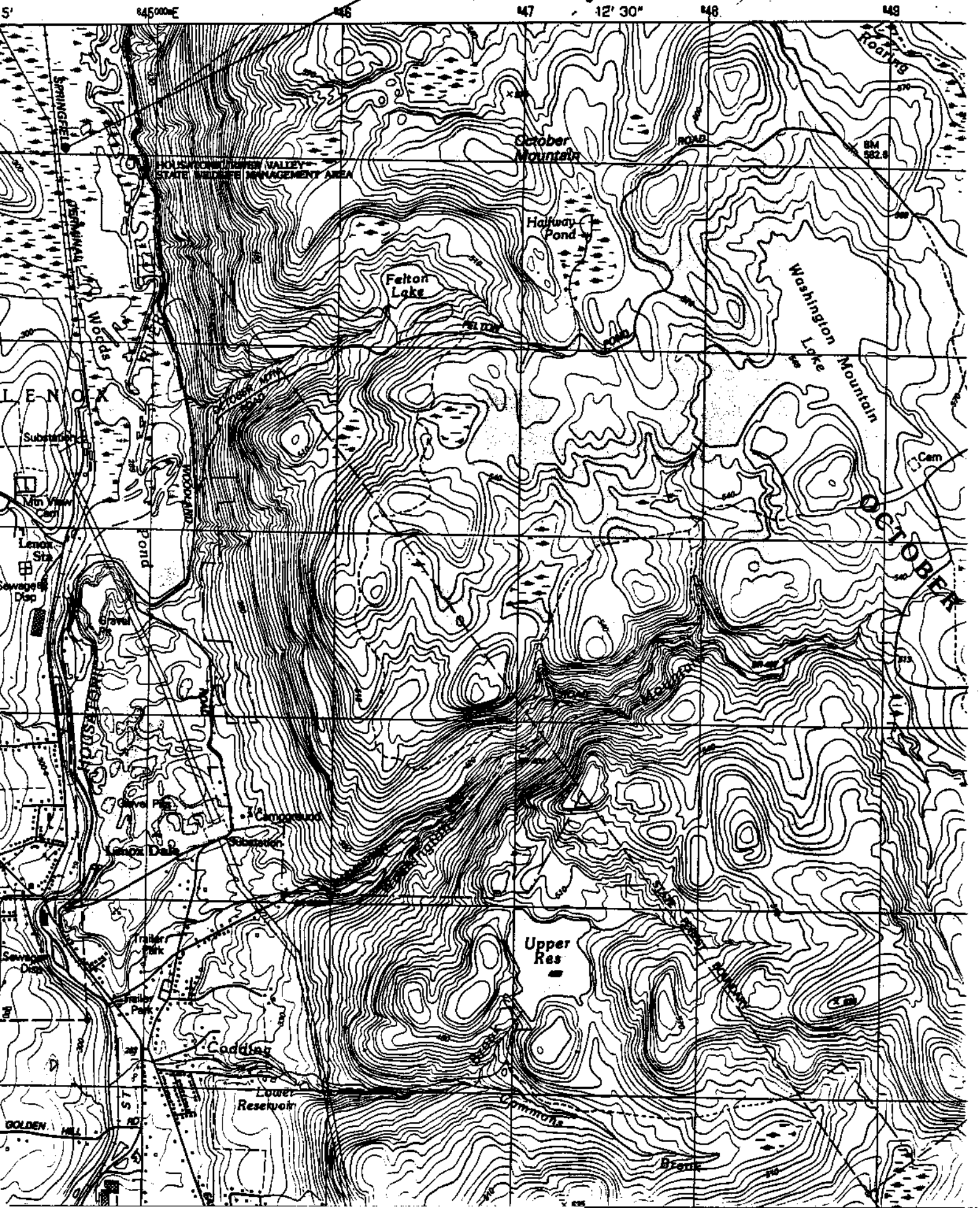
EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 9 November 1998

Ribes americanum

EAST LEE, MASSACHUSETTS



Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Ribes americanum

NHESP Element Occurrence Number (if known):

Observation Date(s): 16 October 1998

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")):

County: Berkshire Town: Pitts field

Directions to location of observations (please attach USGS map): South of the Holmes road crossing of the Housatonic River, west side of River, in Alluvial floodplain 5 meters from rivers edge, ca. 150 meters upstream of prominent east bend in River. (N.4698750 - E0644820)

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Alluvial flood plain of Housatonic River, in a narrow strip of rivershore forest adjacent to a cleared and mowed strip. Growing with Matteuccia struthiopteris, Cornus sericea, Rhamnus cathartica, Rubus idaeus, Acer negundo, and Solidago altissima.

Areal Distribution, Numbers, Phenology

Population found: X
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: 40
No. of immature plants:
No. of plants age unknown:

Population area: 5 X 5 meters

Percent of population in leaf: 100 bud: flower:
with immature fruit: mature fruit: senescent:

Observations of floral visitors, fruit dispersers: none observed

Vigor of individuals and population: Apparently healthy

Evidence of expansion or decline: none

Have you observed this species at this site in previous years? Please give details: no

Site Physiography

Elevation: 215 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ____	0-20 X	open ____	inundated ____
upper slope ____	E ____	20-45 ____	filtered X	wet ____
mid slope ____	S ____	45-75 ____	shade ____	mesic X
lower slope ____	W ____	vert. ____		dry ____
bottom X	Flat X			xeric ____

Soil types: Alluvial silt

Surficial rock types (with percent of ground covered): none

Bedrock/parent material: unknown

Surficial water (distance away): 5 meters Source: Housatonic River

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: Audubon Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc. 122 Main St., #3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: NEBC, Harvard Herbaria

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the virality and vigor of the individuals.)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Large number of individuals relative to other stations on the Housatonic River

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent B - Good C - Marginal (D) - Poor

Comments: Previously cleared and no longer a floodplain forest

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent B - Good (C) - Marginal D - Poor

Comments: Many plants, but succeptible to destruction if trail widened.

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 9 November 1998

Ribes americanum

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Ribes americanum

NHESP Element Occurrence Number (if known):

Observation Date(s): 21 and 22 September 1998

USGS Quad Name and Series (7.5"x7.5" or 7.5"x15"): Pittsfield East (1:25,000)

County: Berkshire Town: Pittsfield

Directions to location of observations (please attach USGS map): (N 4698074 - E 0644940) west side of Housatonic River, south of Holmes Road crossing 750 meters, at edge of floodplain forest and nettle dominated open areas.

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Edge of floodplain forest (Acer negundo canopy dominant here), growing with Impatiens capensis, Alliaria petiolata, Laportea canadensis, and Pilea pumila. Open areas (field like) are adjacent to the floodplain forest fragment.

Areal Distribution, Numbers, Phenology

Population found: X
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: ca. 20
No. of immature plants:
No. of plants age unknown:

Population area: 5 X 5 Meters

Percent of population in leaf: 100 bud: flower:
with immature fruit: mature fruit: senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently vigorous

Evidence of expansion or decline: None

Have you observed this species at this site in previous years? Please give details: NO

Site Physiography

Elevation: 295 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ___	0-20 X	open ____	inundated ____
upper slope ____	E ___	20-45 ____	filtered ____	wet ____
mid slope ____	S ___	45-75 ____	shade X	mesic X
lower slope ____	W ___	vert. ____		dry ____
bottom X	Flat X			xeric ____

Soil types: Alluvial

Surficial rock types (with percent of ground covered): none

Bedrock/parent material: unknown

Surficial water (distance away): ca. 100 m Source: Housatonic River

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: Housatonic River Valley State WMA Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc., 122 Main St., #3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: none collected

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the viability and vigor of the individuals.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent B - Good (C) - Marginal D - Poor

Comments: Degraded community, open field areas with exotic plant species

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent (B) - Good C - Marginal D - Poor

Comments: EO exists on State Property

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: _____

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 9 November 1998


Ribes americanum 25′
Herbert Middle Sch
HRVSWMA
Morewood Lake
Halle Sch
Court Hill
Sackett
Sackett Brook
Park
Substa
East Part Cem
WASHINGTON
Gravel Pit
PIPELINE
RIVER
Sukes
Brook
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Ashley Reservoir
Mountain
Substation
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
New Lenox Cem
Mill Brook Reservoir
Mill
HOUSATONIC
L E N O X
Dewey Hill
Farnham Reservoir
510 000 FEET
OCTOBER MOUNTAIN
STATE FOREST
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
ROAD
42° 22′ 30″
73° 15′
130 000 FEET
646
647
12′ 30″
648

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Ribes americanum

NHESP Element Occurrence Number (if known):

Observation Date(s): 15 October 1998

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfied East (1:25,000)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): North of the Yokum Brook confluence 175 meters, on the North side of the river, between 2 Pools of water (that are connected to river, at least during high water), about 20 meters from River Channel. Locatic is on a portion of E-W oriented river just before bend in river to N-S orientation of channel (see map).

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Silver Maple floodplain forest, in understory with Onoclea sensibilis, Geum canadense, Thalictrum pubescens, Cinna latifolia, and Boehmeria cylindrica.

Areal Distribution, Numbers, Phenology

Population found: yes
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: 8
No. of immature plants:
No. of plants age unknown:

Population area: 2 x 1 meters

Percent of population in leaf: 100 bud: flower:
with immature fruit: mature fruit: senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently healthy

Evidence of expansion or decline: None observed

Have you observed this species at this site in previous years? Please give details: No

Site Physiography

Elevation: 294 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ____	0-20 X	open ____	inundated ____
upper slope ____	E ____	20-45 ____	filtered X	wet X (wet-mesic)
mid slope ____	S ____	45-75 ____	shade ____	mesic ____
lower slope ____	W ____	vert. ____		dry ____
bottom X	Flat X			xeric ____

Soil types: Alluvial Silt

Surficial rock types (with percent of ground covered): none

Bedrock/parent material: unknown

Surficial water (distance away): 5 meters Source: backwater pools of Housatonic River

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: Housatonic River Valley-SWMA

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: _____ Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: 122 Main Street, number 3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: NO

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the virality and vigor of the individuals.)

A - Excellent B - Good (C) Marginal D - Poor

Comments: few number of individuals

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent (B) - Good C - Marginal D - Poor

Comments: relatively pristine

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent (B) - Good C - Marginal D - Poor

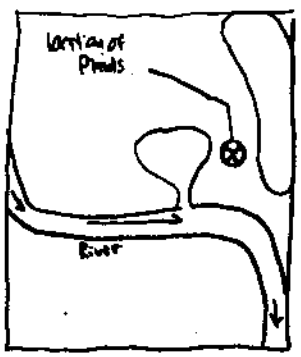
Comments: Site on State-owned property

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 4 December 1998

Detail of Area



Ribes americanum

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Ribes americanum

NHESP Element Occurrence Number (if known):

Observation Date(s): 15 October 1998

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East (1:25,000)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): Alluvial forest west of the Housatonic River 20 meters, below confluence with Yokum Brook, downstream of Small Island with Wood duck Box on downstream end. (Approximate UTM: N 4693250 - 0644400)

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Hardwood floodplain forest with Acer rubrum, Fraxinus, and Quercus macrocarpa in the overstory and Cornus amomum, Cinna latifolia, Solidago rugosa, and Viburnum deutatum in the understory.

Areal Distribution, Numbers, Phenology

Population found: X
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: 5
No. of immature plants:
No. of plants age unknown:

Population area: 10 x 10 m

Percent of population in leaf: 100 bud: flower:
with immature fruit: mature fruit: senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently healthy

Evidence of expansion or decline: none

Have you observed this species at this site in previous years? Please give details: no

Site Physiography

Elevation: 293 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ____	0-20 X	open ____	inundated ____
upper slope ____	E ____	20-45 ____	filtered ____	wet X
mid slope ____	S ____	45-75 ____	shade X	mesic ____
lower slope ____	W ____	vert ____		dry ____
bottom X	Flat X			xeric ____

Soil types: Alluvial

Surficial rock types (with percent of ground covered): none

Bedrock/parent material: unknown

Surficial water (distance away): 15 meters Source: Housatonic River

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: Housatonic River Valley State WMA Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc. 122 Main St., #3 Topsham, ME 04086

Plant ID by: _____

Specimen # & Herbarium: _____

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent (B) - Good C - Marginal D - Poor

Comments: _____

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent B - Good C - Marginal (D) - Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

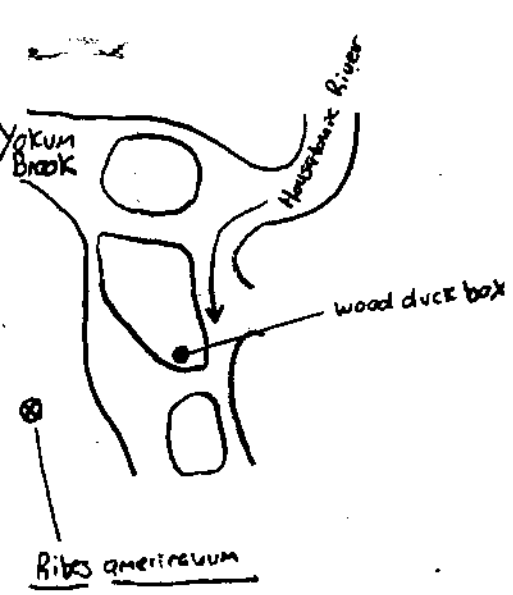
A - Excellent B - Good (C) - Marginal D - Poor

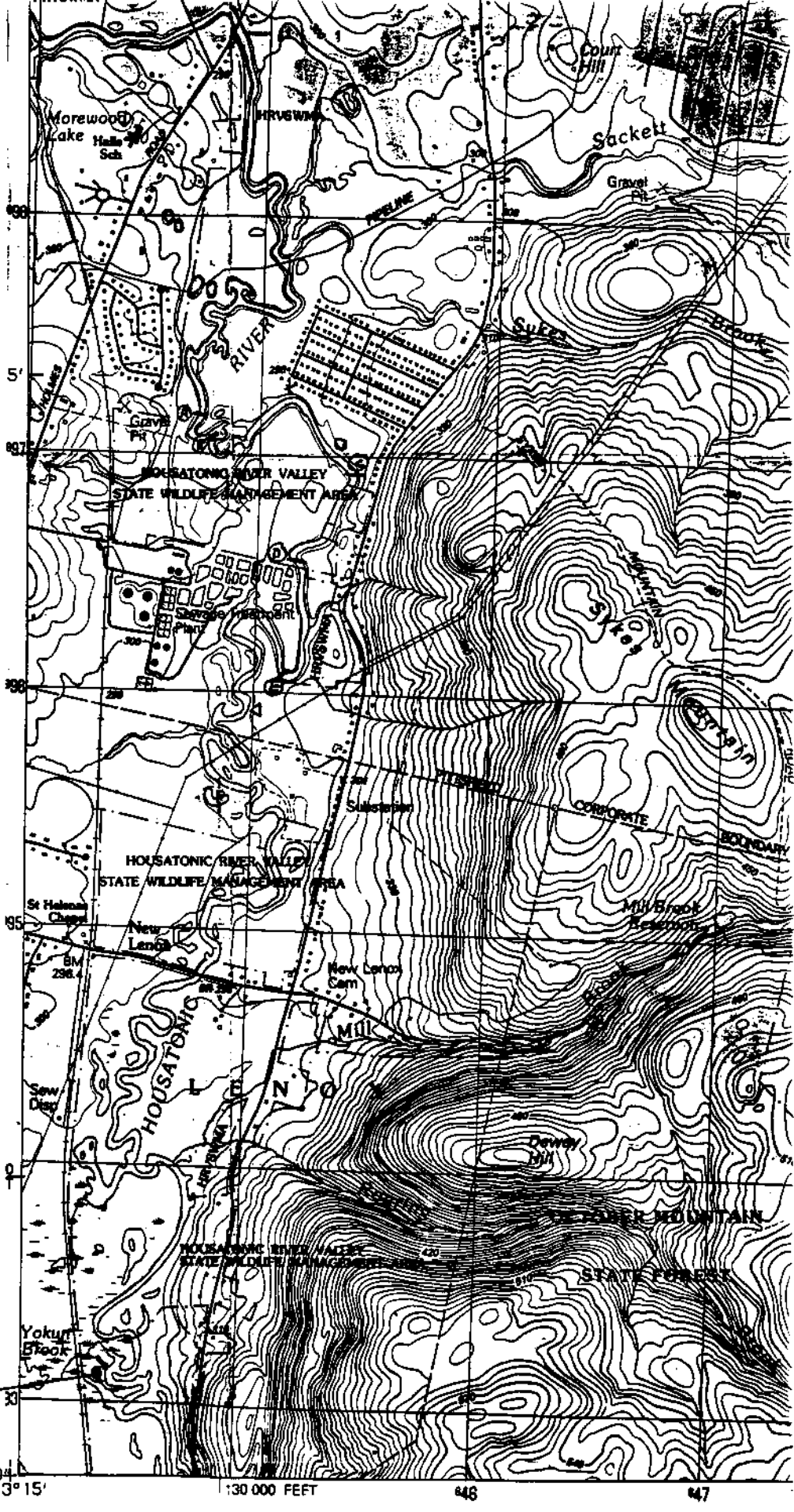
Comments: _____

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 9 November 1998





Ribes americanum

• INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1986

MILES 1

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Ribes americanum

NHESP Element Occurrence Number (if known):

Observation Date(s): 27 August and 9 September 1998

USGS Quad Name and Series (7.5"x7.5" or (15"x15")): East Lee (1:25,000)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): 2.6 km north of the Lenox Station at Woods Pond, west of Housatonic River and East of RR tracks, circa 50 m west of backwater Area of Housatonic River (N 4692800 - E 0644580)

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Bur Oak floodplain forest, growing with Onoclea sensibilis, Helenium autumnale, Quercus Macrocarpa, and Prunus virginiana. Area has some large Quercus Macrocarpa (up to 81cm dbH). Ribes americanum is near transition to Silver Maple floodplain forest to east.

Areal Distribution, Numbers, Phenology

Population found:
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: 1 (2 stems)
No. of immature plants:
No. of plants age unknown:

Population area: 0.5 x 0.5 meters

Percent of population in leaf: 100 bud: flower:
with immature fruit: mature fruit: senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently vigorous

Evidence of expansion or decline: none

Have you observed this species at this site in previous years? Please give details: No

Site Physiography

Elevation: 294 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ___	N ___	0-20 X	open ___	inundated ___
upper slope ___	E ___	20-45 ___	filtered ___	wet ___
mid slope ___	S ___	45-75 ___	shade ___	mesic X
lower slope ___	W ___	vert. ___		dry ___
bottom X	Flat X			xeric ___

Soil types: Alluvial

Surficial rock types (with percent of ground covered): none

Bedrock/parent material: unknown

Surficial water (distance away): 50 m Source: Housatonic River

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: Housatonic River Valley State WMA Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc., 122 Main St., #3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: none collected

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.)

A - Excellent B - Good C - Marginal (D) Poor

Comments: One plant only

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent (B) Good C - Marginal D - Poor

Comments: _____

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent B - Good C - Marginal (D) Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent B - Good (C) Marginal D - Poor

Comments: Rise in water level at Woods Pond will affect hydrology of site

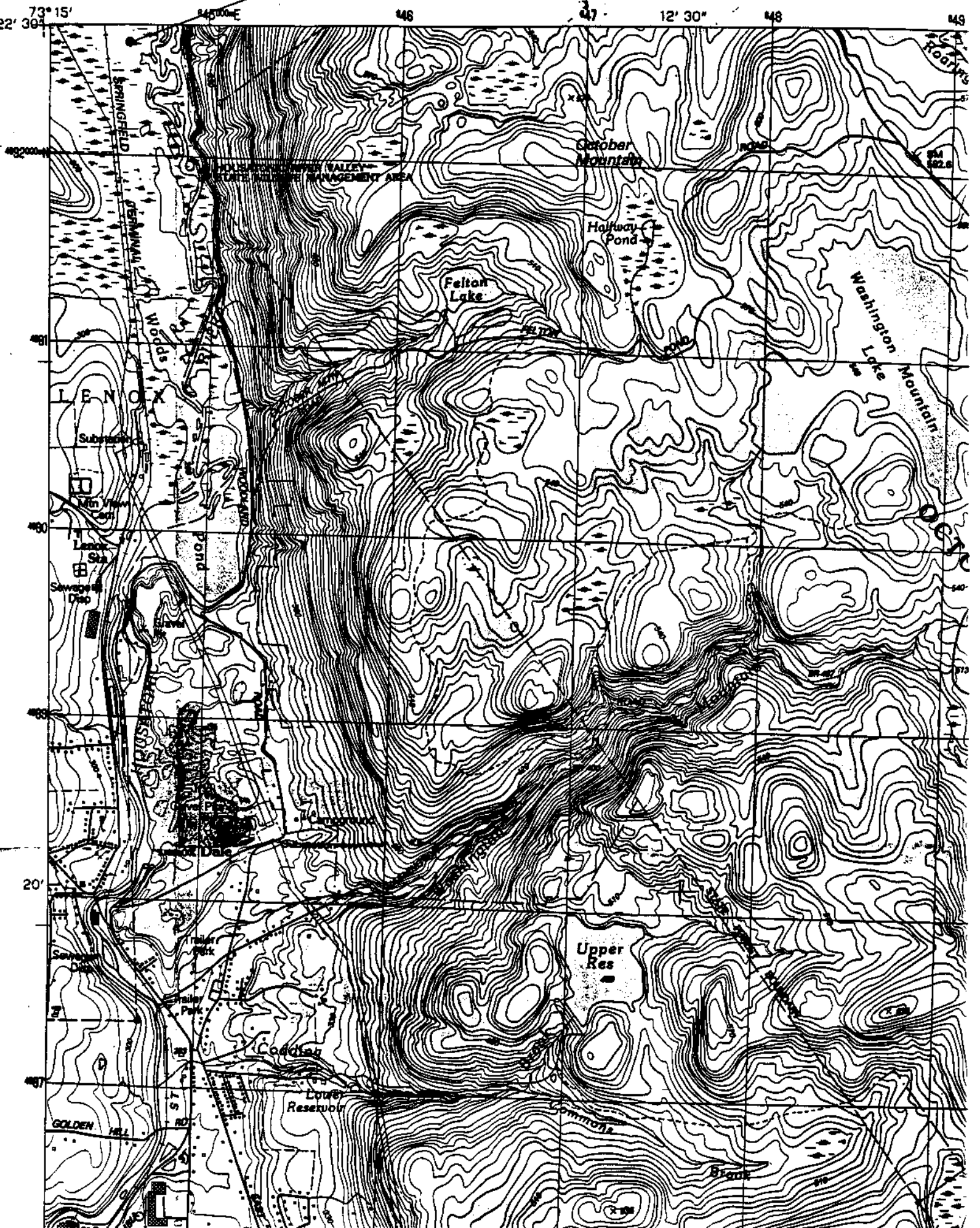
EO RANK: (A summary of all factors listed above.) A - Excellent B - Good C - Marginal (D) Poor

Comments: _____

Signature: Arthur Haines Date: 9 November 1998

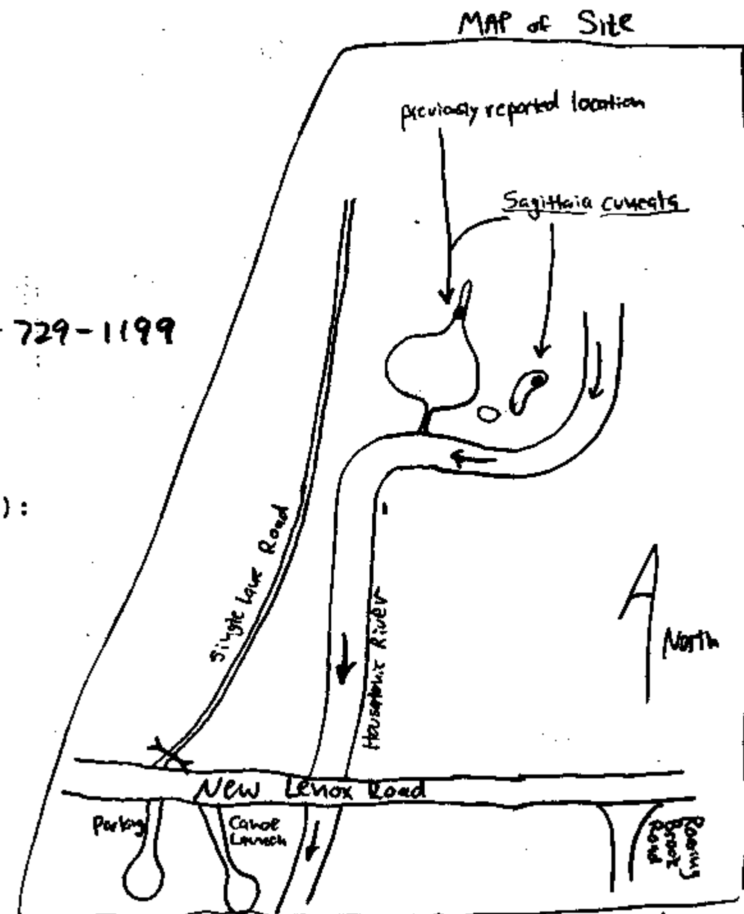
Ribes americanum

EAST LEE, MASSACHUSETTS



Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM



OBSERVER INFORMATION

Observer's Name, Address, and Phone:

Arthur Haines
Woodlot Alternatives, Inc.
122 Main Street, Number 3
Topsham, ME 04086
207-729-1199

Species Scientific Name:

Sagittaria cuneata

NHESP Element Occurrence Number (if known):

Observation Date:

25 June 1999

Today's Date:

28 July 1999

LOCATIONAL INFORMATION

a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): East Lee (1:25,000 scale)

County: Berkshire

Town: Lenox

b) Directions to location of observations (please attach USGS map):

Upstream of New Lenox Road in a vernal Pool 25 meters north of Housatonic River. Pool is located near a prominent E-W section of river. See Map of site on this page.

Approximate UTM coordinates: 4695150N - 0644910E

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)

Mud of a vernal pool (has drawn down since spring flood stage) in a Hardwood floodplain forest daminated by Acer Saccharinum. Associates include Persicaria hydropiperoides, Sagittaria latifolia, Eleocharis aciculars, Lythrum Salicaria, and Alisma triveale.

POPULATION INFORMATION:

Population found? (Y/N): Y

If No, is population presumed extirpated and why?

If Yes,

Number of mature plants: 1

Number of immature plants: 15

Number of plants age unknown:

Population area (give unit of measurement):

3 x 2 meters

Percent of population:

in leaf: 94%

in bud:

in flower: 6%

with immature fruit:

mature fruit:

senescent:

Observations of floral visitors, fruit dispersers:

None observed

Vigor of individuals and population:

apparently vigorous

Evidence of expansion or decline:

none observed

Have you observed this species at this site in previous years?

Please give details:

NO

SITE PHYSIOGRAPHY

Elevation:

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

Aspect (north, south, east, west, flat?):

Slope (0-20 degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light (open, filtered, shade?):

Moisture (inundated, wet, mesic, dry, xeric?):
spring summer

Soil types: silt/mud

Surficial rock types (with percent of ground covered):

none

Bedrock/parent material:

Surficial water (distance away and source):

25 meters, Housatonic River and Adjacent Vernal Pools

MANAGEMENT/OWNERSHIP: unknown

MNHESP Site Name (if any):

Managed Area (if any):

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:

- Lythrum Salicaria or Persicaria hydropiperoides occupying site at densities to exclude Sagittaria cuneata. Control may be beneficial.

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY

(Circle one choice in each category)

EO Quality

How representative is this occurrence? Consider the size and

productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

Small population.

EO Condition

Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent (B) - Good C - Marginal D - Poor

Comments:
Area has been cleared in recent past (as evidenced by nearby clearings and Crataegus punctata) but is now a mature floodplain forest dominated by silver maple.

EO Viability

What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Small population threatened by Persicaria hydropiperoides and possibly Lythrum salicaria.

EO Defensibility

Can this occurrence be protected from extrinsic human factors?

A - Excellent (B) - Good C - Marginal D - Poor

Comments:

EO RANK

A summary of all factors listed above.

A - Excellent B - Good (C) Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any)

Located in close proximity (approximately 60 meters) to another small population of Sagittaria cuneata, Colonies are in separate vernal pools, but might be considered the same station. No specimens or photographs were collected/taken for this Element Occurrance.

CERTIFICATION

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Arthur Haines

Date: 28 July 1999

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

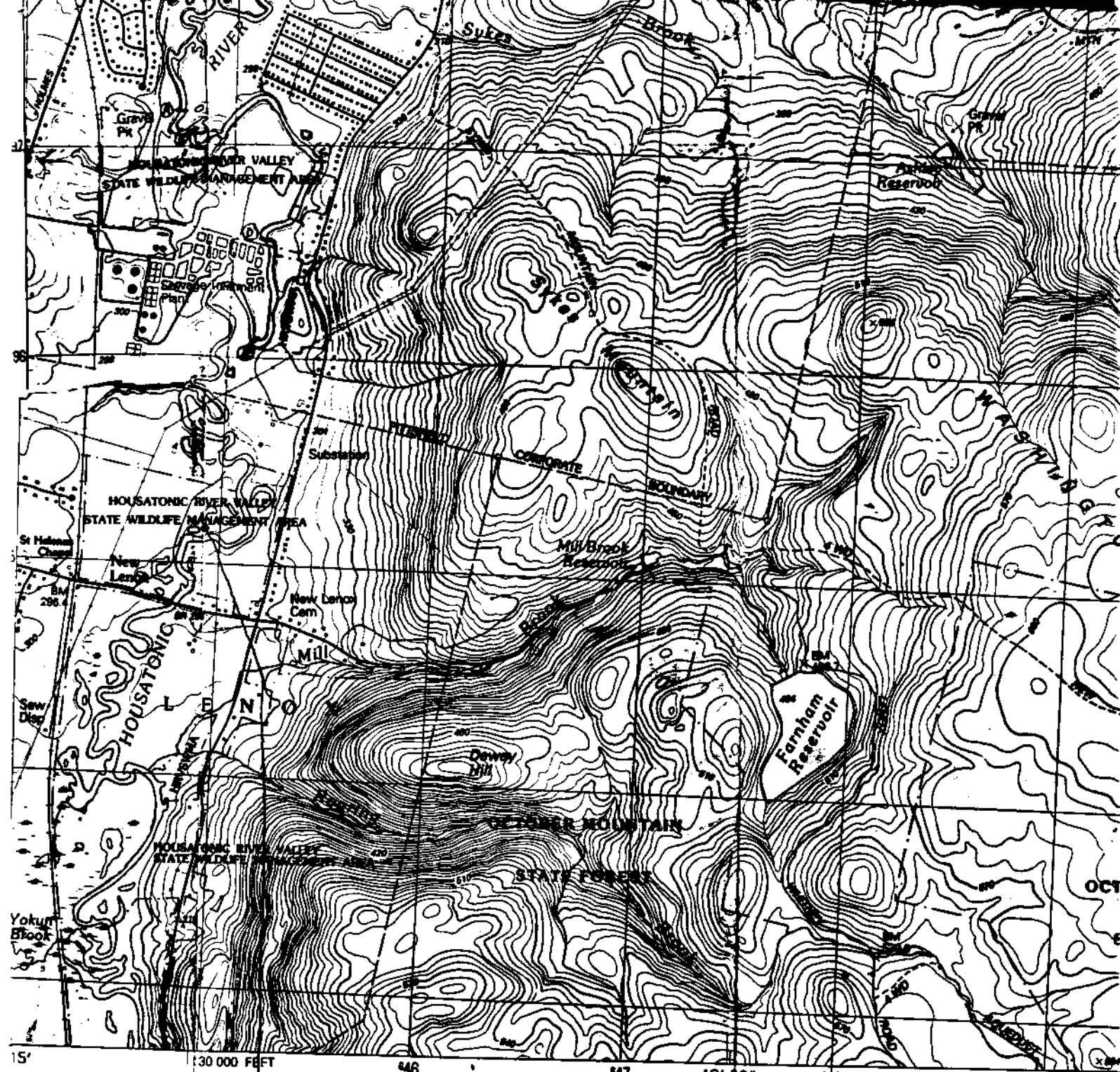
Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife

Route 135

Westborough, MA 01581

(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.



Sagittaria cuneata

Pittsfield East
(1:25,000)

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Sagittaria cuneata

NHESP Element Occurrence Number (if known):

Observation Date(s): 26 August 1998

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East (1:25,000)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): Upstream of New Lenox Road 325 meters, on North side of River, near Prominent 90° bend in River, is a small, emergent marsh in a backwater pool. On the North side of the Pool is a Shaded Channel. Sagittaria cuneata is growing in this silt/muck Channel.

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Community Surrounding backwater Pool is a floodplain forest (Silver maple - false nettle - sensitive fern association). It is largely Silver maple dominated, with some Salix nigra near south edge of Pool. The Pool is surrounded by emergent marsh vegetation (Scirpus cyperinus, Lythum salicaria, Dulichium arundinaceum, Sparganium americanum, Pontederia cordata). Sagittaria latifolia is common in area and mixed with Sagittaria cuneata.

Areal Distribution, Numbers, Phenology

Population found: yes
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: ca. 40
No. of immature plants:
No. of plants age unknown:

Population area: 5 x 5 meters

Percent of population in leaf: 90% bud: flower:
with immature fruit: mature fruit: 10% senescent:

Observations of floral visitors, fruit dispersers: none observed

Vigor of individuals and population: Apparently healthy

Evidence of expansion or decline: none observed

Have you observed this species at this site in previous years? Please give details: no

Site Physiography

Elevation: 294 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ___	N ___	0-20 X	open ___	inundated ___ ← during high water events
upper slope ___	E ___	20-45 ___	filtered X	wet X
mid slope ___	S ___	45-75 ___	shade ___	mesic ___
lower slope ___	W ___	vert. ___		dry ___
bottom X	Flat X			xeric ___

Soil types: wet silt/muck

Surficial rock types (with percent of ground covered): none

Bedrock/parent material: none

Surficial water (distance away): 5 meters Source: emergent marsh in backwater pool

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: Housatonic River Valley State Wildlife Management Area

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: _____ Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: 122 Main St., Number 3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: Harvard Herbaria (NEBC)

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the virality and vigor of the individuals.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent (B) - Good C - Marginal D - Poor

Comments: Relatively intact, a powerline ROW is nearby.

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent (B) - Good C - Marginal D - Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: State-owned property

EO RANK: (A summary of all factors listed above.) A - Excellent (B) - Good C - Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 21 December 1998

Close up of site

Natural Heritage & Endangered Species Program

MA Division of Fisheries & Widllife

Route 135, Westborough, MA 01581

(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION

Observer's Name, Address, and Phone:

Arthur Haines
Woodlot Alternatives, Inc. 207-729-1199
122 Main Street, Number 3
Topsham, ME 04086

Species Scientific Name:

Sagittaria cuneata

NHESP Element Occurrence Number (if known):

Observation Date:

4 August 1999

Today's Date:

8 November 1999

LOCATIONAL INFORMATION

a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): East Lee

County: Berkshire

Town: Lenox

b) Directions to location of observations (please attach USGS map):

From Rock-lined parking lot in field at the end of the Willow Creek Road, travel over bank to RR (east). Population lies +/- 10 meters east of RR, and in an east line from parking lot area, in a small depression, North of Lenox Station, South of Willow-Creek Bridge. Approximate UTM Coordinates - 4690650 N - 0644665

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)

Circumneutral hardwood swamp, in small, wet, vernally flooded depression. Growing with Alisma triveale, Lythrum Salicaria, Lysimachia nummularia, Onoclea sensibilis, Boehmeria cylindrica, and Lycopus uniflorus. Acer rubrum is dominant overstory tree.

POPULATION INFORMATION:

Population found? (Y)N):

If No, is population presumed extirpated and why?

If Yes,

Number of mature plants: 12

Number of immature plants: 0

Number of plants age unknown:

Population area (give unit of measurement):

2 x 1.5 Meters

Percent of population:

in leaf: 66%

in bud:

in flower: 25%

with immature fruit:

mature fruit: 0.98%

senescent:

Observations of floral visitors, fruit dispersers:

None observed

Vigor of individuals and population:

Apparently vigorous.

Evidence of expansion or decline:

none observed.

Have you observed this species at this site in previous years?

Please give details:

no, first discovery

SITE PHYSIOGRAPHY

Elevation: +/- 290 meters

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

flat plain of river valley

Aspect (north, south, east, west, flat?):

Flat

Slope (0-20 degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light (open, filtered, shade?):

Moisture (inundated, wet, mesic, dry, xeric?):

Soil types: wet silt/muck

Surficial rock types (with percent of ground covered):

none

Bedrock/parent material:

Unknown

Surficial water (distance away and source):

Housatonic River, ca. 50 meters

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any):

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:

Changes in Hydrology, large-scale disturbances due to RR.

Land Owner's Name, Address, and Phone:

Land likely belongs to owners of Springfield Terminal Railroad.

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY

(Circle one choice in each category)

EO Quality

How representative is this occurrence? Consider the size and

productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good (C) - Marginal D - Poor

Comments:
Small population area and low numbers

EO Condition

Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent (B -) Good C - Marginal D - Poor

Comments: Though occurence is rebtively close to RR line.

EO Viability

What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C) - Marginal D - Poor

Comments:

EO Defensibility

Can this occurrence be protected from extrinsic human factors?

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Likely property is privately owned.

EO RANK

A summary of all factors listed above.

A - Excellent B - Good (C) - Marginal D - Poor

Comments: This, like most of the Housatonic River populations, are small, isolated colonies confined to a single depression or backwater pool shoreline.

ADDITIONAL COMMENTS (if any)

CERTIFICATION

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Anita Haines

Date: 8 November 1999

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

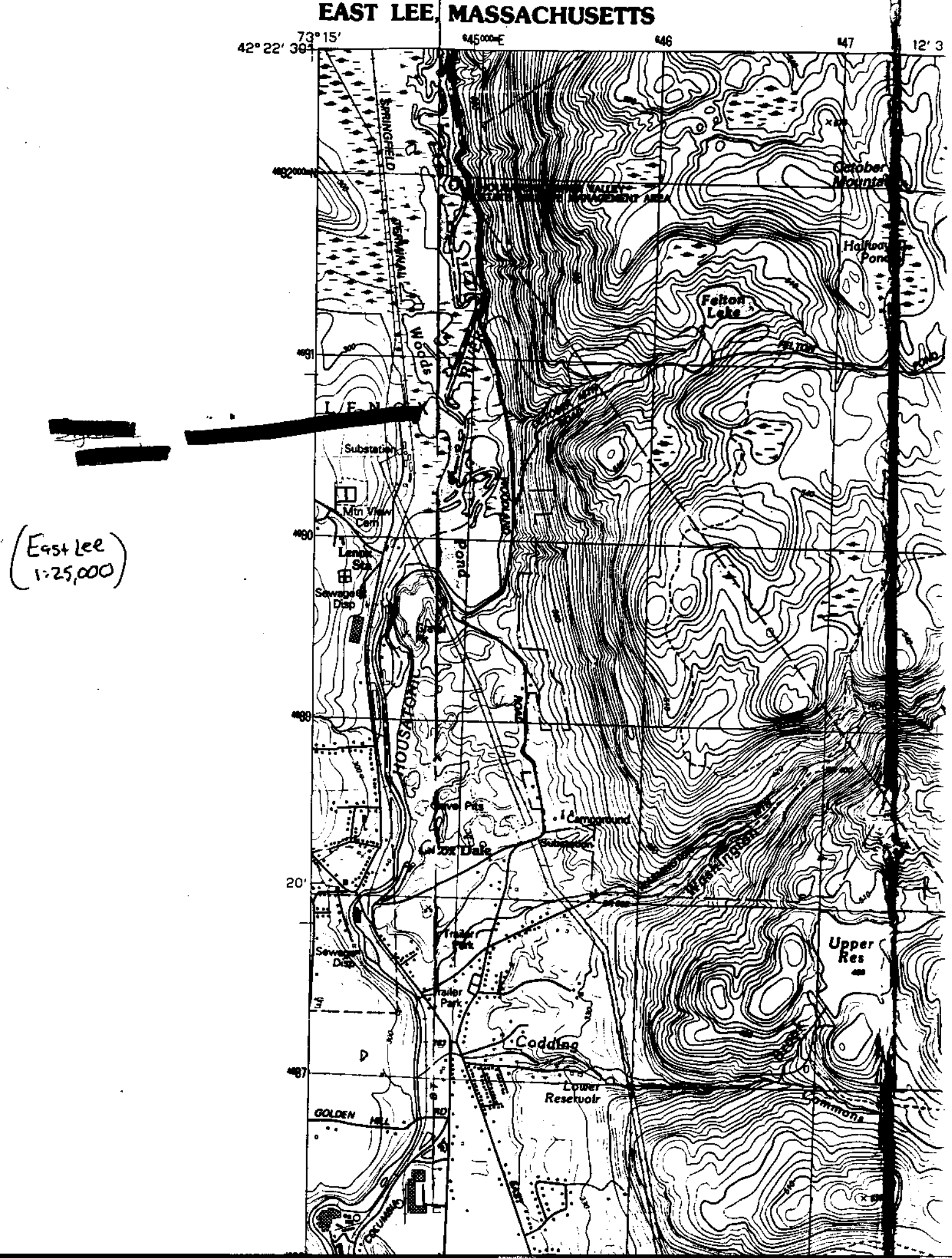
Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife

Route 135

Westborough, MA 01581

(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.



(East Lee
1:25,000)

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Salix candida

NHESP Element Occurrence Number (if known):

Observation Date(s): 8 September 2000

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East (1:25,000)

County: Berkshire Town: Hinsdale

Directions to location of observations (please attach USGS map): At the northwest end of Muddy Pond, 9 meters from RR embankment and 25 meters north of pond margin in a open marsh.

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Calcareous seepage marsh with high organic matter content and shallow standing water (ca. 1 cm) in low areas. Associated with Schoenoplectus x oblongus (hybrid of S. acutus and S. tabernaemontani), Carex lasiocarpa, Carex utriculata, Comarum palustre, Myrica gale, Salix discolor, Salix bebbiana, and limited peatphyllaides floribunda. Site has likely been impacted by railroad construction as wetland has been bisected.

Areal Distribution, Numbers, Phenology

Population found: yes
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: 110 upright stems (perhaps one or few plants)
No. of immature plants:
No. of plants age unknown:

Population area: 3 x 3 meters

Percent of population in leaf: 97% bud: flower:
with immature fruit: mature fruit: 4 stems = 3% senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently healthy — lepidopteran larvae seen on plants but no evidence of defoliation.

Evidence of expansion or decline: None observed

Have you observed this species at this site in previous years? Please give details: NO

Site Physiography

Elevation: 440 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ___	0-20 X	open X	inundated X
upper slope ____	E ___	20-45 ____	filtered ____	wet ____
mid slope ____	S ___	45-75 ____	shade ____	mesic ____
lower slope ____	W ___	vert. ____		dry ____
bottom X	Flat X			xeric ____

Soil types: high organic matter content.

Surficial rock types (with percent of ground covered): none in immediate area.

Bedrock/parent material: unknown

Surficial water (distance away): 25 meters Source: Muddy Pond

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: Hinsdale Flats State WMA.

Comments/Management recommendations: Contact rail line company to ensure plants are not disturbed by RR Maintenance or stockpiling of materials.

Disturbance or threats (natural or unnatural) to population: Railroad maintenance,

Owner's Name: Commonwealth of Massachusetts Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc., 122 Main Street, Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: Harvard University Herbaria

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Small population

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent B - Good (C) Marginal D - Poor

Comments: Majority of habitat intact, railroad embankment close to EO

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent (B) - Good C - Marginal D - Poor

Comments: Located in out-of-way area and likely able to utilize vegetative reproduction.

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

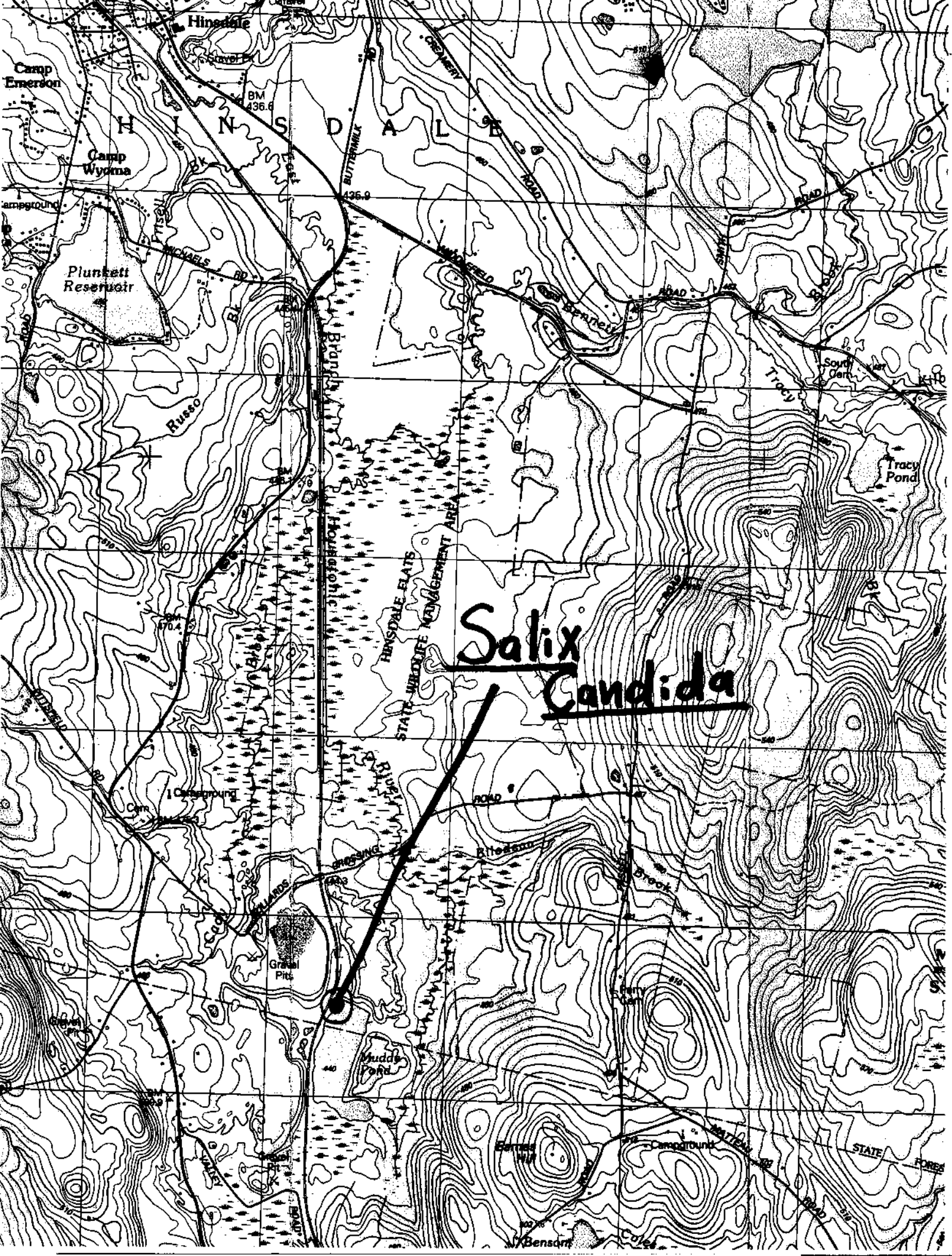
A - Excellent (B) - Good C - Marginal D - Poor

Comments: Public ownership of property

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 4 January 2000


Salix
Candida

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION

Observer's Name, Address, and Phone:

Arthur Haines
Woodlot Alternatives, Inc.
122 Main Street, Number 3
Topsham, ME 04086 207-729-1199

Species Scientific Name:

Salix serrissima

NHESP Element Occurrence Number (if known):

Observation Date: 28 June 1999

Today's Date: 2 December 1999

LOCATIONAL INFORMATION

a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Great Barrington, 1:25,000
County: Berkshire
Town: Sheffield

b) Directions to location of observations (please attach USGS map):

Drive to the end of the Brush Hill Road (past Threemile Pond) to a gate. Walk through gate and along a single-lane gravel road ca. 100 meters and turn right (east) and walk out into circumneutral meadow. Salix serrissima is scattered thruout rich areas of meadow.

Approximate UTM — 4667925 N X 0640810 E

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)

Circumneutral Meadow, growing with Salix discolor, pentaphylloides floribunda, Parnassia glauca, Carex flava, Carex conoidea, Carex retrorsa, Doellingeria umbellata, Eriophorum viride carinatum, Geum rivale, and Muhlenbergia glomerata. Due to Agricultural use of adjoining fields species like Lolium pratense, Rudbeckia hirta var. pulcherrima, Trifolium pratense, Anthoxanthum odoratum, and Galium Mollugo are invading meadow.

POPULATION INFORMATION:

Population found? (Y/N): Y

If No, is population presumed extirpated and why?

If Yes,

Number of mature plants: ca. 50

Number of immature plants:

Number of plants age unknown:

Population area (give unit of measurement):

50 x 20 meters

Percent of population:

in leaf: 60%

in bud:

in flower:

with immature fruit:

mature fruit: 40%

senescent:

Observations of floral visitors, fruit dispersers:

None observed (past flowering, fruits wind dispersed)

Vigor of individuals and population:

Vigorous

Evidence of expansion or decline:

none observed

Have you observed this species at this site in previous years?

Please give details: NO

SITE PHYSIOGRAPHY

Elevation: 285 meters

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

Aspect (north, south, east, west, flat?):

Slope (0-20 degrees, 20-45 degrees, 45-75 degrees, vertical?):

Light (open, filtered, shade?):

Moisture (inundated, wet, mesic, dry, xeric?):

Soil types: Mineral soil overlain by organic

Surficial rock types (with percent of ground covered):

none observed

Bedrock/parent material:

unknown

Surficial water (distance away and source):

25 meters — Marshes continuous with the north end of Threemile Pond

MANAGEMENT/OWNERSHIP: unknown

MNHESP Site Name (if any):

Managed Area (if any):

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:

Mowing of field to remove woody plants

Land Owner's Name, Address, and Phone: unknown

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY

(Circle one choice in each category)

EO Quality

How representative is this occurrence? Consider the size and

productivity of the population and the vitality and vigor of the individuals.

A - Excellent (B - Good) C - Marginal D - Poor

Comments: Moderate sized population

EO Condition

Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good (C - Marginal) D - Poor

Comments: Exotic herbs present in meadow, surrounding land use indicates Agriculture and provides a source of non-native propagules.

EO Viability

What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent (B - Good) C - Marginal D - Poor

Comments: If meadow is not cleared in future and other woody competitors are excluded — If these conditions are not met EO viability rank may be lower.

EO Defensibility

Can this occurrence be protected from extrinsic human factors?

A - Excellent B - Good (C - Marginal) D - Poor

Comments:

EO RANK

A summary of all factors listed above.

A - Excellent (B - Good) C - Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any) It is unknown how long Circumneutral Meadow has existed. Both agricultural clearing and earth dike at Southern end of Threemile Pond (raised water level) may have contributed to creation of meadow and neighboring Circumneutral Shrub Swamp.

CERTIFICATION

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Anita Haines

Date: 2 December 1999

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

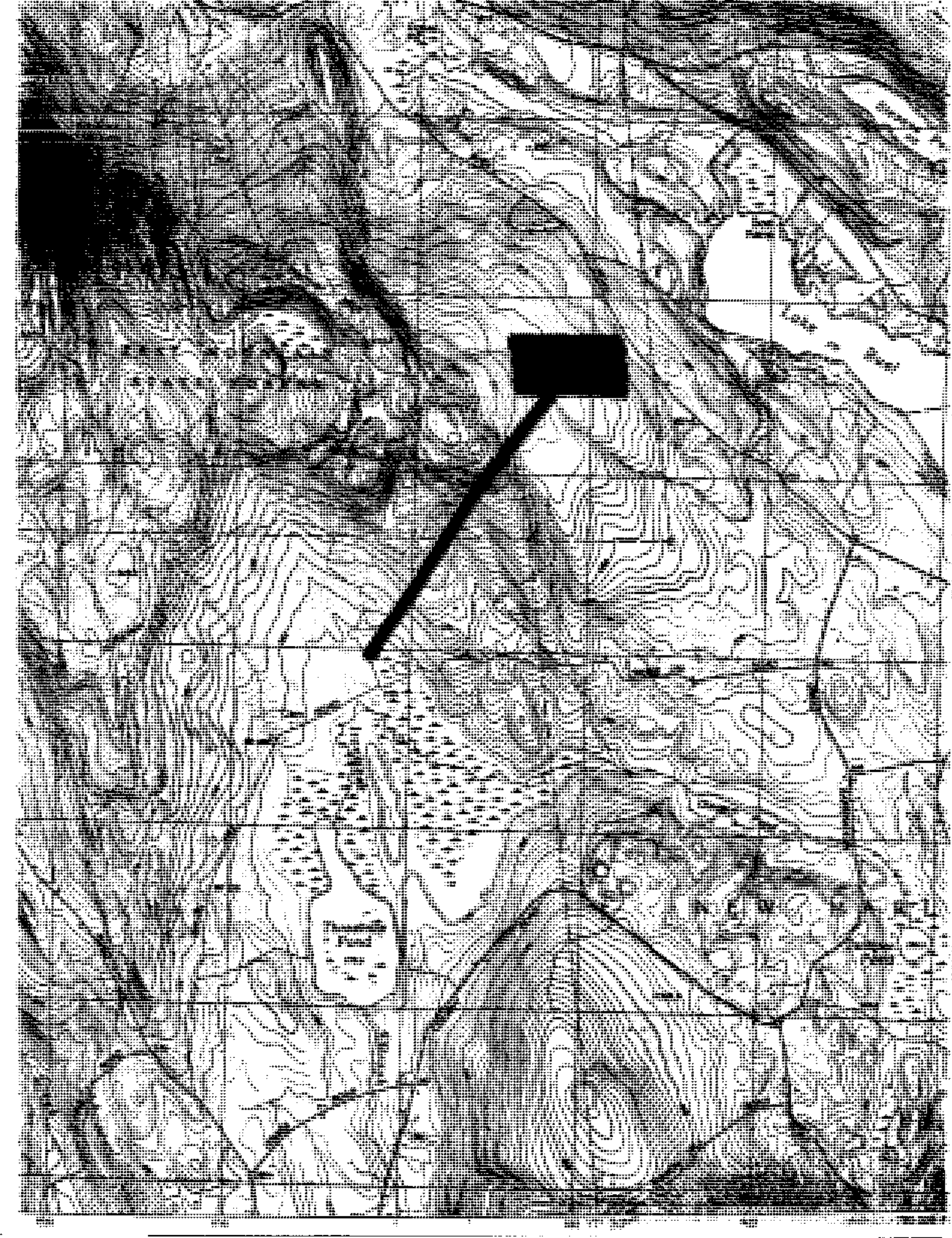
Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife

Route 135

Westborough, MA 01581

(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.



Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Saxicula odorata

NHESP Element Occurrence Number (if known):

Observation Date(s): 6 June 2000

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): East Lee (1:25,000)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): From Housatonic Street follow the Willow Creek Road north, beyond the gravel parking lot, and out onto the old railroad grade. The railroad line (now without tracks) can be followed north, past a small bridge over Willow Creek, and beyond the large emergent marsh and forested swamp complex. The plants are located along the edge of the road beyond the fenced gate across the path/mast of west side of road).

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Plants occur in herb dominated swath along edge of old railroad line. Forest in area is a mixed conifer-hardwood forest with a high proportion of Tsuga canadensis. Phyma leptostachya also occurs in vicinity of plants indicating rich character of landscape.

Areal Distribution, Numbers, Phenology

Population found: yes
not found:
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: Exact counts not performed - perhaps 20
No. of immature plants:
No. of plants age unknown:

Population area: Detailed survey not performed, less than ½ ha

Percent of population in leaf: with immature fruit: bud: mature fruit: flower: 100% senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population: Apparently healthy

Evidence of expansion or decline: None observed

Have you observed this species at this site in previous years? Please give details: No

Site Physiography

Elevation: 293

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N ___	0-20 X	open ___	inundated ___
upper slope ___	E X	20-45 ___	filtered ___	wet ___
mid slope ___	S ___	45-75 ___	shade X	mesic X
lower slope X	W ___	vert. ___		dry ___
bottom ___	Flat ___			xeric ___

Soil types: unknown

Surficial rock types (with percent of ground covered): none observed

Bedrock/parent material: Presumably limestone

Surficial water (distance away): within 100 meters Source: Willow Creek wetland complex

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: Site now largely a foot path and horse riding trail. Landowner contact to identify plants and location suggested.

Disturbance or threats (natural or unnatural) to population: Road maintenance and vehicle traffic (infrequent in this area).

Owner's Name: _____ Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc., 122 Main Street, Topsham, ME 04086

Plant ID by: _____

Specimen # & Herbarium: _____

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the virality and vigor of the individuals.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: relatively small number of individuals seen.

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent B - Good (C) - Marginal D - Poor

Comments: Though intact forest and swamp occurs around EO, immediate area disturbed by past railroad line construction

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent (B) - Good C - Marginal D - Poor

Comments: Publicly owned property occurs around EO, area infrequently used.

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

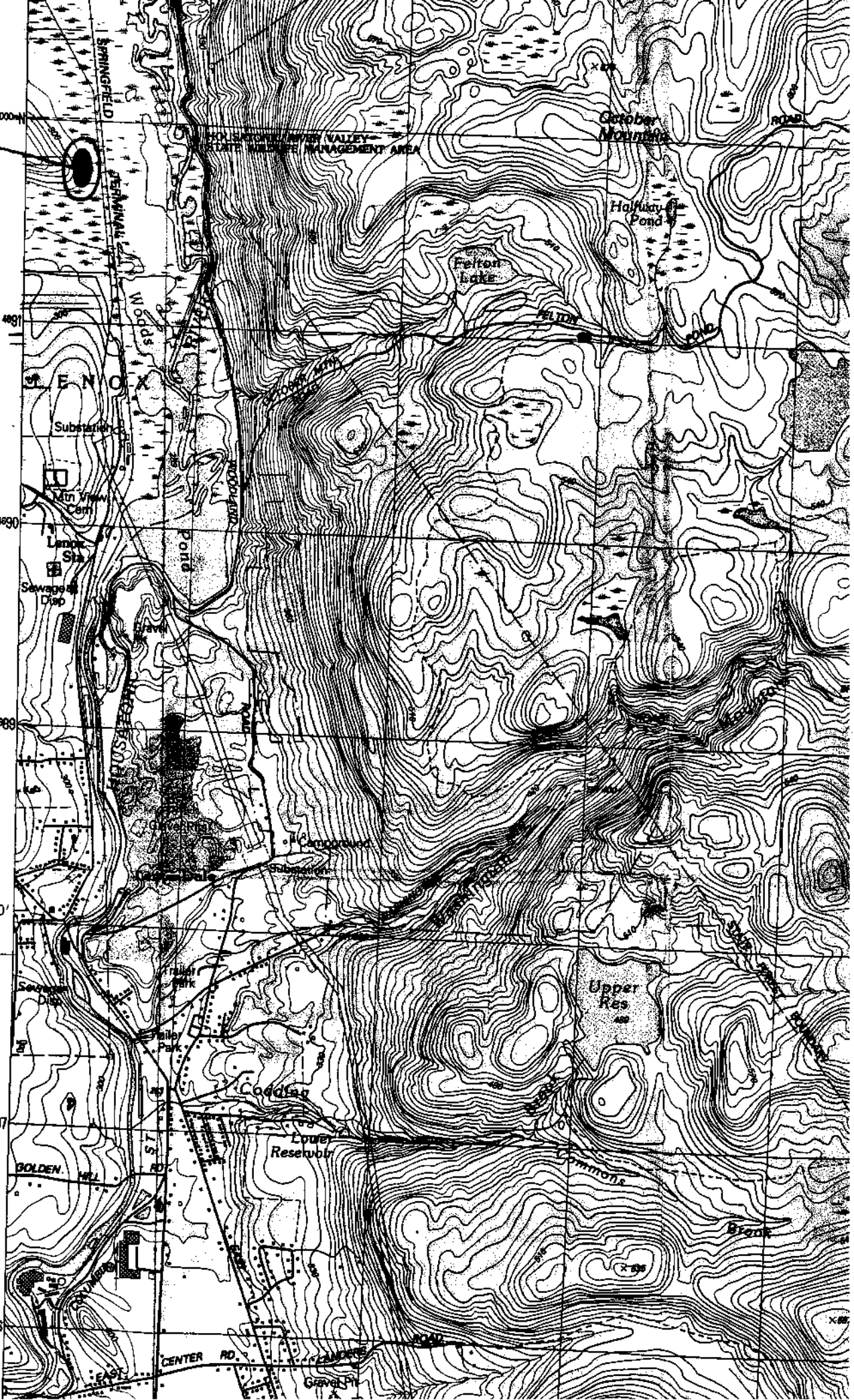
EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 4 January 2000

Sanicula

Marilandica



Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION
Observer's Name, Address, and Phone:
Arthur Haines Woodlot Alternatives, Inc. 122 Main Street Topsham, ME 04086 207-729-1199

Species Scientific Name:
Schoenoplectus acutus
NHESP Element Occurrence Number (if known):

Observation Date: 28 September 2000

Today's Date: 3 October 2000

LOCATIONAL INFORMATION
a) USGS Quad Name and Series (7.5"x7.5" or (15"x15")): 1:25,000 Pittsfield East
County: Berkshire
Town: Hinsdale

b) Directions to location of observations (please attach USGS map):
East shore of Muddy Pond, centered around point of land where Pond bends to the east. Accessed from Route 8, to the Valley Road, crossing over train tracks and driving north to a small canoe/boat launch.

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)
Deep emergent marsh with Nuphar variegatum, Myrica gale, Decodon verticillatus, Potamogeton natans, Brasenia schreberi, Nymphaea odorata. Plants are growing in 30-100 cm of water just off a Carex lasiocarpa dominated shoreline.

POPULATION INFORMATION:

Population found? (Y/N):

If No, is population presumed extirpated and why?

If Yes,
Number of mature plants: As few as 5 individuals around SE end of Lake. Ramets > 10,000.
Number of immature plants:
Number of plants age unknown:

Population area (give unit of measurement): ca. 120 x 20 meters

Percent of population:
in leaf: 10
in bud:
in flower:
with immature fruit:
mature fruit: 50
senescent: 40

Observations of floral visitors, fruit dispersers:
None observed, though some Muskrat herbivory noted.

Vigor of individuals and population:
Apparently healthy. Moderately large population. Plants beginning to senesce.

Evidence of expansion or decline:

None observed

Have you observed this species at this site in previous years? yes
Please give details:
Observed the following year. Population appears similar to previous year.

SITE PHYSIOGRAPHY
Elevation: 440 m

Topographic position (crest, upper slope, mid slope, lower slope, (bottom?)):

Aspect (north, south, east, west, flat?): Southwest

Slope (0-20 degrees, 20-45 degrees, 45-75 degrees, vertical?): 0°

Light (open), filtered, shade?):

Moisture (inundated, wet, mesic, dry, xeric?):

Soil types: Mucky Mineral

Surficial rock types (with percent of ground covered): NA

Bedrock/parent material: unknown

Surficial water (distance away and source): 0 cm, Muddy Pond

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any): Hinsdale Flats State Wildlife Management Area

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:
None observed

Land Owner's Name, Address, and Phone:

Commonwealth of Massachusetts

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY
(Circle one choice in each category)

EO Quality
How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.

A - Excellent (B) - Good C - Marginal D - Poor

Comments: moderately large population (in terms of ramets)

EO Condition
Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent (B) - Good C - Marginal D - Poor

Wetlands have been bisected by railroad, otherwise in good condition

Comments:

EO Viability
What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent (B) Good C - Marginal D - Poor

Comments:

EO Defensibility
Can this occurrence be protected from extrinsic human factors?

A - Excellent (B) Good C - Marginal D - Poor

Comments: Public ownership of property

EO RANK
A summary of all factors listed above.

A - Excellent (B) Good C - Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any)
Populations are mixed with hybrid colonies of Schoenoplectus acutus x tabernaemontanii. See detailed map.

CERTIFICATION
I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

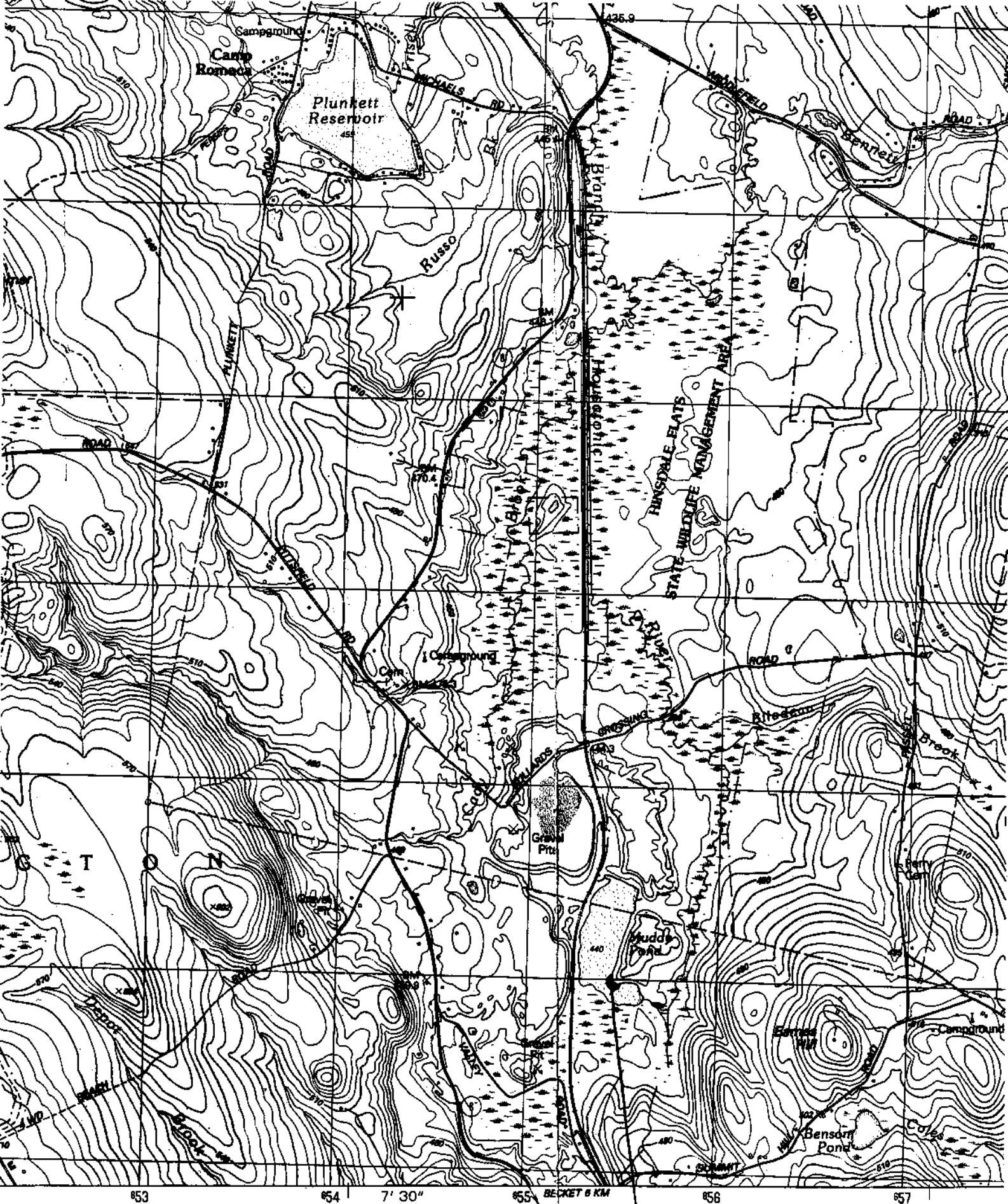
Signature: Ruth Haines

Date: 3 October 2000

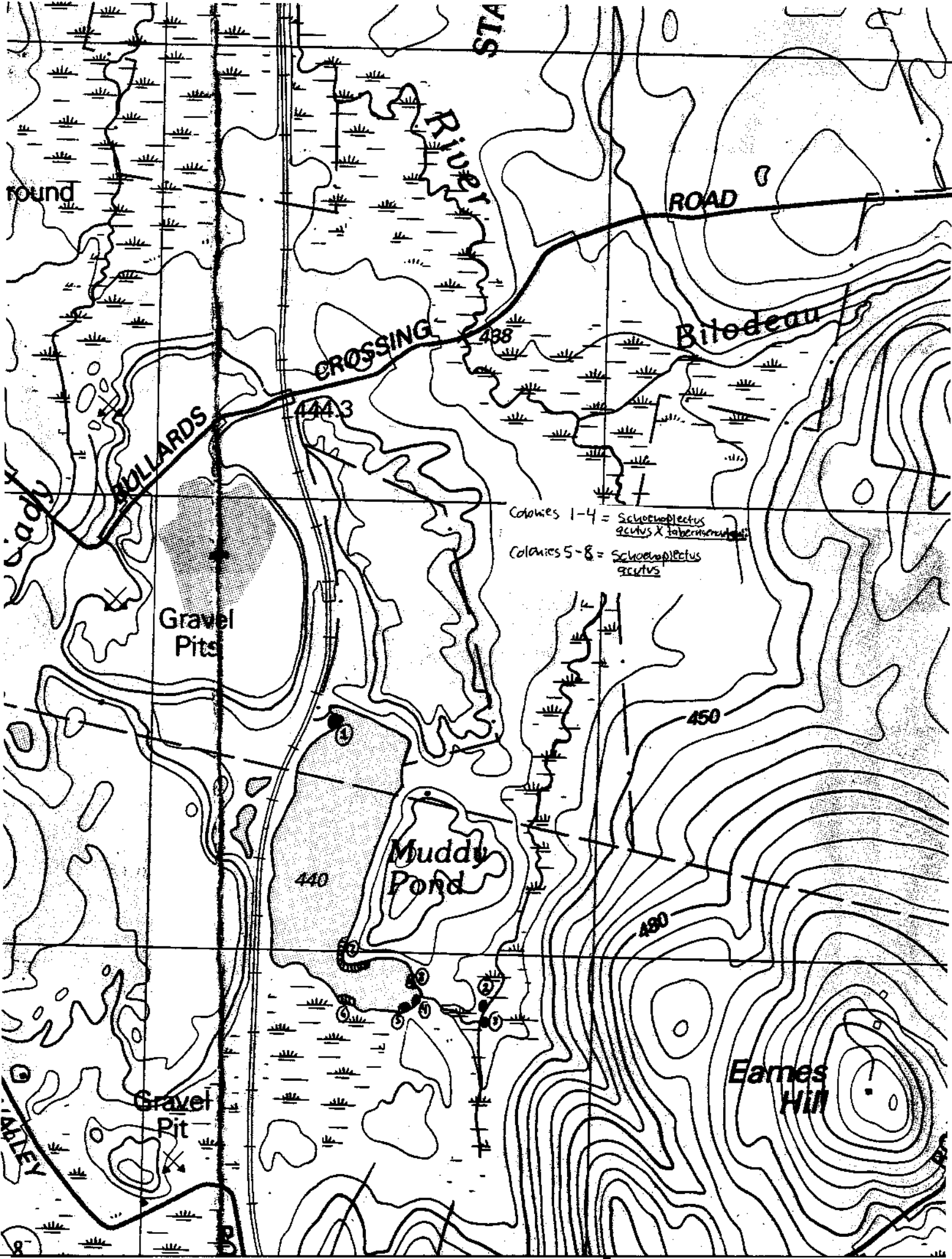
Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.



Schoenoplectus acutus (major population)


River
ROAD
CROSSING
438
Bilodeau
144.3
BULLARDS
Colonies 1-4 = Schoenoplectus acutus X tabernaemontani
Colonies 5-8 = Schoenoplectus acutus
Gravel Pits
450
Muddy Pond
440
480
Gravel Pit
Eames Hill

Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage
and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Schoenoplectus acutus x tabernaemontani

NHESP Element Occurrence Number (if known):

Observation Date(s): 10 October 2000

USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East (1:25,000)

County: Berkshire Town: Pittsfield

Directions to location of observations (please attach USGS map): Southwest end of Silver Lake, best accessed by foot from East Street just west of two-lane paved road which accesses General Electric plant.

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Deep Emergent Marsh along shores of Silver Lake. Schoenoplectus acutus x tabernaemontani a dominant member of the community in this portion of lake. Associated with Typha latifolia, Lythrum salicaria, Cornus sericea, Galium trifidum, Epilobium ciliatum ssp. glandulosum, Salix discolor, and Typha angustifolia. Plants are growing on saturated lake-shore soils and out into standing water.

Areal Distribution, Numbers, Phenology

Population found:
not found: X
Presumed extirpated:
(give reasons under "Comments")

No. of mature plants: ca. 4000 ramets, total number of plants may be as few as 3.
No. of immature plants:
No. of plants age unknown:

Population area: 90 x 5 meters

Percent of population in leaf: ·bud: flower:
with immature fruit: mature fruit: senescent: 100% (population beginning to brown and die back)

Observations of floral visitors, fruit dispersers: none observed, likely waterfowl utilize pond

Vigor of individuals and population: Apparently vigorous

Evidence of expansion or decline: none observed

Have you observed this species at this site in previous years? Please give details: yes, briefly in 1999. No substantial differences in site or population observed.

Site Physiography

Elevation: 298 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ____	N X	0-20 X	open X	inundated X
upper slope ____	E X	20-45 ____	filtered ____	wet ____
mid slope ____	S ____	45-75 ____	shade ____	mesic ____
lower slope ____	W ____	vert. ____		dry ____
bottom X	Flat ____			xeric ____

Soil types: Mineral

Surficial rock types (with percent of ground covered): unknown

Bedrock/parent material: Presumably Limestone

Surficial water (distance away): 0 meters Source: Silver Lake

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: No

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: Site is heavily contaminated by PCBs; non-native plants may pose threat at future time

Owner's Name: General Electric Co. Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc. 122 Main Street Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: No specimens collected

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.)

A - Excellent B - Good (C) - Marginal D - Poor

Comments: Moderate-sized population

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent B - Good C - Marginal (D) - Poor

Comments: Lake heavily contaminated and urbanized; non-native plants abundant

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent B - Good (C) - Marginal D - Poor

Comments: Dredging, armoring etc. is likely to occur to Lake due to contamination

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

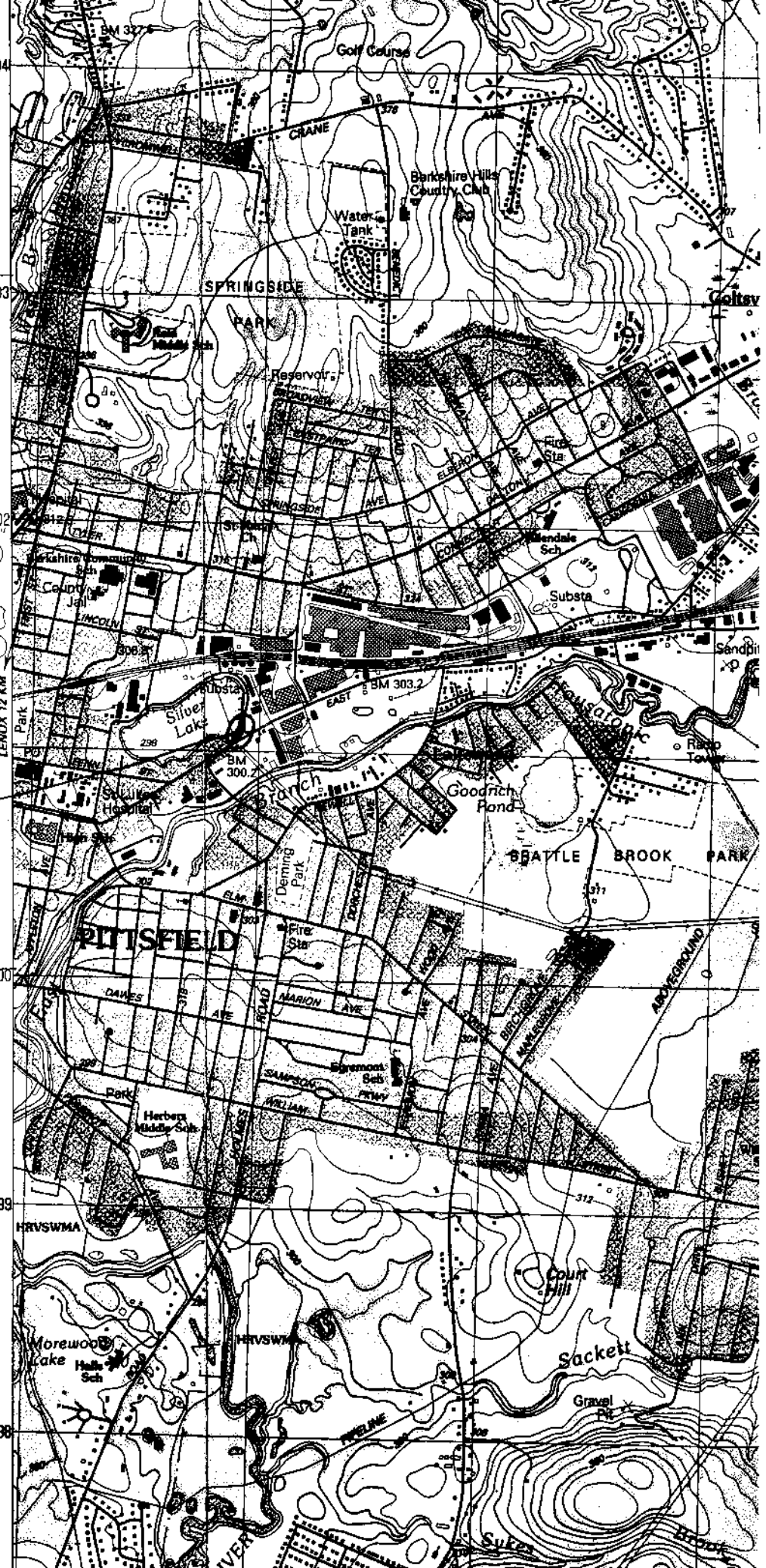
A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

Signature: Arthur Haines Date: 13 October 2000



Schoenoplectus acutus X tabernaemontanii

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION
Observer's Name, Address, and Phone:
Arthur Haines Woodlot Alternatives, Inc. 122 Main St. Topsham, ME 04086 207-729-1199

Species Scientific Name: Schoenoplectus acutus x tabernaemontani
NHESP Element Occurrence Number (if known):

Observation Date: 20 september 2000

Today's Date: 3 October 2000

LOCATIONAL INFORMATION
a) USGS Quad Name and Series (7.5"x7.5" or (15"x15")): Pittsfield East (1:25,000)
County: Berkshire
Town: Hinsdale

b) Directions to location of observations (please attach USGS map):
Northwest corner of Muddy Pond, ca. 10 meters north of open water edge and 7 meters east of RR tracks. Population can be accessed by foot by taking the Valley Road (off Route 8) and driving up the west side of the RR tracks until Muddy Pond is reached.

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)
Calcareous seepage Marsh with Carex lasiocarpa, Carex utriculata, Salix candida, Comarum palustre, Typha latifolia, Thelypteris palustris, Salix discolor, Salix bebbiana, and Salix lucida. Plants growing in 5-20 cm of water on a somewhat floating mat of vegetation and mucky peat.

POPULATION INFORMATION:

Population found? (Y/N):

If No, is population presumed extirpated and why?

If Yes,
Number of mature plants: ca. 3500 ramets (perhaps only one individual)
Number of immature plants:
Number of plants age unknown:

Population area (give unit of measurement): 30 x 8 meters

Percent of population:
in leaf: 10
in bud:
in flower:
with immature fruit:
mature fruit: 50
senescent: 40

Observations of floral visitors, fruit dispersers:

None observed

Vigor of individuals and population:

Apparently healthy, though browning and spotting as plants senesce.

Evidence of expansion or decline:

None observed

Have you observed this species at this site in previous years? NO
Please give details:

SITE PHYSIOGRAPHY
Elevation: 440 m

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

Aspect (north, south, east, west, flat?): Southeast

Slope (0-20 degrees, 20-45 degrees, 45-75 degrees, vertical?): 0°

Light (open), filtered, shade?):

Moisture (inundated) wet, mesic, dry, xeric?):

Soil types:

Surficial rock types (with percent of ground covered): NA

Bedrock/parent material: unknown

Surficial water (distance away and source): Ox Muddy Pond

MANAGEMENT/OWNERSHIP: Commonwealth of Massachusetts

MNHESP Site Name (if any):

Managed Area (if any): Hinsdale Flats Wildlife, State Wildlife Management Area

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:
None observed

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY
(Circle one choice in each category)

EO Quality
How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.

A - Excellent (B) - Good C - Marginal D - Poor

Comments: Moderately large population other individuals occur around SE portion of pond and short distance down outlet (East Branch Housatonic River)

EO Condition
Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good (C) - Marginal D - Poor

RR embankment passes close to community and bisects wetlands

Comments:

EO Viability
What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent (B) Good C - Marginal D - Poor

Comments:

EO Defensibility
Can this occurrence be protected from extrinsic human factors?

A - Excellent (B) Good C - Marginal D - Poor

Comments: Public ownership of property; plants far enough from RR line as to likely be safe from railline maintenance.

EO RANK
A summary of all factors listed above.

A - Excellent (B) Good C - Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any) Hybrid colonies are mixed with one of the paiental species (Schoenoplectus acutus) at the SE end of the lake.

CERTIFICATION
I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

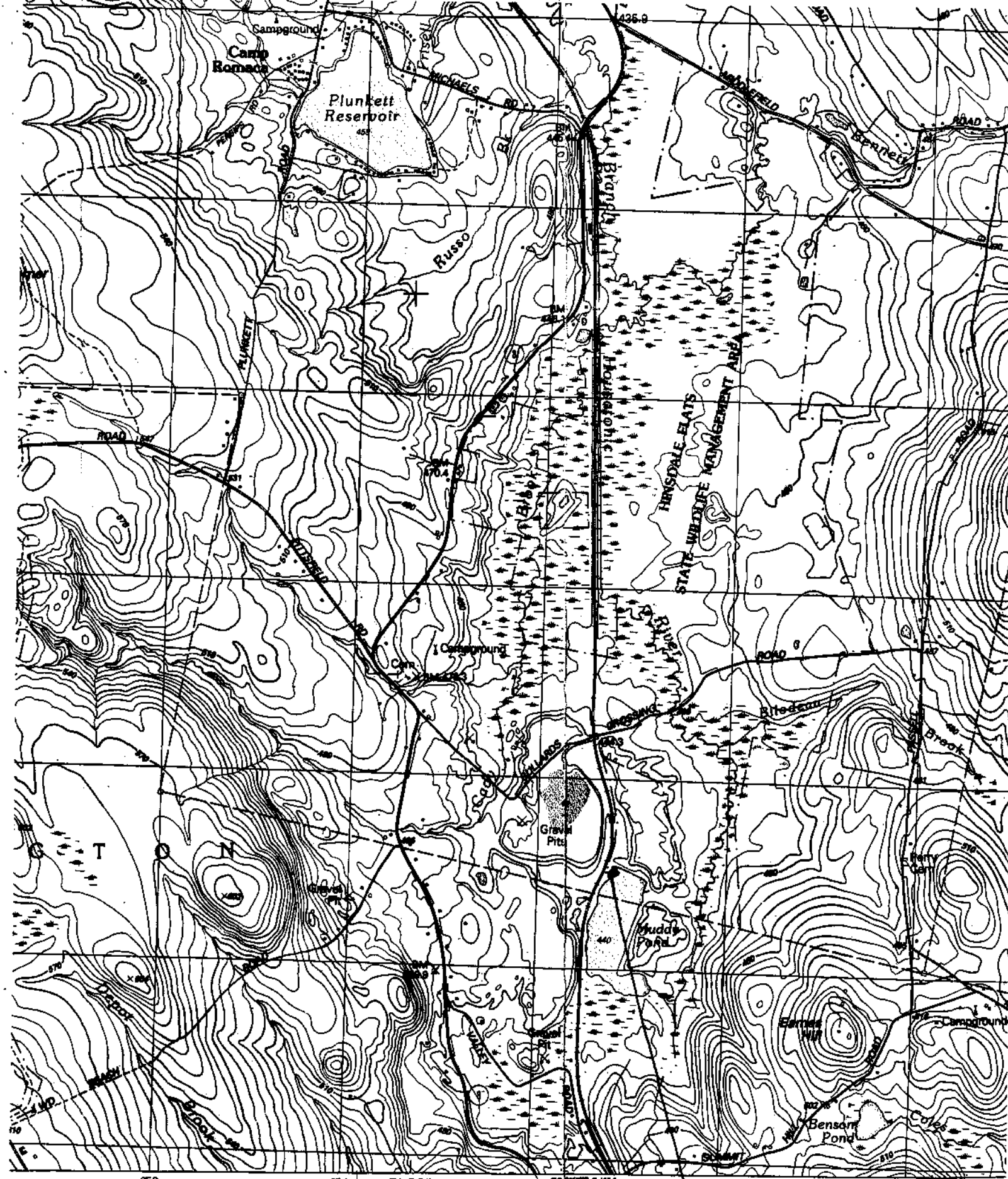
Signature: Ruth Hawkes

Date: 3 October 2000

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.



SCALE 1:25 000

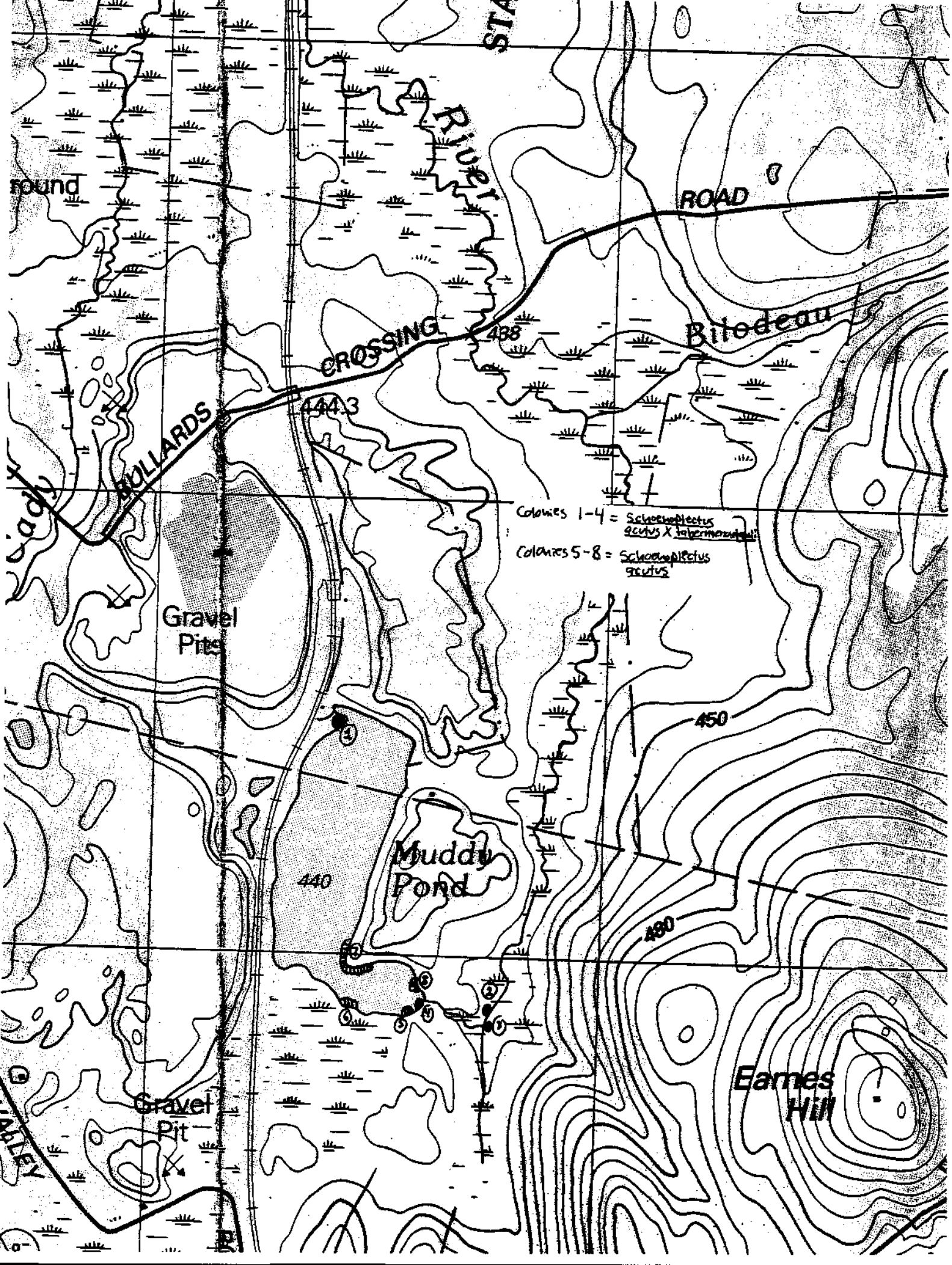
1 CENTIMETER ON THE MAP REPRESENTS 250 METERS ON THE GROUND

CONTOUR INTERVAL 6 METERS

1000 0 1000

1000 0 2000 4000 6000

Schoenoplectus acutus x tabernaemontanii (major population)


River
ROAD
CROSSING
Bilodeau
488
444.3
BULLARDS
Colonies 1-4 = Schoenoplectus acutus X tabernaemontani
Colonies 5-8 = Schoenoplectus acutus
Gravel Pits
450
Muddy Pond
440
480
Gravel Pit
Eames Hill

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION

Observer's Name, Address, and Phone:

Arthur Haines
Woodlot Alternatives, Inc.
122 Main Street, Number 3
Topsham, ME 04086
207-729-1199

Species Scientific Name:

Scirpus pendulus

NHESP Element Occurrence Number (if known):

Observation Date: August 1999

Today's Date: 8 November 1999

LOCATIONAL INFORMATION

a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): Pittsfield East

County: Berkshire

Town: Lenox

b) Directions to location of observations (please attach USGS map):

Parking lot on North side of New Lenox Road, west of Housatonic where where Powerline ROW crosses Road.

Approximate UTM Coordinates - 4694900 N - 0644440 E

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)

Gravel parking lot with low, wet areas in Spring.

POPULATION INFORMATION:

Population found? (Y)/N):

If No, is population presumed extirpated and why?

If Yes,

Number of mature plants: < 10

Number of immature plants:

Number of plants age unknown:

Population area (give unit of measurement):

Percent of population: unknown

in leaf:

in bud:

in flower:

with immature fruit:

mature fruit:

senescent:

Observations of floral visitors, fruit dispersers:

none observed

Vigor of individuals and population:

Shorter and stunted compared to plants observed at other sites.

Evidence of expansion or decline:

None Observed

Have you observed this species at this site in previous years?

Please give details:

No.

SITE PHYSIOGRAPHY

Elevation: 296 m

Topographic position (crest, upper slope, mid slope, lower slope, bottom?):

flat Plain

Aspect (north, south, east, west, flat?):

NA

Slope (0-20 degrees) 20-45 degrees, 45-75 degrees, vertical?):

Light (open) filtered, shade?):

Moisture (inundated, (wet) mesic, dry, xeric?):

Soil types: wet gravel

Surficial rock types (with percent of ground covered):

NA

Bedrock/parent material:

Unknown

Surficial water (distance away and source):

Housatonic River, 175 meters

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any): Housatonic River Valley State Wildlife Management Area

Comments/Management recommendations:

Disturbance or threats (natural or unnatural) to population:

vehicle traffic, regrading of lot

Land Owner's Name, Address, and Phone:

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY

(Circle one choice in each category)

EO Quality

How representative is this occurrence? Consider the size and

productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good C - Marginal (D - Poor)

Comments: Small population and Stunted Plants

EO Condition

Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good C - Marginal (D - Poor)

Comments: Disturbed gravel of parking lot

EO Viability

What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C - Marginal) D - Poor

Comments: Plants easily extirpated by parking lot improvements

EO Defensibility

Can this occurrence be protected from extrinsic human factors?

A - Excellent B - Good C - Marginal (D - Poor)

Comments:

EO RANK

A summary of all factors listed above.

A - Excellent B - Good C - Marginal (D - Poor)

Comments:

ADDITIONAL COMMENTS (if any)

(1) Detailed counts and observations of Associated species were not made at this site.

(2) A second small population was observed on the west shore of Felton Lake (pond is dammed). Detailed counts and observations were not made at this site. Plants were present in July and mowed shortly after (the west shore of the lake has a small, tended lawn area). Plants <15.

CERTIFICATION

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Anita Haines

Date: 8 November 1999

↓

Specimen (of New Lenox Road site) to be deposited at Harvard Herbaria.

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

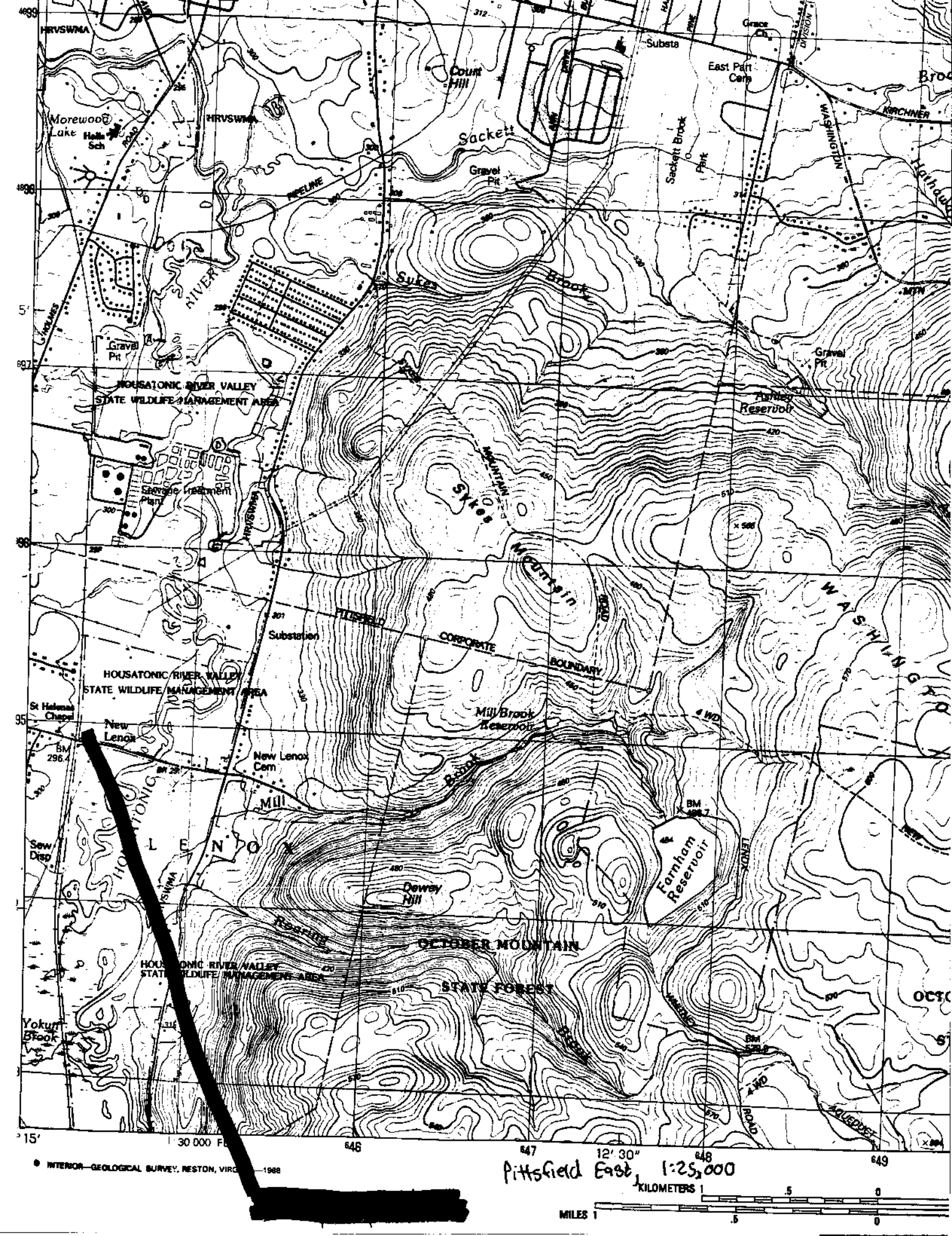
Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife

Route 135

Westborough, MA 01581

(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.



Pittsfield East, 1:25,000

See "Additional Comments"

(1:25,000)

EAST LEE, MASSACHUSETTS

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Widllife
Route 135, Westborough, MA 01581
(508) 792-7270 x 165

RARE PLANT OBSERVATION FORM

OBSERVER INFORMATION
Observer's Name, Address, and Phone: Arthur Haines
Woodlot Alternatives, Inc.
122 Main Street
Topsham, ME 04086
207-729-1199

Species Scientific Name: Scirpus pendulus
NHESP Element Occurrence Number (if known):

Observation Date: 6 July 2000

Today's Date: 3 October 2000

LOCATIONAL INFORMATION
a) USGS Quad Name and Series (7.5"x7.5" or (7.5"x15")): East Lee (1:25,000)
County: Berkshire
Town: Lenox

b) Directions to location of observations (please attach USGS map):
From Route 7 and 20, follow Housatonic Street east to a left turn (north) onto Willow Creek Road. Follow this to its end in a rock-lined parking lot. Plants are found just north of parking lot on east side of trail, in a low depression, 30 meters east of pole # 6018. Additional plants found further north at 4-way intersection just south of Willow Creek.

c) Habitat: (plant communities, associated vegetation, physical characteristics, geological features, surrounding land use. Are other rare species present?)
Seasonally wet field with Cornus amomum, Galium mollugo, Carex vulpinoidea, Scirpus atrovirens, Juncus articulatus, Carex stoporia, Viburnum dentatum, Salix eriocephala, and Spiraea alba var. latifolia.

POPULATION INFORMATION:

Population found? (Y/N):

If No, is population presumed extirpated and why?

If Yes,
Number of mature plants: ca. 15, approximately 75 flowering stems
Number of immature plants:
Number of plants age unknown:

Population area (give unit of measurement): 50 x 5 meters (for main population)

Percent of population:
in leaf:
in bud:
in flower:
with immature fruit:
mature fruit: 100%
senescent:

Observations of floral visitors, fruit dispersers: None observed

Vigor of individuals and population:

Vigorous individuals.

Evidence of expansion or decline:
Expansion of population. Some plants are known not to have occured here in 1998 and 1999 (as site was commonly passed through or by during studies).
Have you observed this species at this site in previous years? NO
Please give details:
Plants are known to be recent colonizers (at least part of population).

SITE PHYSIOGRAPHY
Elevation: 298M

Topographic position (crest, upper slope, mid slope, (lower slope) bottom?):

Aspect (north, south, (east) west, flat?):

Slope ((0-20 degrees), 20-45 degrees, 45-75 degrees, vertical?):

Light ((open) filtered, shade?):

Moisture (inundated, (wet) mesic, dry, xeric?): becoming mesic in later season
in early season

Soil types:

Surficial rock types (with percent of ground covered):

Bedrock/parent material: unknown

Surficial water (distance away and source): Housatonic River, 60 meters

MANAGEMENT/OWNERSHIP:

MNHESP Site Name (if any):

Managed Area (if any):

Comments/Management recommendations:
Maintain mowing/clearing practice that continues open field habitat.

Disturbance or threats (natural or unnatural) to population:

Land Owner's Name, Address, and Phone:
unknown

Ownership Comments:

ELEMENT OCCURRENCE (EO) SUMMARY
(Circle one choice in each category)

EO Quality
How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.

A - Excellent B - Good (C) - Marginal D - Poor

Comments: relatively small population

EO Condition
Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances?

A - Excellent B - Good C - Marginal (D) - Poor

habitat has been disturbed and abundant non-native species are present

Comments:

EO Viability
What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?

A - Excellent B - Good (C) Marginal D - Poor

Comments: Site will succeed to Shrubs if not maintained

EO Defensibility
Can this occurrence be protected from extrinsic human factors?

A - Excellent B - Good (C) Marginal D - Poor

Comments:

EO RANK
A summary of all factors listed above.

A - Excellent B - Good (C) Marginal D - Poor

Comments:

ADDITIONAL COMMENTS (if any)

CERTIFICATION
I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Anne Haines

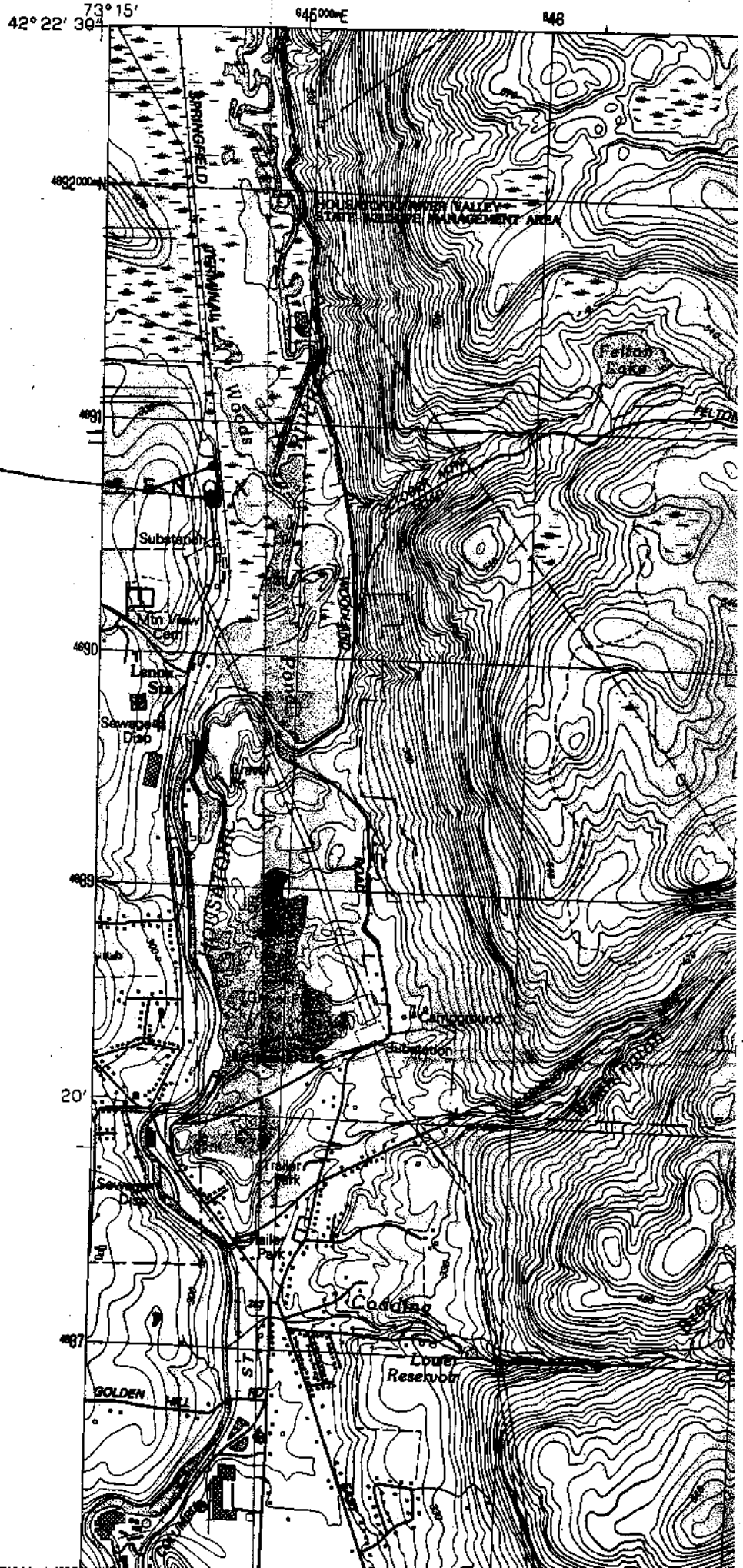
Date: 3 October 2000

Please submit form, a copy of a USGS topo map showing plant location, and all supporting documentation to the State Botanist at:

Massachusetts Natural Heritage & Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext 200

Thank you for contributing to the Natural Heritage & Endangered Species Program database. Your efforts are valuable and appreciated.

Scirpus pendulus



Natural Heritage & Endangered Species Program

Please submit field forms, a copy of a USGS map, and all supporting documentation to the State Botanist at:
Massachusetts Natural Heritage and Endangered Species Program
Division of Fisheries & Wildlife
Route 135
Westborough, MA 01581
(508) 792-7270 ext. 200

RARE PLANT OBSERVATION FORM

Species Scientific Name: Symphyotrichum prenanthoides [= Aster p.]

NHESP Element Occurrence Number (if known):

Observation Date(s): 16 September 1998

USGS Quad Name and Series (7.5"x7.5" or 15"x15"): Pittsfield East (1:25,000)

County: Berkshire Town: Lenox

Directions to location of observations (please attach USGS map): South of New Lenox road to southeast portion of field, walk South along trail in woods that parallels RR track about 0.25 km, short distance South of a metal pipe across trail, on east side of trail. Field is located west of Canoe launch at a Pump Station. (N4694120 — E0644500)

Habitat: (Describe plant communities, associated vegetation, physical characteristics, geological features and surrounding land use. Are other rare species present?) Early successional forest / floodplain forest in area, with numerous agricultural fields. Trail passes through forest, and dominant herbs of site include Symphyotrichum cordifolium, Onoclea sensibilis, Athyrium felix-femina. Prunus virginiana is dominant shrub.

Areal Distribution, Numbers, Phenology

Population found: X No. of mature plants: 60

not found: No. of immature plants:

Presumed extirpated: No. of plants age unknown:

(give reasons under "Comments")

Population area: 8 x 3 meters

Percent of population in leaf: 20% bud: flower: 80%

with immature fruit: mature fruit: senescent:

Observations of floral visitors, fruit dispersers: None

Vigor of individuals and population: Vigorous and appearing healthy

Evidence of expansion or decline: None observed

Have you observed this species at this site in previous years? Please give details: No

Site Physiography

Elevation: 295 meters

Topographic position	Aspect	Slope	Light	Moisture
crest ___	N ___	0-20 X	open ___	inundated ___
upper slope ___	E ___	20-45 ___	filtered X	wet ___
mid slope ___	S ___	45-75 ___	shade ___	mesic X
lower slope ___	W ___	vert. ___		dry ___
bottom X	Flat X			xeric ___

Soil types: unknown

Surficial rock types (with percent of ground covered): none

Bedrock/parent material: unknown

Surficial water (distance away): ½ 100 meters Source: Housatonic River

Management / Ownership

NHESP Site Name (if any): _____ Managed Area: _____

Comments/Management recommendations: _____

Disturbance or threats (natural or unnatural) to population: _____

Owner's Name: Housatonic River Valley State WMA Telephone: (___) _____

Address: _____

Owner Comments: _____

Observer Information

Observer's Name: Arthur Haines Telephone: (207) 729-1199

Address: Woodlot Alternatives, Inc. 122 Main Street, Number 3 Topsham, ME 04086

Plant ID by: Arthur Haines

Specimen # & Herbarium: Will be deposited at the Harvard Herbaria

Element Occurrence (EO) Summary (Circle one choice in each category)

EO Quality: (How representative is this occurrence? Consider the size and productivity of the population and the vitality and vigor of the individuals.)

A - Excellent (B) - Good C - Marginal D - Poor

Comments: healthy and vigorous

EO Condition: (Is the habitat supporting the EO pristine or degraded? Is there a potential for the habitat to recover from disturbances? A - Excellent B - Good (C) - Marginal D - Poor

Comments: Area has been cut and numerous exotic shrubs found along field and trail edges.

EO Viability: (What are the long-term prospects for continued existence of this occurrence at the indicated level of quality?) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

EO Defensibility: (Can this occurrence be protected from extrinsic human factors?)

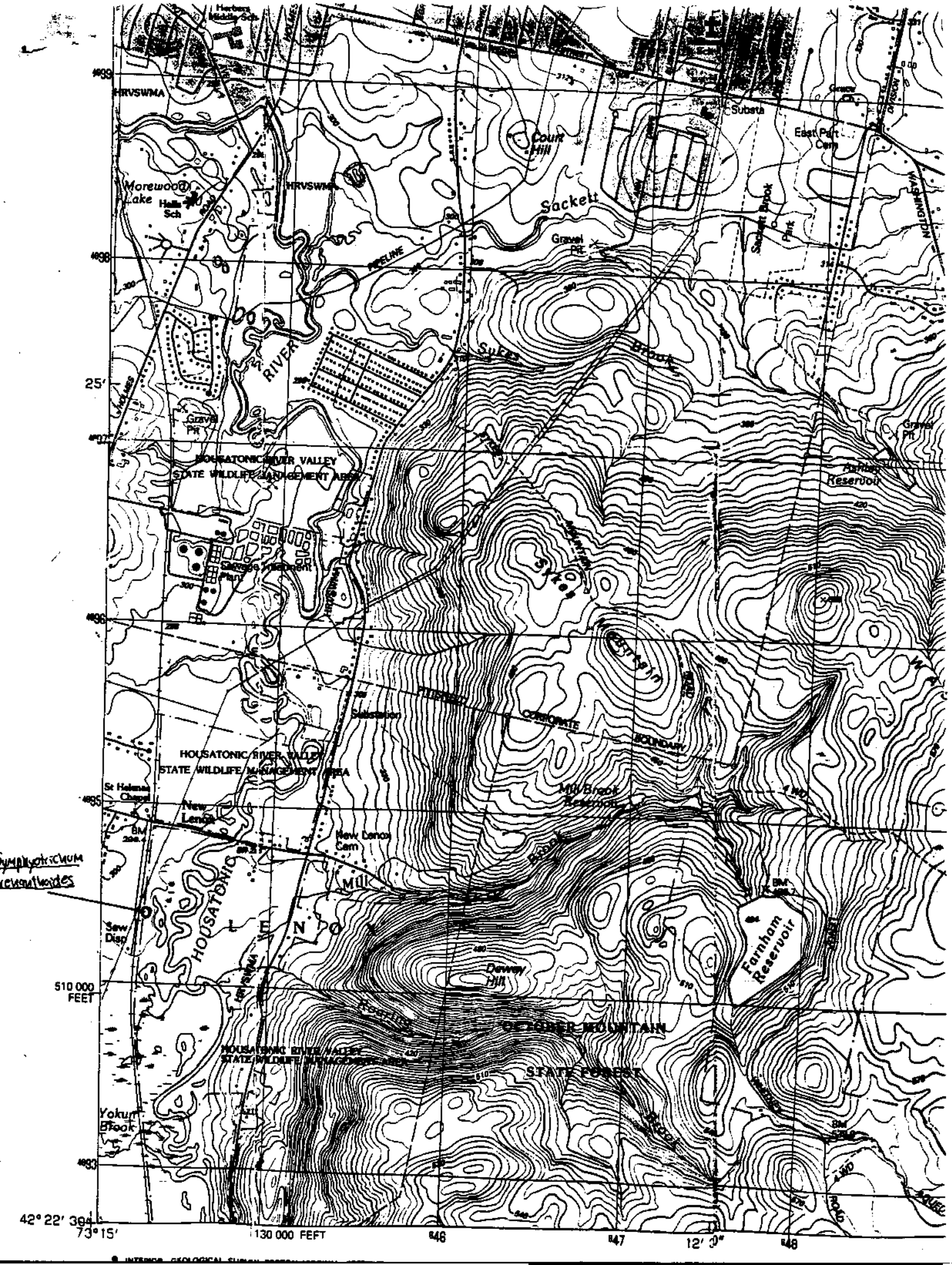
A - Excellent B - Good (C) - Marginal D - Poor

Comments: fields, trails, and RR all in viscinity, plants easily trampled or driven on by ATV

EO RANK: (A summary of all factors listed above.) A - Excellent B - Good (C) - Marginal D - Poor

Comments: _____

Signature: _____ Date: _____


HRVSWMA
Morewood Lake
Hall's Sch
Court Hill
Sackett
Sackett Brook
Gravel Pit
PIPELINE
Housatonic River
Sykes Brook
Gravel Pit
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Ashley Reservoir
Sykes Mountain
Substation
CORPORATE BOUNDARY
St Helena Chapel
New Lenox
New Lenox Cem
Mill Brook Reservoir
Mill Brook
Sew Disp
HOUSATONIC
LENOX
Farnham Reservoir
Dewey Hill
Yokum Brook
OCTOBER MOUNTAIN STATE FOREST
Roads
510 000 FEET
130 000 FEET
42° 22' 30"
73° 15'
12' 30"

www.woodlotalt.com

Attachment H Rare Animal Forms

american_bittern_1998-1.pdf	216 KB
american_bittern_1999-1.pdf	171 KB
american_bittern_1999-2.pdf	208 KB
american_bittern_1999-3.pdf	184 KB
american_bittern_2000-1.pdf	173 KB
american_bittern_2000-2.pdf	197 KB
american_bittern_2000-3.pdf	175 KB
american_bittern_2000-4.pdf	158 KB
american_bittern_2000-5.pdf	215 KB
arrow_clubtail_1999-1.pdf	162 KB
arrow_clubtail_1999-2.pdf	161 KB
arrow_clubtail_1999-3.pdf	163 KB
arrow_clubtail_1999-4.pdf	241 KB
arrow_clubtail_1999-5.pdf	163 KB
arrow_clubtail_1999-6.pdf	166 KB
arrow_clubtail_1999-7.pdf	166 KB
bald_eagle_1998-1.pdf	168 KB
bald_eagle_1998-2.pdf	183 KB
bald_eagle_1999-1.pdf	159 KB
bald_eagle_2000-1.pdf	181 KB
bald_eagle_2000-2.pdf	158 KB
bald_eagle_2000-3.pdf	176 KB
bald_eagle_2000-4.pdf	176 KB
bald_eagle_2000-5.pdf	198 KB
blackpoll_warbler_1999-1.pdf	149 KB
blackpoll_warbler_1999-2.pdf	181 KB
blackpoll_warbler_1999-3.pdf	192 KB
blackpoll_warbler_1999-4.pdf	158 KB
blackpoll_warbler_2000-1.pdf	132 KB

common_moorhen_1998-1.pdf	219 KB
common_moorhen_1999-1.pdf	176 KB
common_moorhen_1999-2.pdf	177 KB
common_moorhen_1999-3.pdf	153 KB
common_moorhen_1999-4.pdf	187 KB
coopers_hawk_1999-1.pdf	188 KB
coopers_hawk_1999-2.pdf	188 KB
coopers_hawk_1999-3.pdf	165 KB
coopers_hawk_2000-1.pdf	149 KB
coopers_hawk_2000-2.pdf	195 KB
coopers_hawk_2000-3.pdf	173 KB
coopers_hawk_2000-4.pdf	236 KB
four-toed_salamander_1999-1.pdf	185 KB
jeffersons_salamander_1999-1.pdf	162 KB
northern_harrier_1998-1.pdf	175 KB
northern_harrier_1998-2.pdf	150 KB
northern_harrier_1998-3.pdf	140 KB
northern_harrier_1999-1.pdf	151 KB
northern_harrier_1999-2.pdf	164 KB
northern_harrier_1999-3.pdf	168 KB
northern_harrier_1999-4.pdf	165 KB
northern_harrier_1999-5.pdf	171 KB
northern_harrier_1999-6.pdf	161 KB
northern_harrier_1999-7.pdf	165 KB
northern_harrier_2000-1.pdf	198 KB
northern_parula_1999-1.pdf	153 KB
northern_parula_1999-2.pdf	193 KB
riffle_snaketail_1999-1.pdf	130 KB
riffle_snaketail_1999-2.pdf	164 KB
sharp-shinned_hawk_1998-1.pdf	143 KB
sharp-shinned_hawk_1998-2.pdf	187 KB
sharp-shinned_hawk_1999-1.pdf	176 KB
sharp-shinned_hawk_1999-2.pdf	176 KB
sharp-shinned_hawk_1999-3.pdf	166 KB

sharp-shinned_hawk_1999-4.pdf	169 KB
sharp-shinned_hawk_2001-1.pdf	162 KB
sharp-shinned_hawk1.pdf	174 KB
small-footed_myotis_1999-1.pdf	174 KB
Spring_salamander_1999-1.pdf	209 KB
squawfoot_1998-1.pdf	318 KB
triangle_floater_1998-1.pdf	179 KB
wood_turtle_1998-1.pdf	288 KB
wood_turtle_1999-1.pdf	170 KB
wood_turtle_1999-2.pdf	162 KB
wood_turtle_1999-3.pdf	185 KB
wood_turtle_1999-4.pdf	177 KB
zebra_clubtail_1999-1.pdf	163 KB
zebra_clubtail_1999-2.pdf	165 KB
zebra_clubtail_1999-3.pdf	163 KB
zebra_clubtail_1999-4.pdf	193 KB
zebra_clubtail_1999-5.pdf	165 KB
zebra_clubtail_1999-6.pdf	167 KB
zebra_clubtail_1999-7.pdf	168 KB
zebra_clubtail_1999-8.pdf	170 KB

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy

Address: Woodlot Alternatives, Inc.
122 Main Street
[illegible]m, Maine 04066

Phone: 207-846-6764 (H) 207-729-1199 (W)

Species observed: American Bittern

Date and Time of observation: 5-11-98, ± noon

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield West

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Enter Housatonic River Valley State WMA via Undermill Place (off of Rte 7/20). From gate, walk up access rd ± 300 yards. Once access rd enters second (larger) field, turn left into woods, drop down steep slope to large open wetland.

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? Observation of bird from ± 15' away

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: —

5. Evidence (if any) of breeding activity at this site: —

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: LARGE OPEN EMERGENT WETLAND DOMINATED BY PHALARIS ARUNDINACEA & LYTHRUM SALICARIA IN BRIER SECTIONS & PELTANDRA VIRGINICA & CAREX LACUSTRIS IN WETTER AREAS. SOME POS AREAS WITH ALNUS INCANA & SYMPLOCARPUS FOETIDUS.

8. Observed or potential threats to the species or its habitat at this site: _____

9. Landowner's name and address, if known: MASS. FISH & WILDLIFE (STATE WMA)

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: PREVIOUS EXPERIENCE W/ MARSH BIRDS & MARSH BIRD SURVEYS

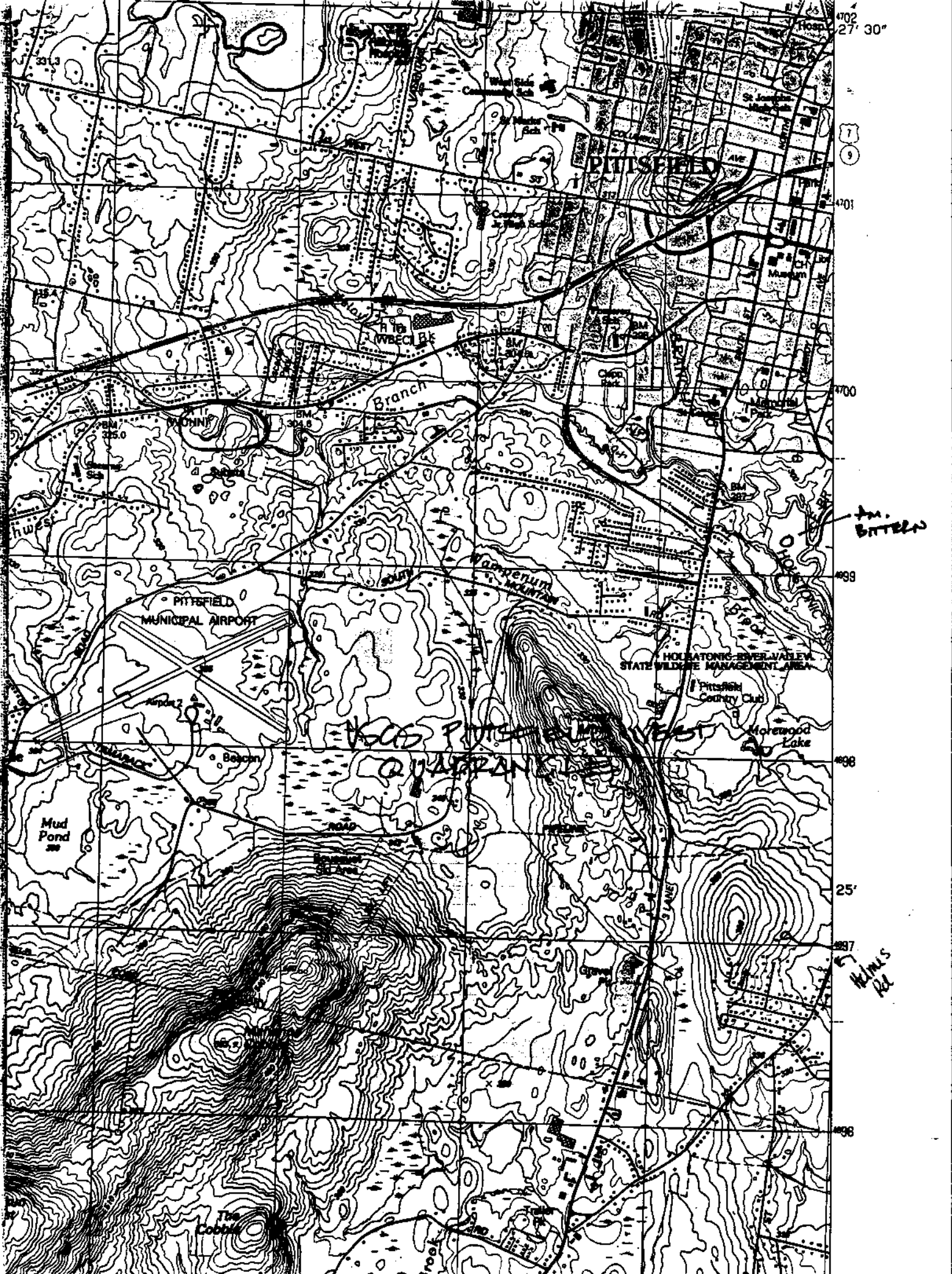
13. List names and qualifications of other observers (if any): _____

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 5-11-98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


PITTSFIELD
PITTSFIELD MUNICIPAL AIRPORT
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Pittsfield Country Club
Morewood Lake
Mud Pond
Warnerum Mountain
Branch
The Cobble
27' 30"
25'
4702
4701
4700
4699
4698
4697
4696
Hospital
Museum
Park
Beacon
Gravel
Trailer Pk
Golf Course
Cemetery
Substation
Tank
Tower
Church
School
Hospital
Pk
Ch
Cem
Sch
Sub
Trailer Pk
Golf Course
Tank
Tower
Gravel
Beacon
Mud Pond
Morewood Lake
Pittsfield Country Club
Warnerum Mountain
Branch
The Cobble
PITTSFIELD MUNICIPAL AIRPORT
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
ROAD
Dr. BITTER
HOUSATONIC
Holmes Rd
WBEC
WHMN
BM 305.0
BM 304.8
BM 307
BM 308
BM 309
BM 310
BM 311
BM 312
BM 313
BM 314
BM 315
BM 316
BM 317
BM 318
BM 319
BM 320
BM 321
BM 322
BM 323
BM 324
BM 325
BM 326
BM 327
BM 328
BM 329
BM 330
BM 331
BM 332
BM 333
BM 334
BM 335
BM 336
BM 337
BM 338
BM 339
BM 340
BM 341
BM 342
BM 343
BM 344
BM 345
BM 346
BM 347
BM 348
BM 349
BM 350
BM 351
BM 352
BM 353
BM 354
BM 355
BM 356
BM 357
BM 358
BM 359
BM 360
BM 361
BM 362
BM 363
BM 364
BM 365
BM 366
BM 367
BM 368
BM 369
BM 370
BM 371
BM 372
BM 373
BM 374
BM 375
BM 376
BM 377
BM 378
BM 379
BM 380
BM 381
BM 382
BM 383
BM 384
BM 385
BM 386
BM 387
BM 388
BM 389
BM 390
BM 391
BM 392
BM 393
BM 394
BM 395
BM 396
BM 397
BM 398
BM 399
BM 400
BM 401
BM 402
BM 403
BM 404
BM 405
BM 406
BM 407
BM 408
BM 409
BM 410
BM 411
BM 412
BM 413
BM 414
BM 415
BM 416
BM 417
BM 418
BM 419
BM 420
BM 421
BM 422
BM 423
BM 424
BM 425
BM 426
BM 427
BM 428
BM 429
BM 430
BM 431
BM 432
BM 433
BM 434
BM 435
BM 436
BM 437
BM 438
BM 439
BM 440
BM 441
BM 442
BM 443
BM 444
BM 445
BM 446
BM 447
BM 448
BM 449
BM 450
BM 451
BM 452
BM 453
BM 454
BM 455
BM 456
BM 457
BM 458
BM 459
BM 460
BM 461
BM 462
BM 463
BM 464
BM 465
BM 466
BM 467
BM 468
BM 469
BM 470
BM 471
BM 472
BM 473
BM 474
BM 475
BM 476
BM 477
BM 478
BM 479
BM 480
BM 481
BM 482
BM 483
BM 484
BM 485
BM 486
BM 487
BM 488
BM 489
BM 490
BM 491
BM 492
BM 493
BM 494
BM 495
BM 496
BM 497
BM 498
BM 499
BM 500
BM 501
BM 502
BM 503
BM 504
BM 505
BM 506
BM 507
BM 508
BM 509
BM 510
BM 511
BM 512
BM 513
BM 514
BM 515
BM 516
BM 517
BM 518
BM 519
BM 520
BM 521
BM 522
BM 523
BM 524
BM 525
BM 526
BM 527
BM 528
BM 529
BM 530
BM 531
BM 532
BM 533
BM 534
BM 535
BM 536
BM 537
BM 538
BM 539
BM 540
BM 541
BM 542
BM 543
BM 544
BM 545
BM 546
BM 547
BM 548
BM 549
BM 550
BM 551
BM 552
BM 553
BM 554
BM 555
BM 556
BM 557
BM 558
BM 559
BM 560
BM 561
BM 562
BM 563
BM 564
BM 565
BM 566
BM 567
BM 568
BM 569
BM 570
BM 571
BM 572
BM 573
BM 574
BM 575
BM 576
BM 577
BM 578
BM 579
BM 580
BM 581
BM 582
BM 583
BM 584
BM 585
BM 586
BM 587
BM 588
BM 589
BM 590
BM 591
BM 592
BM 593
BM 594
BM 595
BM 596
BM 597
BM 598
BM 599
BM 600
BM 601
BM 602
BM 603
BM 604
BM 605
BM 606
BM 607
BM 608
BM 609
BM 610
BM 611
BM 612
BM 613
BM 614
BM 615
BM 616
BM 617
BM 618
BM 619
BM 620
BM 621
BM 622
BM 623
BM 624
BM 625
BM 626
BM 627
BM 628
BM 629
BM 630
BM 631
BM 632
BM 633
BM 634
BM 635
BM 636
BM 637
BM 638
BM 639
BM 640
BM 641
BM 642
BM 643
BM 644
BM 645
BM 646
BM 647
BM 648
BM 649
BM 650
BM 651
BM 652
BM 653
BM 654
BM 655
BM 656
BM 657
BM 658
BM 659
BM 660
BM 661
BM 662
BM 663
BM 664
BM 665
BM 666
BM 667
BM 668
BM 669
BM 670
BM 671
BM 672
BM 673
BM 674
BM 675
BM 676
BM 677
BM 678
BM 679
BM 680
BM 681
BM 682
BM 683
BM 684
BM 685
BM 686
BM 687
BM 688
BM 689
BM 690
BM 691
BM 692
BM 693
BM 694
BM 695
BM 696
BM 697
BM 698
BM 699
BM 700
BM 701
BM 702
BM 703
BM 704
BM 705
BM 706
BM 707
BM 708
BM 709
BM 710
BM 711
BM 712
BM 713
BM 714
BM 715
BM 716
BM 717
BM 718
BM 719
BM 720
BM 721
BM 722
BM 723
BM 724
BM 725
BM 726
BM 727
BM 728
BM 729
BM 730
BM 731
BM 732
BM 733
BM 734
BM 735
BM 736
BM 737
BM 738
BM 739
BM 740
BM 741
BM 742
BM 743
BM 744
BM 745
BM 746
BM 747
BM 748
BM 749
BM 750
BM 751
BM 752
BM 753
BM 754
BM 755
BM 756
BM 757
BM 758
BM 759
BM 760
BM 761
BM 762
BM 763
BM 764
BM 765
BM 766
BM 767
BM 768
BM 769
BM 770
BM 771
BM 772
BM 773
BM 774
BM 775
BM 776
BM 777
BM 778
BM 779
BM 780
BM 781
BM 782
BM 783
BM 784
BM 785
BM 786
BM 787
BM 788
BM 789
BM 790
BM 791
BM 792
BM 793
BM 794
BM 795
BM 796
BM 797
BM 798
BM 799
BM 800
BM 801
BM 802
BM 803
BM 804
BM 805
BM 806
BM 807
BM 808
BM 809
BM 810
BM 811
BM 812
BM 813
BM 814
BM 815
BM 816
BM 817
BM 818
BM 819
BM 820
BM 821
BM 822
BM 823
BM 824
BM 825
BM 826
BM 827
BM 828
BM 829
BM 830
BM 831
BM 832
BM 833
BM 834
BM 835
BM 836
BM 837
BM 838
BM 839
BM 840
BM 841
BM 842
BM 843
BM 844
BM 845
BM 846
BM 847
BM 848
BM 849
BM 850
BM 851
BM 852
BM 853
BM 854
BM 855
BM 856
BM 857
BM 858
BM 859
BM 860
BM 861
BM 862
BM 863
BM 864
BM 865
BM 866
BM 867
BM 868
BM 869
BM 870
BM 871
BM 872
BM 873
BM 874
BM 875
BM 876
BM 877
BM 878
BM 879
BM 880
BM 881
BM 882
BM 883
BM 884
BM 885
BM 886
BM 887
BM 888
BM 889
BM 890
BM 891
BM 892
BM 893
BM 894
BM 895
BM 896
BM 897
BM 898
BM 899
BM 900
BM 901
BM 902
BM 903
BM 904
BM 905
BM 906
BM 907
BM 908
BM 909
BM 910
BM 911
BM 912
BM 913
BM 914
BM 915
BM 916
BM 917
BM 918
BM 919
BM 920
BM 921
BM 922
BM 923
BM 924
BM 925
BM 926
BM 927
BM 928
BM 929
BM 930
BM 931
BM 932
BM 933
BM 934
BM 935
BM 936
BM 937
BM 938
BM 939
BM 940
BM 941
BM 942
BM 943
BM 944
BM 945
BM 946
BM 947
BM 948
BM 949
BM 950
BM 951
BM 952
BM 953
BM 954
BM 955
BM 956
BM 957
BM 958
BM 959
BM 960
BM 961
BM 962
BM 963
BM 964
BM 965
BM 966
BM 967
BM 968
BM 969
BM 970
BM 971
BM 972
BM 973
BM 974
BM 975
BM 976
BM 977
BM 978
BM 979
BM 980
BM 981
BM 982
BM 983
BM 984
BM 985
BM 986
BM 987
BM 988
BM 989
BM 990
BM 991
BM 992
BM 993
BM 994
BM 995
BM 996
BM 997
BM 998
BM 999
BM 1000

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: John Lortie

Address: Woodlot Alt., Inc.
122 Main St, Topsham ME

Phone: _____ (H) 207 725 1199 (W)

Species observed:
American Bittern (Botaurus lentiginosus)

Date and Time of observation:
7/1/99 ~ 9:30 PM

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: East Lee, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: see map - large backwater above woods pond (approx. 1 Km) on western side of the river

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? call and visual

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: unknown - likely an adult

5. Evidence (if any) of breeding activity at this site: _____

(OVER)

6. Have you observed this species at this site in previous years? Yes

If yes, please give details: OBSERVED DURING 1998 FIELD SURVEYS

7. Description of habitat at this site: Cowardin classes = RAB, REM, PSS.

8. Observed or potential threats to the species or its habitat at this site: PCB contamination

9. Landowner's name and address, if known: MA Fish & Wildlife

10. Additional observations/comments:

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - ✓ Environmental Consultant
   - ✓ Degree in Biology: ✓ Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: 20+yrs experience

12. Briefly explain your previous field experience with this species: Have observed them during playback call surveys in ME, CT, MA. Have observed species during other surveys

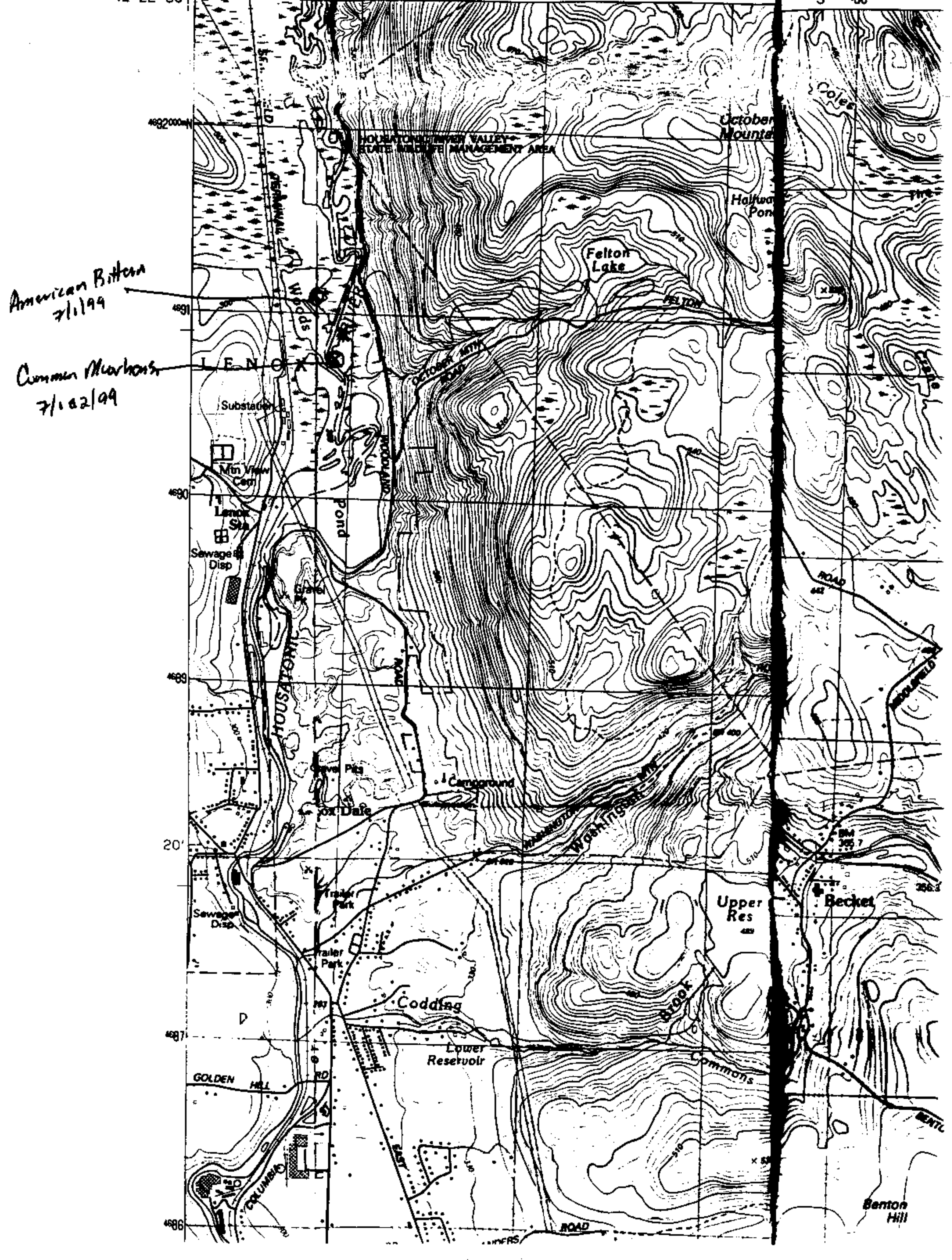
13. List names and qualifications of other observers (if any): Av 20 yrs WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 7/2/99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



American Bittern
7/1/99
Common Moorhen
7/1&2/99
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
4692000mN
4691
4690
4689
4687
4686
20′
Felton
Lake
FELTON
L E N O X
Woods
Pond
OCTOBER MTN
ROAD
WOODLAND
Substation
Mtn View
Cem
Lenox
Sta
Sewage
Disp
Gravel
Pit
HOUSATONIC
Gravel Pits
Campground
ox Dale
Washington Mtn
Trailer
Park
Upper
Res
Becket
Brook
Codding
Lower
Reservoir
Commons
GOLDEN
HILL
RD
COLUMBIA
ROAD
Benton
Hill
Coles

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Karol Worden

Address: Woodlot Alternatives
Topsham ME

Phone: 207 729-1199 (H) _____ (W)

Species observed: American Bittern (Botaurus lentiginosus)

Date and Time of observation: July 22, 1999, 1500

1. Location where species was observed:

a) Town: Washington County Berkshire USGS Map: East Lee, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Washington Mountain Lake, October Mountain State Forest

2. Number of individuals observed: One (1)

3. Was a positive ID possible? Yes Based on what field marks? Size, Coloration, flight posture

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Unknown

5. Evidence (if any) of breeding activity at this site: Unknown

(OVER)

Commonwealth of Massachusetts
Division of Fisheries & Wildlife 100 Cambridge St. Boston, MA 02202 (617) 727-9194, -3151

6. Have you observed this species at this site in previous years? No

If yes, please give details: _____

7. Description of habitat at this site: Palustrine emergent vegetation along edge of Washington Mountain Lake

8. Observed or potential threats to the species or its habitat at this site: None.

9. Landowner's name and address, if known: Massechusetts State Forest

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):

____ Amateur naturalist. Years of experience: ____
____ Conservation Commission member
____ Biology/science teacher
✓ Environmental Consultant
✓ Degree in Biology: ____ Bachelor's ✓ Master's ____ Ph. D.
____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: Observed in the field on a few other occassions

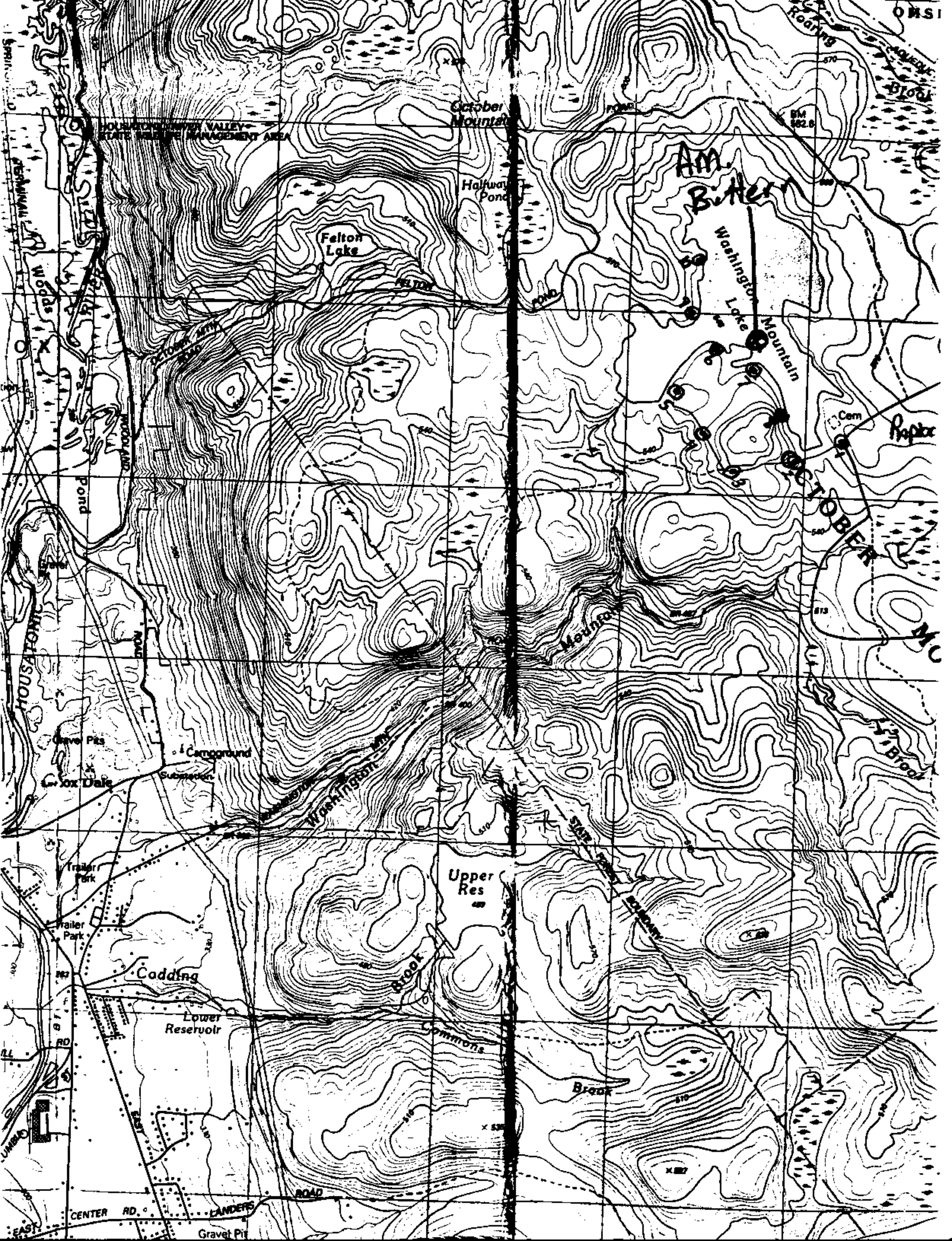
13. List names and qualifications of other observers (if any): Jonathan Milne, Natural Resource Management - Woodlot Alternatives

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: Karol A. Worden Date: 7-26-99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



October Mountain
HOUSATONIC VALLEY STATE WILDLIFE MANAGEMENT AREA
Halfway Pond
Felton Lake
FELTON
POND
ROAD
Washington Lake
Washington Mountain
OCTOBER
Woods Pond
HOUSATONIC
Gravel Pits
Campground
Substation
Trailer Park
Lower Reservoir
Upper Res
Brook
Commons
STATE FOREST BOUNDARY
Washington Mtn
Roaring
Cem
CENTER RD.
LANDERS
ROAD
Gravel Pit

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KAKWACKY

Address: WOODLOT ALTERNATIVES, INC.
122 MAIN ST., NO. 3 TOPSHAM, MAINE 04086

Phone: 207-729-1199 (H) _____ (W)
WORK

Species observed:
AMERICAN BITTERN - BOTAURUS LENTIGINOSUS

Date and Time of observation:
6MAY 99 - 1530

1. Location where species was observed:

a) Town: Washington County BERKSHIRE USGS Map: PITTSFIELD EAST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: WASHINGTON MTN. RESERVOIR ON TOP OF OCTOBER MTN. STATE FOREST, EAST OF WOODS POND (HOUSATONIC RIVER). LOCATED IN NORTHEASTER SECTION OF LAKE APPROX 1 KM NORTHEAST FROM THE PARKING AREA

2. Number of individuals observed: 1 (ONE)

3. Was a positive ID possible? YES Based on what field marks? SIZE, FLIGHT PATTERN, HABITAT, PLUMAGE

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: UNKNOWN

5. Evidence (if any) of breeding activity at this site: UNKNOWN

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: RESERVOIR/MARSH WITH PATCHES OF PHRAGMITES AUSTRALIS AND TYPHA LATIFOLIA ALONG THE EDGE.

8. Observed or potential threats to the species or its habitat at this site: NONE OBSERVED

9. Landowner's name and address, if known: STATE, POSSIBLY

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):
- ✓ Amateur naturalist. Years of experience: 10
- ___ Conservation Commission member
- ✓ Biology/science teacher
- ✓ Environmental Consultant
- ✓ Degree in Biology: ✓ Bachelor's ___ Master's ___ Ph. D.
- ___ Other. Please specify: AVIAN BIOLOGIST FOR PAST 6 YEARS

12. Briefly explain your previous field experience with this species: OBSERVED SPECIES ON MANY OCCASIONS WHILE BIRDING IN NJ, MA, ME

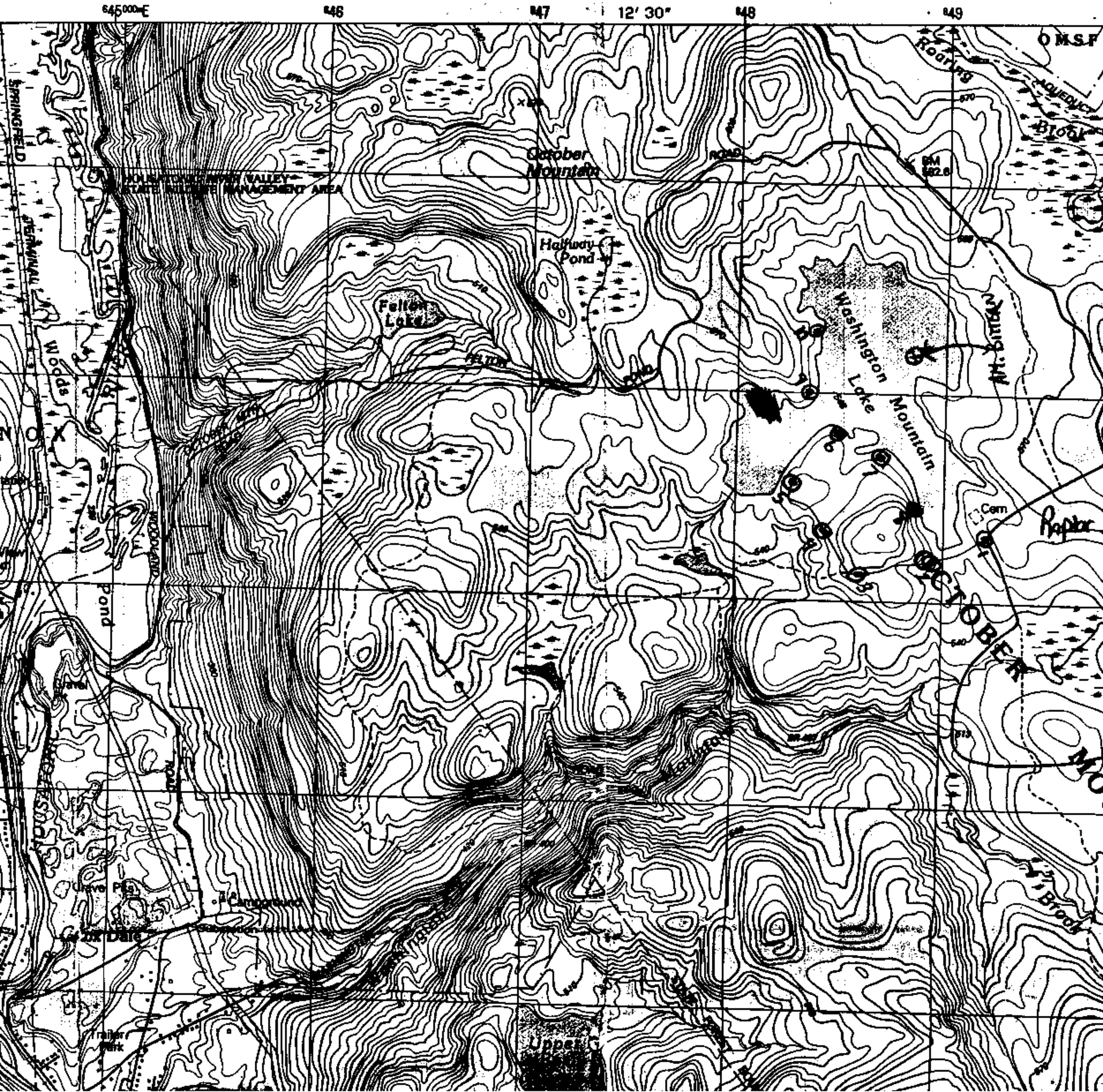
13. List names and qualifications of other observers (if any): NONE

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 6 MAY 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



645000mE
646
647
12′ 30″
648
649
O M S F
Roaring
Brook
AQUEDUCT
October Mountain
ROAD
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
SPRINGFIELD
TERMINAL
Halfway Pond
Felton Lake
FELTON
Washington Mountain Lake
Washington Mountain
Woods Pond
Cem
OCTOBER
Gravel
Gravel Pits
Campground
Trailer Park
Upper
Brook

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
AMERICAN BITTERN (BOTARUS LENTIGINOSUS)

Date and Time of observation:
23 AUG 00 1100

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: PITTSFIELD EAST, MASS.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: ACCESS HOUSATONIC RIVER FROM DECKER CANOE LAUNCH ON SOUTH SIDE OF NEW LENOX ROAD. CONTINUE DOWNSTREAM TO LOCATION

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE (DARK PRIMARY AND SOME SECONDARY FLIGHT FEATHERS AND COVERTS), SIZE, FLIGHT PATTERN, 'FREEZE' POSTURE, HABITAT

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE - UNKNOWN, SEX - UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: BIOLOGISTS WITH WOODLOT ALTERNATIVES OBSERVED SPECIES IN VICINITY IN 1999 AND 2000.

7. Description of habitat at this site: RIVERBANK CONSISTS OF ACER SACCHARINUM AND CORNUS SERICEA WITH AN ADJACENT WET MEADOW CONSISTING MAINLY OF PHALARIS ARUNDINACEA

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: STATE OF MASSACHUSETTS - HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: BIRD PERCHED ALONG RIVERBANK ON FALLEN TREE IN WATER

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - X Other. Please specify: AVIAN BIOLOGIST WITH 6+ YEARS EXPERIENCE

12. Briefly explain your previous field experience with this species: AVIAN BIOLOGIST, BIRD BANDER, AVID BIRDER

13. List names and qualifications of other observers (if any): NONE

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 20CT00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

AMERICAN BITTERN
Morewood Lake
Hollo Sch
HRVSWMA
Court Hill
Sackett
Gravel Pit
PIPELINE
Sucker Brook
HOUSATONIC RIVER
25'
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Barrage Pond
Barrage Pond Dam
MOUNTAIN
Sheffield
TURNPIKE
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
BM 298.4
New Lenox Sem
Mill Brook Reservoir
Mill
Sew Disp
HOUSATONIC
LENOX
Dewey Hill
510 000 FEET
Ridge
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
TOWER MOUNTAIN
STATE FOREST
Yokum Brook
42° 22' 30"
73° 15'
30 000 FEET
646
647
12' 3
INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1966
MILES 1

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: JOHN LOATHE

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:

AMERICAN BITTERN (BOTAURUS LENTIGINOSUS)

Date and Time of observation:

AM 23 AUG 00

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: PITTSFIELD EAST, MASS.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: ACCESS HOUSATONIC RIVER FROM DEEKER CANOE LAUNCH ON SOUTH SIDE OF NEW LENOX ROAD. OBSERVATION LOCATION IS APPROXIMATELY 250m DOWNSTREAM OF CANOE LAUNCH.

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, SIZE, FLIGHT PATTERN, POSTURE

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE - UNKNOWN, SEX - UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: BIOLOGISTS WITH WOODLOT ALTERNATIVES OBSERVED THIS SPECIES IN VICINITY IN 1999 AND 2000

7. Description of habitat at this site: RIVERBANK CONSISTS OF ACER SACCHARINUM AND CORNUS SERICEA WITH ADJACENT WET MEADOWS MAINLY COMPOSED OF PHALARIS ARUNDINACEA

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: STATE OF MASSACHUSETTS - HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: BIRD PERCHED ALONG RIVERBANK

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   ____ Environmental Consultant
   ____ Degree in Biology: ____ Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: >20 years field experience

12. Briefly explain your previous field experience with this species: I have performed bittern-specific surveys in the past

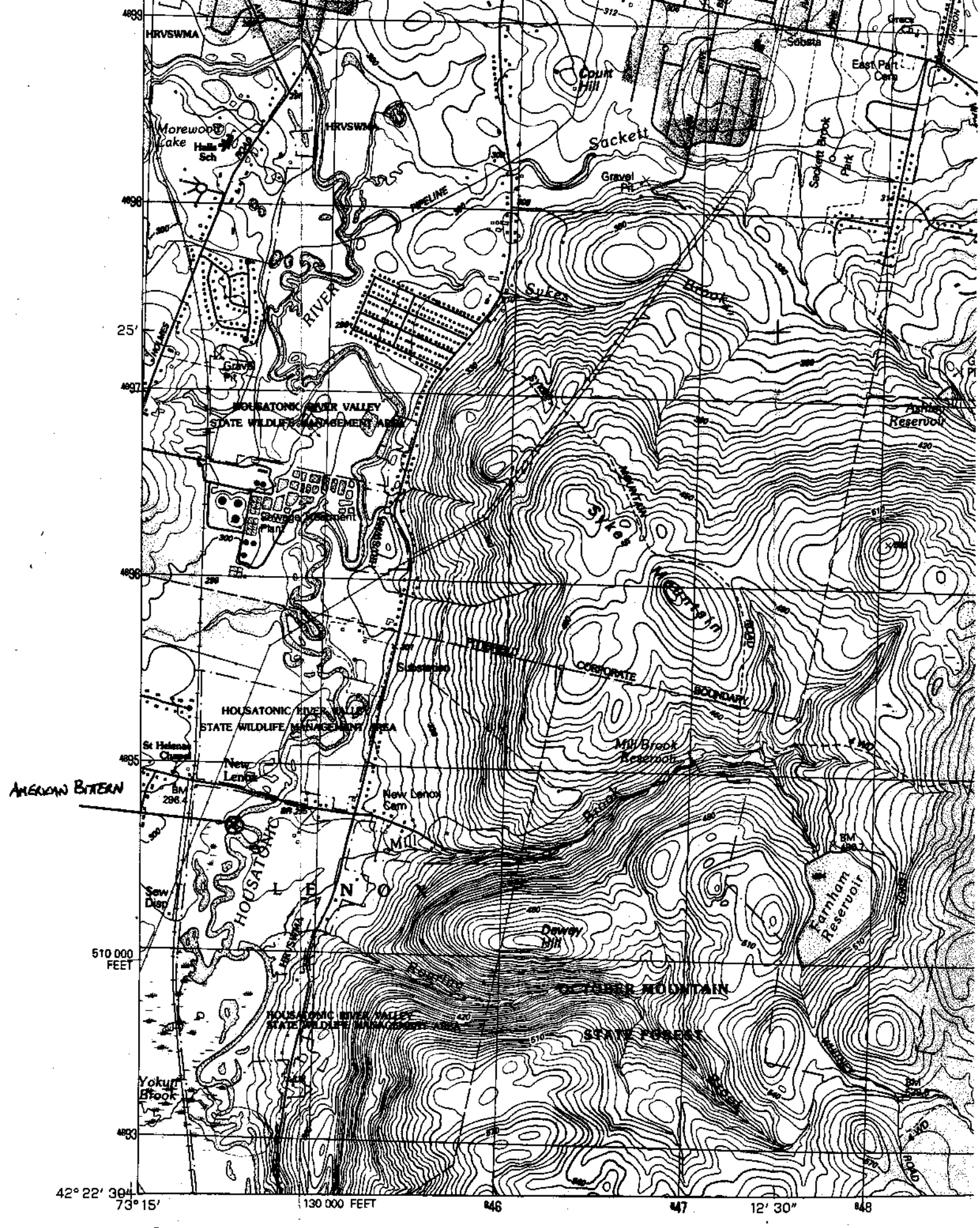
13. List names and qualifications of other observers (if any): ____

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature ____ Date: 11/4/00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1969

Natural Heritage &
Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: JOHN LORTIE

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
AMERICAN BITTERN (BOTAURUS LENTIGINOSUS)

Date and Time of observation:
AM 24 AUG 00

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: PITTSFIELD EAST, MASS.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: ACCESS HOUSATONIC RIVER FROM DECKER CANOE LAUNCH ON SOUTH SIDE OF NEW LENOX ROAD. OBSERVATION LOCATION IS APPROXIMATELY 500m DOWNSTREAM OF CANOE LAUNCH

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, SIZE, POSTURE, FLIGHT PATTERN

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE-UNKNOWN, SEX-UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: BIOLOGISTS WITH WOODLOT ALTERNATIVES OBSERVED SPECIES IN VICINITY IN 1999 AND 2009.

7. Description of habitat at this site: RIVERBANK CONSISTS OF ACER SACCHARINUM AND CORNUS SERICEA WITH AN ADJACENT WET MEADOW CONSISTING MAINLY OF PHALARIS ARUNDINACEA

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: STATE OF MASSACHUSETTS – HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: BIRD PERCHED ALONG RIVERBANK

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   ✓ Environmental Consultant
   ____ Degree in Biology: ____ Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: >20 yrs experience

12. Briefly explain your previous field experience with this species: ____

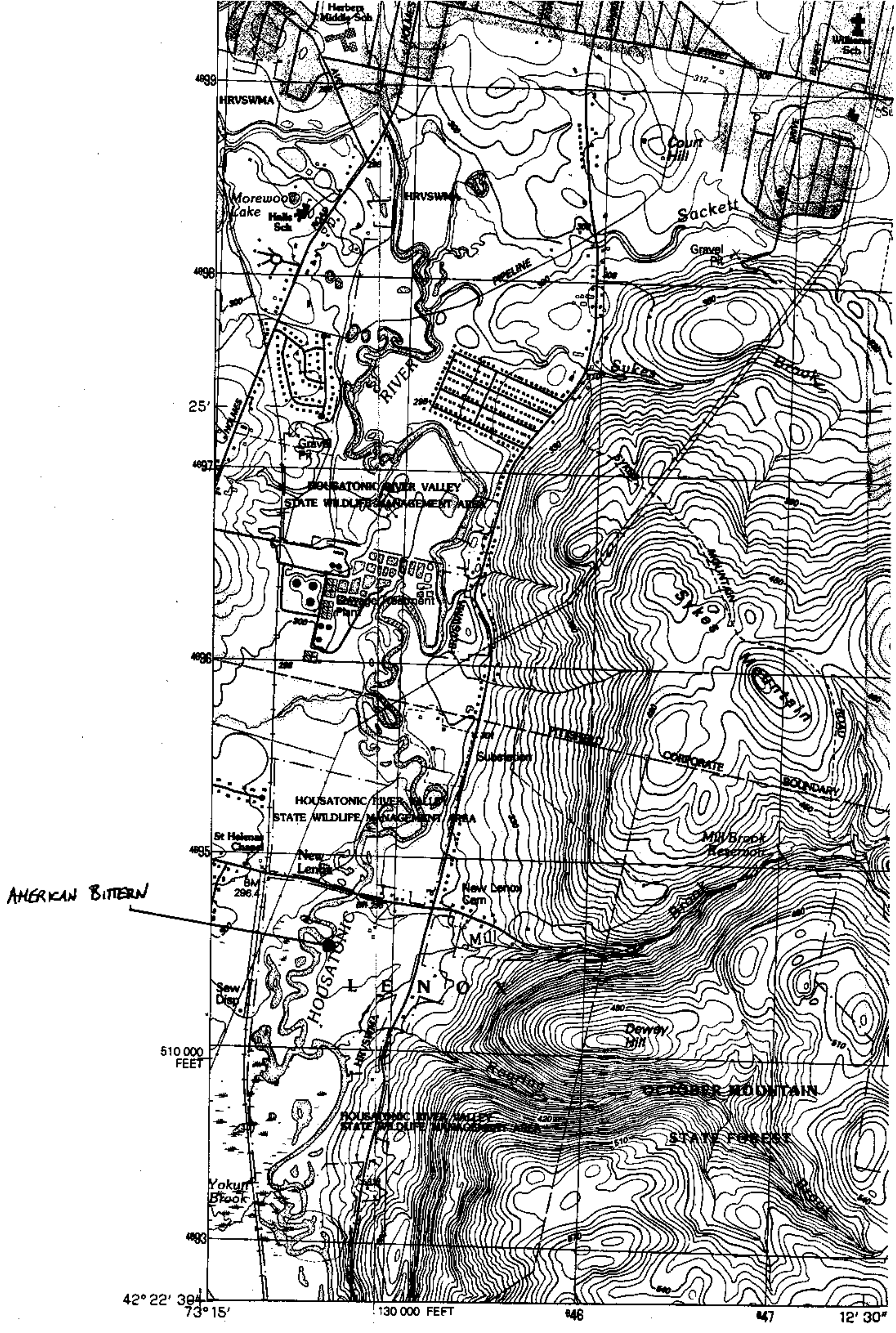
13. List names and qualifications of other observers (if any): ____

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature JPR Date: 11/4/10

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


AMERICAN BITTERN
Herberg Middle Sch
Williams Sch
HRVSWMA
Court Hill
Morewood Lake
Halls Sch
Sackett
Gravel Pit
PIPELINE
Sykes
Brook
RIVER
25′
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes Mountain
MOUNTAIN
Substation
CORPORATE
BOUNDARY
St Helenas Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill
Mill Brook Reservoir
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN
STATE FOREST
Yokun Brook
42° 22′ 30″
73° 15′
130 000 FEET
12′ 30″

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: CHRISTINA WEEKER

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: Am. BITTERN

Date and Time of observation: 20 SEPT 2000 15:00

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: 1

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FOLLOW THE HOUSATONIC RIVER SOUTH FROM NEW LENOX RD FOR APPROX 1 MILE. THE SMALL BACKWATER IS ON THE WEST SIDE OF THE RIVER

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? SIZE, COLORATION, BLACK WHISKER

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: UNKNOWN ADULT

5. Evidence (if any) of breeding activity at this site: NONE OBSERVED

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: Am BITTERNS SEEN IN HOUSATONIC RIVER BACKWATERS, NORTH OF WOODS POND, PERIODICALY FROM 1998 TO PRESENT

7. Description of habitat at this site: Am. BITTERN IN SHALLOW WATER ALONG THE EDGE OF A BACKWATER AMONG PONTEDERIA CORDATA, LYTHRUM SALICARIA, TYPHA LATIFOLIA BORDERED BY CORNUS SP.

8. Observed or potential threats to the species or its habitat at this site:

9. Landowner's name and address, if known:

10. Additional observations/comments: Am BITTERN SEEN EATING SMALL (APPROX. 2-3") RANA SP. (EITHER CATESBEIANA OR CLAMITANS)

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify:

12. Briefly explain your previous field experience with this species:

HEARD & OBSERVED SPECIES ON SEVERAL OCCASSIONS

13. List names and qualifications of other observers (if any):

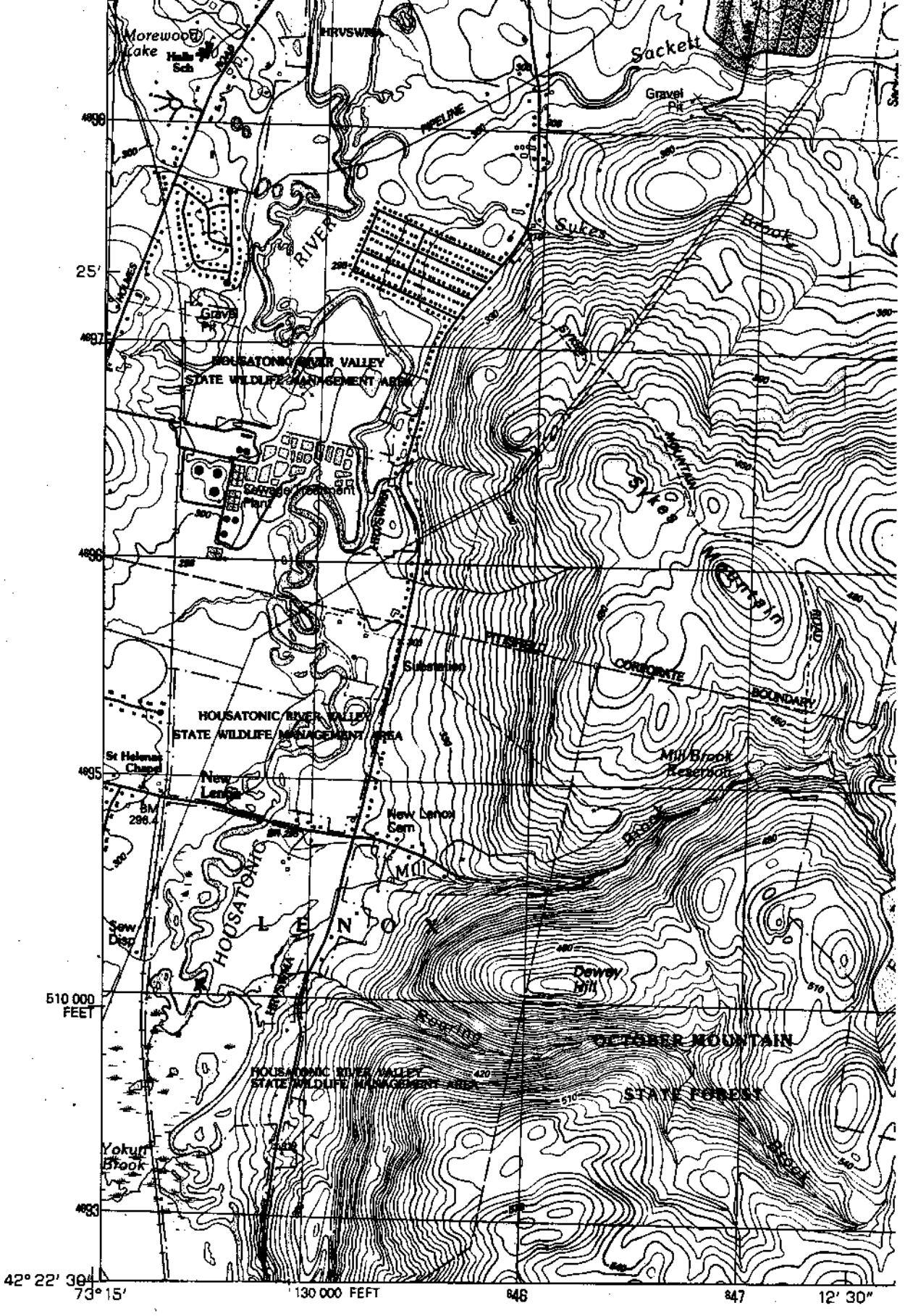
VICKI SCHOONARD, ENVIRONMENTAL CONSULTANT

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Christ M W Date: 10/3/00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1968

KILO

MILES 1

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Arthur Haines

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: 207-865-4283 (H) 207-729-1199 (W)

Species observed: American bittern (Botaurus lentiginosus)

Date and Time of observation: 22 September 2000, morning

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: Pittsfield East (1:25,000)

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: On the west side of the Housatonic River, and north side of New Lenox road is a cable-gated, single-lane gravel road that travels north to a field containing 2 EPRI Towers. The bird was on the west side of the first pool encountered on this road (+/- 30 meters north of New Lenox Road)

2. Number of individuals observed: one

3. Was a positive ID possible? yes Based on what field marks? morphology and habit of bird at rest and markings in flight (bill-up posture, dark markings on distal portion of wing)

Were photographs taken? yes
If yes, please submit one clear photograph of the animal. (animal is small in image)

4. Age and sex of individuals:

5. Evidence (if any) of breeding activity at this site: none observed

(OVER)

6. Have you observed this species at this site in previous years? yes

If yes, please give details: Occasional sightings of American bitterns along Housatonic River in Lenox

7. Description of habitat at this site: Deep Emergent marsh with shallow flooded water (up to 30 cm deep) bordered by low, dense shrubs.

8. Observed or potential threats to the species or its habitat at this site: None observed

9. Landowner's name and address, if known: Housatonic River Valley State Wildlife Management Area

10. Additional observations/comments: Individual observed foraging at marsh edge

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: ____

12. Briefly explain your previous field experience with this species: Observed on several occasions in MA and ME in numerous habitat types.

13. List names and qualifications of other observers (if any): Eugenie Moore, Environmental consultant

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Anita Hanny Date: 5 October 2000

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

HRVSWMA
Morewood Lake
Halls Sch
Court Hill
Sackett
Gravel Pit
East Part Cem
Sackett Brook Park
PIPELINE
RIVER
Sykes Brook
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Ashley Reservoir
Sewage Treatment Plant
Sykes Mountain
American bittern
PITTSFIELD CORPORATE BOUNDARY
Substation
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
BM 296.4
Mill Brook Reservoir
New Lenox Cem
Mill
HOUSATONIC
L E N O X
Sew Disp
Farnham Reservoir
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN
STATE FOREST
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
25′
42° 22′ 30″
73° 15′
30 000 FEET
646
647
12′ 30″
648
INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA
KILOMETERS 1
MILES 1
.5

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kirwacky

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
Arrow Clubtail (Stylurus spiniceps)

Date and Time of observation:
6 Jul 99, 27 Jul 99, 18 Aug 99

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Downstream of where New Lenox Rd crosses the Housatonic River (Decker Canoe Launch)

2. Number of individuals observed: 6 Jul 99 - 20 inds., 27 Jul 99 - 40 inds., 18 Aug 99 - 9 inds.

3. Was a positive ID possible? Yes Based on what field marks? _____

Exuvia. Identification completed by Jeremiah Trimble and Blair Nikula
Warwickport, MA 508-432-6348

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Exuvia

5. Evidence (if any) of breeding activity at this site: Yes

(OVER)

DFT

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BANK OF HOUSATONIC RIVER WITH EMERGENT AND SCRUB-SHRUB VEGETATION, ADJACENT TO FLOODPLAIN FOREST; RIVER IS DEEP AND SLOW-MOVING; MUD BOTTOM

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS; OTHER SPECIES IDENTIFIED INCLUDE: ASHY CLUBTAIL, DUSKY CLUBTAIL, FAWN DARNER, LANCET CLUBTAIL

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any): KAREL WORDEN, CHRIS WERNER, EUGENIE MOORE, JONATHAN MILNE - WOODLOT ALTS.

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 2 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

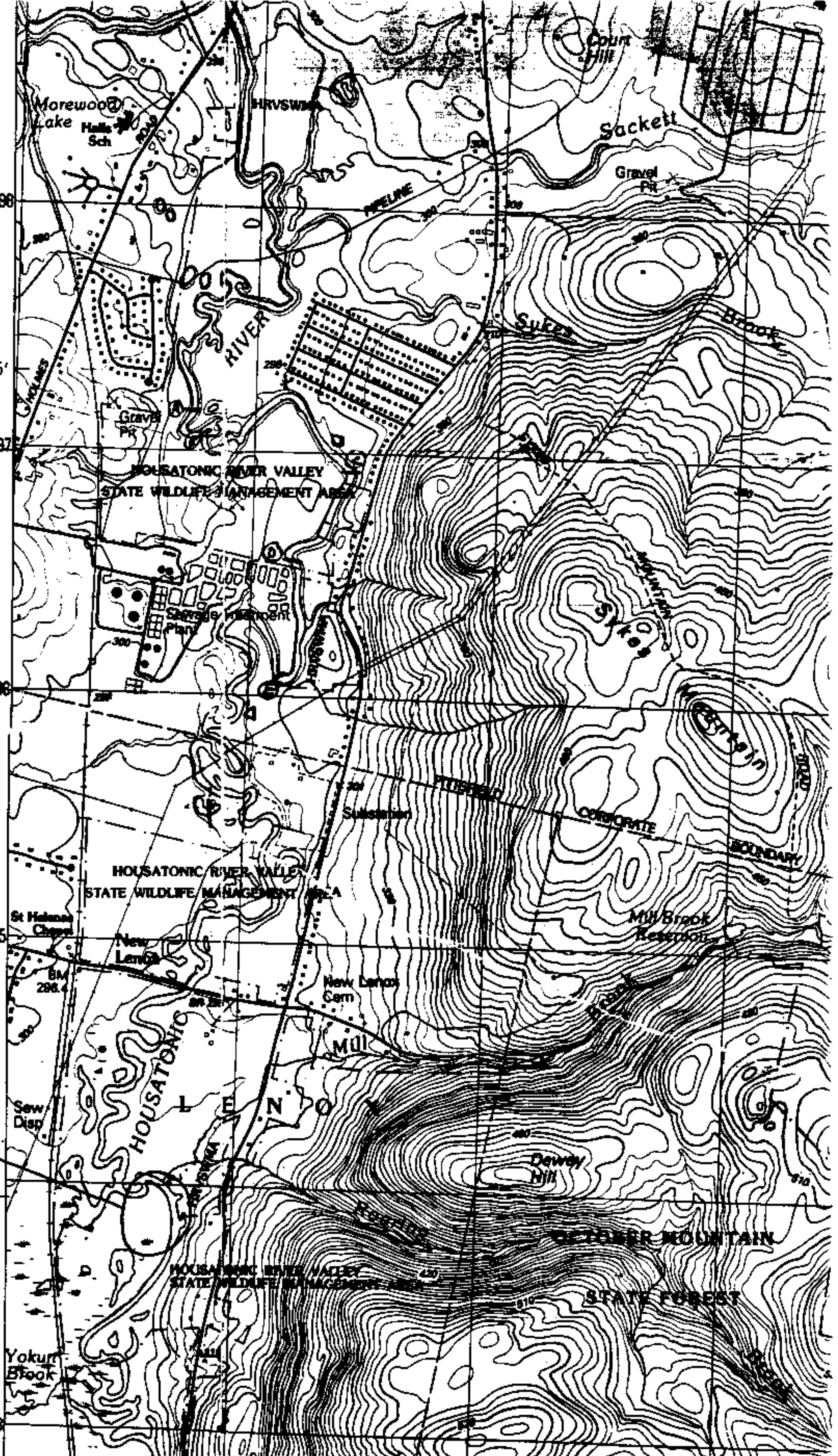
MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

* -Cobble / sand bottom
Backpack fishing

□ = Sand bottom,
Shallow
Backpack fishing

Δ = Deep section
good area for
Gill net

ARROW CLUBTAIL



Morewood Lake
Halls Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes Brook
25'
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes Mountain
Substation
PITTSFIELD CORPORATE BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN
STATE FOREST
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
42° 22' 30"
73° 15'
30 000 FEET
646
647
12'

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1988

MILES 1

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kalwacky

Address: ~~Woodlot Alternatives, Inc.~~ 122 Main Street ~~Topsham, Maine 04086~~

Phone: _____ (H) 207-729-1199 (W)

Species observed: ARROW CLUBTAIL (STYLURUS SPINICEPS)

Date and Time of observation: 6 JUN 99

1. Location where species was observed:

a) Town: Lenox County BERKSHIRE USGS Map: PITTSFIELD EAST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: DOWNSTREAM OF DEEKER CANOE LAUNCH (OFF NEW LENOX ROAD)

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? _____

DRAGONFLY SPECIMEN IDENTIFICATION COMPLETED BY JEREMIAH TRUMBLE AND BLAIR NIKULA NARWICHPORT, MA 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: TENERAL (YOUNG) MALE

5. Evidence (if any) of breeding activity at this site: NO

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BANK OF HOUSATONIC RIVER WITH SCRUB-SHRUB AND EMERGENT VEGETATION ADJACENT TO FLOODPLAIN FOREST; RIVER IS DEEP AND SLOW-MOVING

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: SPECIMEN COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES IDENTIFIED INCLUDE: ASHY CLUBTAIL, DUSKY CLUBTAIL, FAWN DARNER, LANCET CLUBTAIL, ZEBRA CLUBTAIL

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species:

GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any):

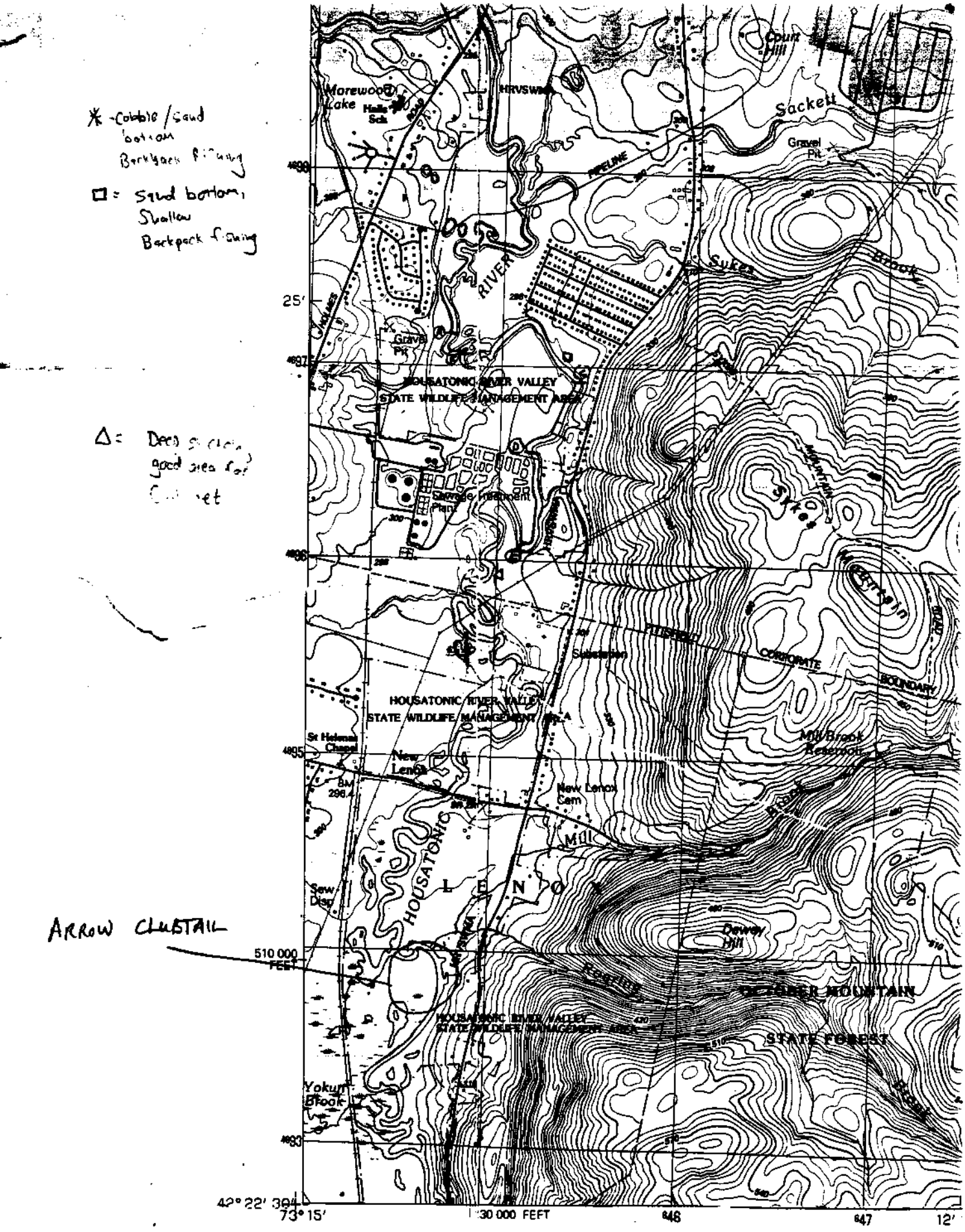
JONATHAN MILNE. DOUG STEWART – WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 2DEC99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



* - Cobble / Sand bottom Backpack flowing

□ = Sand bottom; Shallow Backpack flowing

△ = Deep [illegible] good area for [illegible]

ARROW CLUBTAIL

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kakwacky

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
Arrow Clubtail (Stylurus spiniceps)

Date and Time of observation:
6 Jul 99, 27 Jul 99, 17 Aug 99

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Upstream of where New Lenox Road crosses the Housatonic River

2. Number of individuals observed: 6 Jul 99 - 31 inds., 27 Jul 99 - 48 inds., 17 Aug 99 - 9 inds.

3. Was a positive ID possible? Yes Based on what field marks? _____

Exuvia. Identification completed by Jeremiah Trimble and Blair Nikula 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Exuvia

5. Evidence (if any) of breeding activity at this site: Yes

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BANK OF HOUSATONIC RIVER, WITH EMERGENT AND SCRUB-SHRUB VEGETATION, ADJACENT TO FLOODPLAIN FOREST; RIVER WIDE & SLOW-MOVING, MUD BOTTOM

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES INCLUDE: ZEBRA CLUBTAIL, BLACK-SHOULDERED SPINYLEG, COMMON GREEN DARNER, FAWN DARNER

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species:

GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any):

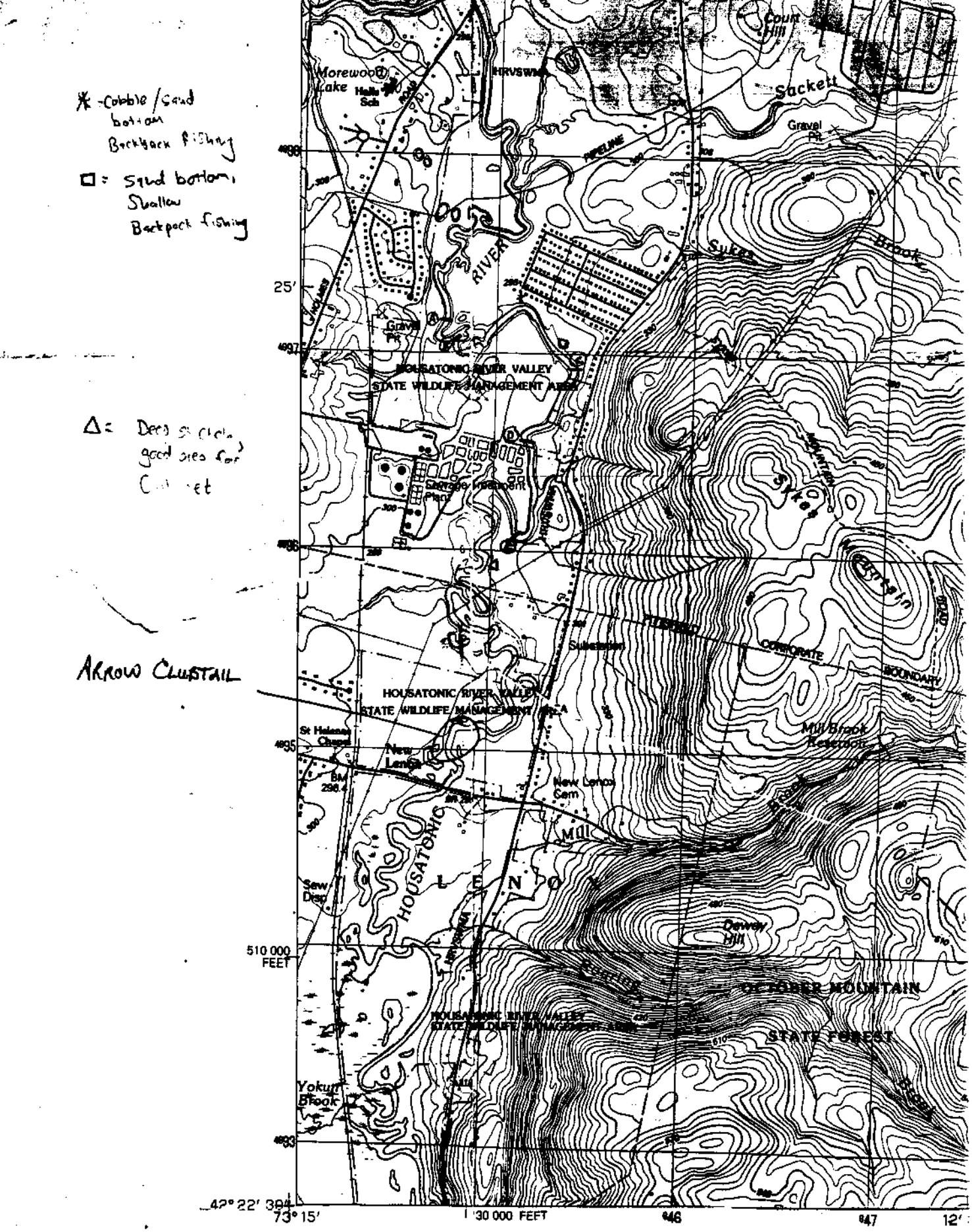
KAROL WRONSKI, CHRIS WERNER, EUGENIE MOORE, JONATHAN MICHE-WOODLOT ALTS.

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 2 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1988

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: ~~Woodlot Alternatives, Inc.~~
122 Main Street
~~Topsham, Maine 04086~~

Phone: _____ (H) 207-729-1199 (W)

Species observed:
ARROW CLUBTAIL (STYLURUS SPINICORNIS)

Date and Time of observation:
24 JUN 99

1. Location where species was observed:

a) Town: SHEFFIELD/GREAT BARRINGTON County BERKSHIRE USGS Map: GREAT BARRINGTON, MASS.-NY

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: THREE-MILE POND STATE WILDLIFE MANAGEMENT AREA. ROUTE 7 SOUTH OF GREAT BARRINGTON, TAKE BRUSH HILL ROAD TO SOUTHEAST.

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? DRAGONFLY SPECIMEN IDENTIFIED BY JEREMIAH TRIMBLE AND BLAIR NIKULA HARWICHPORT, MA 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: TENERAL (YOUNG) MALE

5. Evidence (if any) of breeding activity at this site: NO

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: MAN-CREATED POND WITH EMERGENT VEGETATION ALONG BANKS, STANDING WATER AND MUD BOTTOM.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: DRAGONFLY COLLECTED DURING OPPORTUNISTIC DRAGONFLY COLLECTION. OTHER SPECIES IDENTIFIED: TWELVE-SPOTTED SKIMMER, HALLOWEEN PENNANT, BLUE DASHER, RACKET-TAILED EMERALD

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

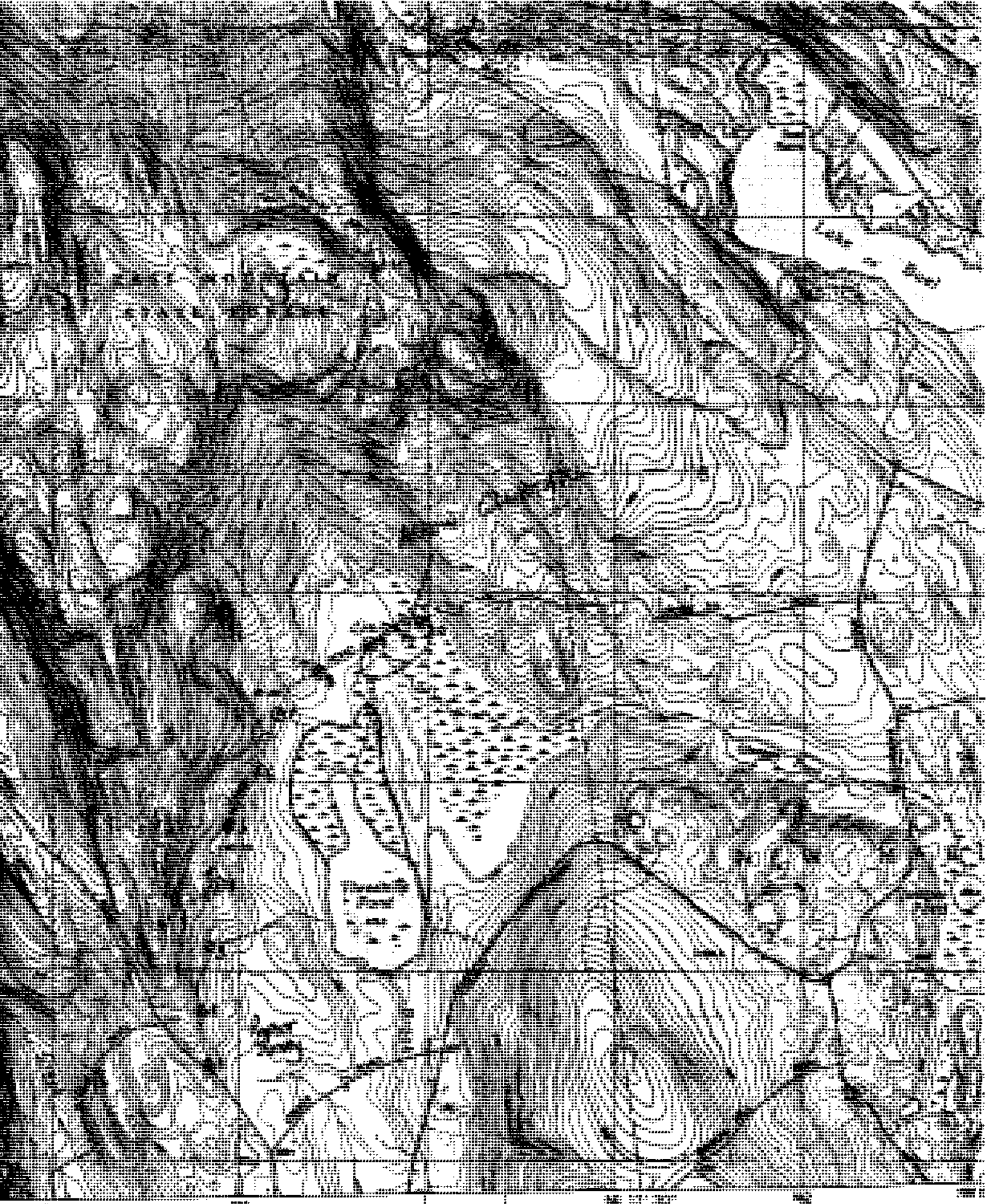
13. List names and qualifications of other observers (if any): CHRIS WERNER - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 2 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


GREAT B
2000
3000
4000
5000 METERS
6000
8000
10 000
12 000
14 000
16 000 FEET

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KNOWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
ARROW CLUBTAIL (STYLURUS SPINICEPS)

Date and Time of observation:
26 JUL 99, 19 AUG 99

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD EAST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: UPSTREAM OF PITTSFIELD WASTEWATER TREATMENT FACILITY OUTFLOW, EAST OF HOLMES ROAD

2. Number of individuals observed: 26 JUL 99 - 3 INDS., 19 AUG 99 - 3 INDS.

3. Was a positive ID possible? YES Based on what field marks? _____

EXUVIA IDENTIFICATION COMPLETED BY BLAIR NIKULA AND JEREMIAH TRIMBLE HARWICHPORT, MA 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: EXUVIA

5. Evidence (if any) of breeding activity at this site: YES

(OVER)

6. Have you observed this species at this site in previous years? NONE

If yes, please give details: _____

7. Description of habitat at this site: BANK ALONG HOUSATONIC RIVER ADJACENT TO FLOODPLAIN FOREST; RIVER IS QUICKWATER WITH COBBLE BOTTOM.

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES INCLUDE: ZEBRA CLUBTAIL, ASHY CLUBTAIL, DRAGONHUNTER, FAWN DARNER

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- A Environmental Consultant
- X Degree in Biology: A Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species:

GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any):

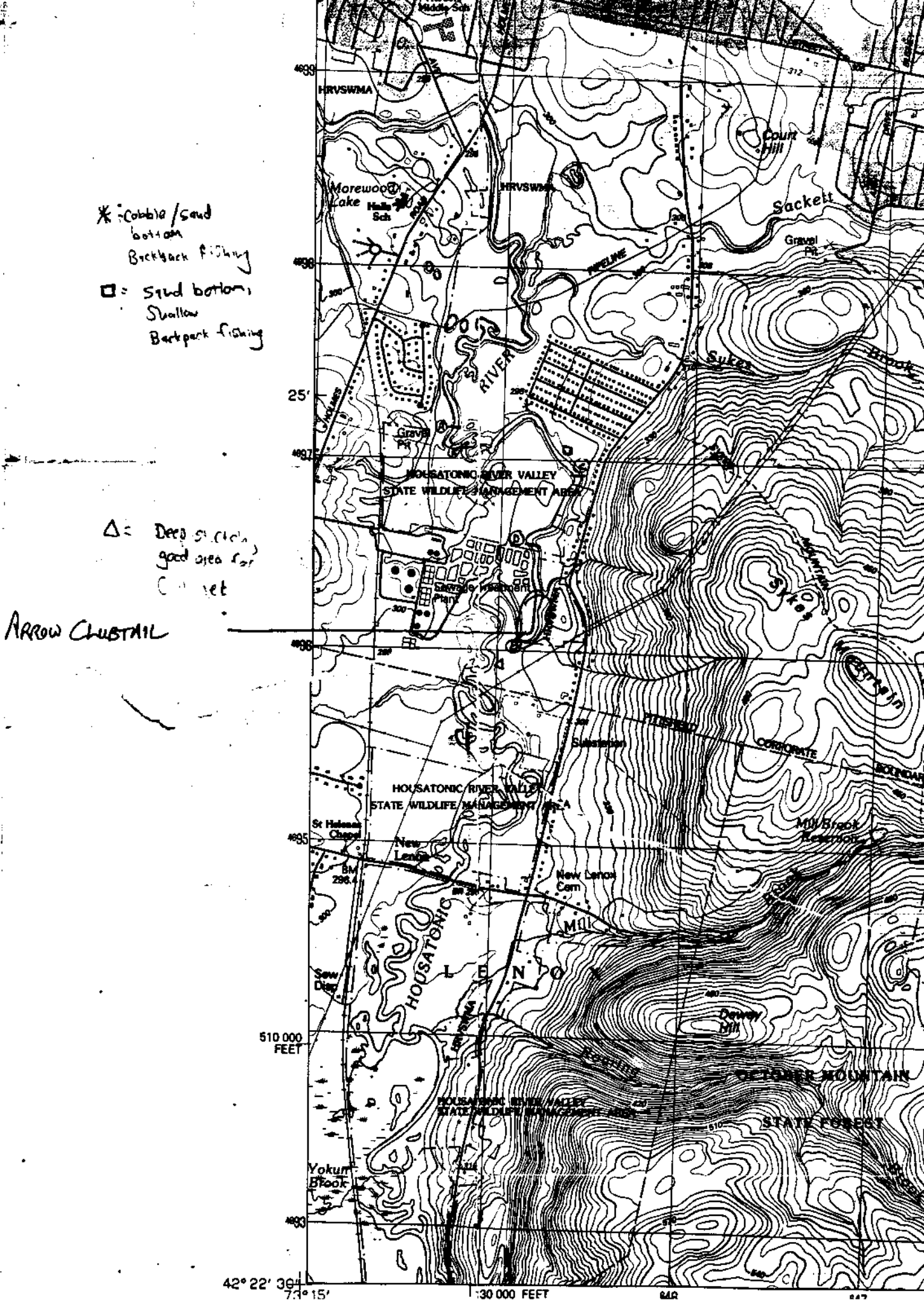
ARTHUR HAINES, EUGENIE MOORE, JONATHAN MILNE - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 1 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


* : Cobble / sand bottom Backpack fishing
□ : Sand bottom Shallow Backpack fishing
Δ : Deep ... good area for ... et
ARROW CLUBTAIL
HRVSWMA
Morewood Lake
Halls Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes
Brook
25'
Gravel Pit
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Substation
CORPORATE
St Helena Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN STATE FOREST
Yokum Brook
42° 22' 30"
7.5° 15'
30 000 FEET

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kolwicky

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
Arrow Clubtail (Stylurus spiniceps)

Date and Time of observation:
6 Jul 99, 21 Jul 99

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: upstream of Pittsfield Wastewater Treatment Facility; east of Holmes Road

2. Number of individuals observed: 6 Jul 99 - 12 inds., 21 Jul 99 - 23 inds.

3. Was a positive ID possible? Yes Based on what field marks? _____

Exuvia identification completed by Jeremiah Trimble and Blair Nikula Warwick Mass, MA 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Exuvia

5. Evidence (if any) of breeding activity at this site: Yes

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BANK OF HOUSATONIC RIVER ADJACENT TO FLOODPLAIN FOREST; RIVER IS QUICKWATER WITH COBBLE BOTTOM

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES INCLUDE: RUSTY SNAKETAIL, FAWN DARNER, ASHY CLUBTAIL, ZEBRA CLUBTAIL

11. Qualifications of observer (check all that apply):
    - ____ Amateur naturalist. Years of experience: ____
    - ____ Conservation Commission member
    - ____ Biology/science teacher
    - X Environmental Consultant
    - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
    - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

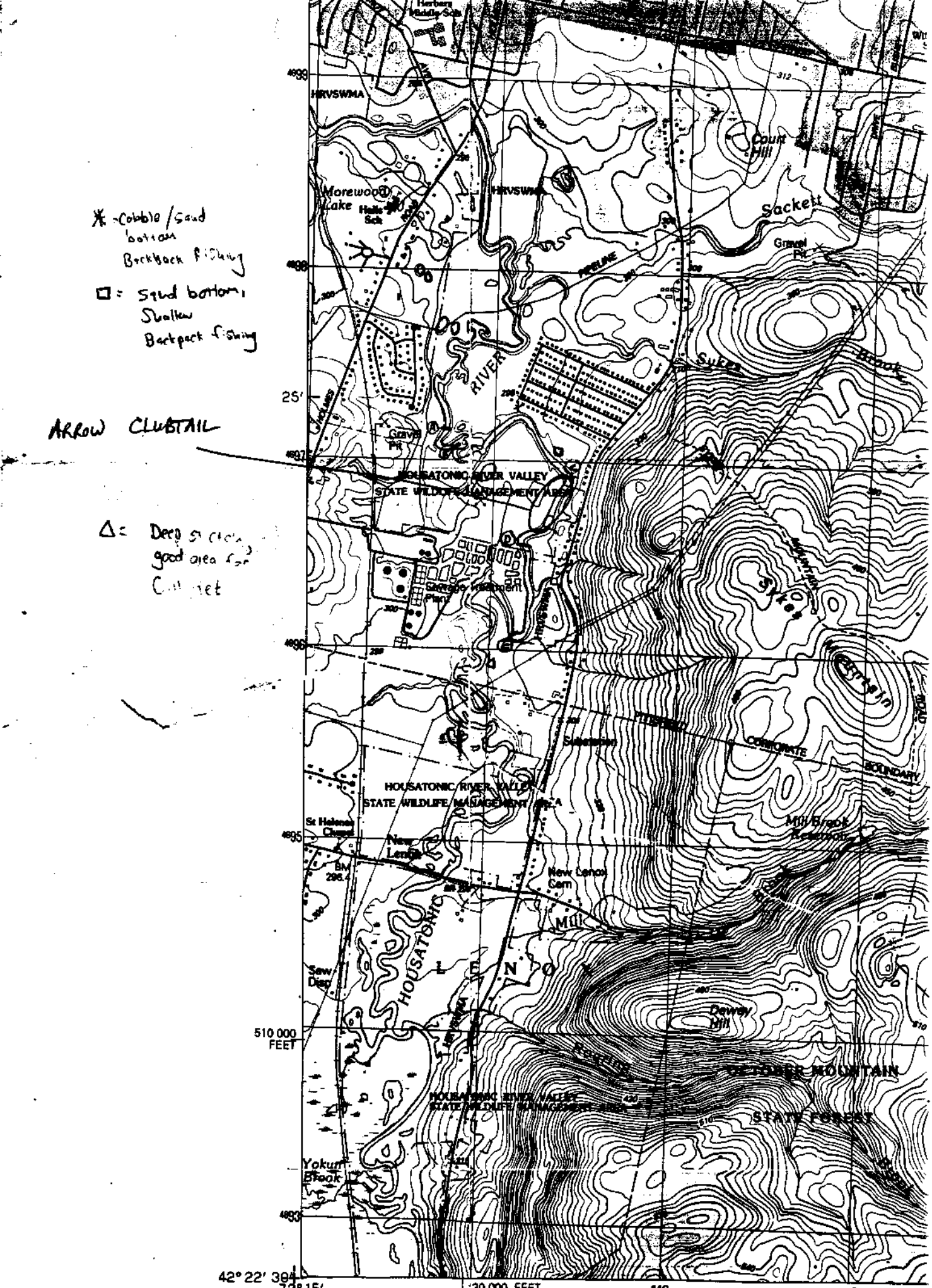
13. List names and qualifications of other observers (if any): KAREN WARREN, CHRIS WERNER - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 10 Dec 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



* = Cobble / Sand bottom Backpack fishing

□ = Sand bottom Shallow Backpack fishing

ARROW CLUBTAIL

Δ = Deep [illegible] good area for Clubtail

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kwiatkowski

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: Arrow Clubtail (Stylurus spiniceps)

Date and Time of observation: 21 Jul 99 AM

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: ~~Start~~ Located upstream of Wahconah Pomeroy Ave. Bridge crosses the Housatonic River, Downstream of the confluence of the East and West Branches of the Housatonic River

2. Number of individuals observed: 12

3. Was a positive ID possible? Yes Based on what field marks? _____

Exuvia identification completed by Jeremiah Trimble and Blair Nikula Hadwichport, MA 508-432-6348.

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Exuvia

5. Evidence (if any) of breeding activity at this site: ~~Habitat~~ Yes

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: STEEP BANK ALONG HOUSATONIC RIVER ADJACENT TO FORESTED UPLAND; RIVER IS SHALLOW, FAST-MOVING, COBBLE BOTTOM.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES INCLUDE: ZEBRA CLUBTAIL, ASHY CLUBTAIL, COMMON BASKETTAIL, FAWN DARNER, LANCET CLUBTAIL

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any): KAREN WORDEN CHRIS WERNER - WOODLOT ALTERNATIVES.

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 10 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

ARROW CLUBTAIL

* - Cobble / sand bottom
Backpack fishing

□ = Sand bottom, Shallow
Backpack fishing

Δ = Deep stretch
good area for
[illegible] net

PITTSFIELD
St Luke's Hospital
High Sch
Goodrich Pond
BRATTLE BROOK PARK
Deming Park
Fire Sta
DAVIES
MARION AVE
SAMPSON PKWY
WILLIAM
Egremont Sch
Herberg Middle Sch
HOLMES
BIRCHGROVE
MAPLEGROVE
ABOVEGROUND
STREET
HRVSWMA
Morewood Lake
Court Hill
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes Brook
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Sykes Mountain
Substation
CORPORATE BOUNDARY
St Helena Chapel
New Lenox
New Lenox Cem
Mill Brook Reservoir
BM 296.4
HOUSATONIC
4700
4699
4698
25'
4697
4696
4695

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: 207.846.6764 (H) 207.729.1199 (W)

Species observed: Bald Eagle

Date and Time of observation: 9.2.98

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: East Lee

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Backwater on Housatonic River. On west side of River, ± 0.75 north of Woods Pond.

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? White head & tail. Brown body

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Adult

5. Evidence (if any) of breeding activity at this site: None observed

(OVER)

Commonwealth of Massachusetts
Division of Fisheries & Wildlife 100 Cambridge St. Boston, MA 02202 (617) 727-9194, -3151

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: FLOODPLAIN FOREST, SHRUB WETLANDS SHALLOW &/SUBMERGED AQUATIC BED BACKWATERS WITH EMERGENT FRINGES ASSOCIATED W/ HOUSATONIC RIVER & WOODS POND.

8. Observed or potential threats to the species or its habitat at this site: —

9. Landowner's name and address, if known: —

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: FAMILIAR W/ EAGLES. HAVE CONDUCTED RAPTOR SURVEYS THROUGHOUT NORTHEAST.

13. List names and qualifications of other observers (if any): _____

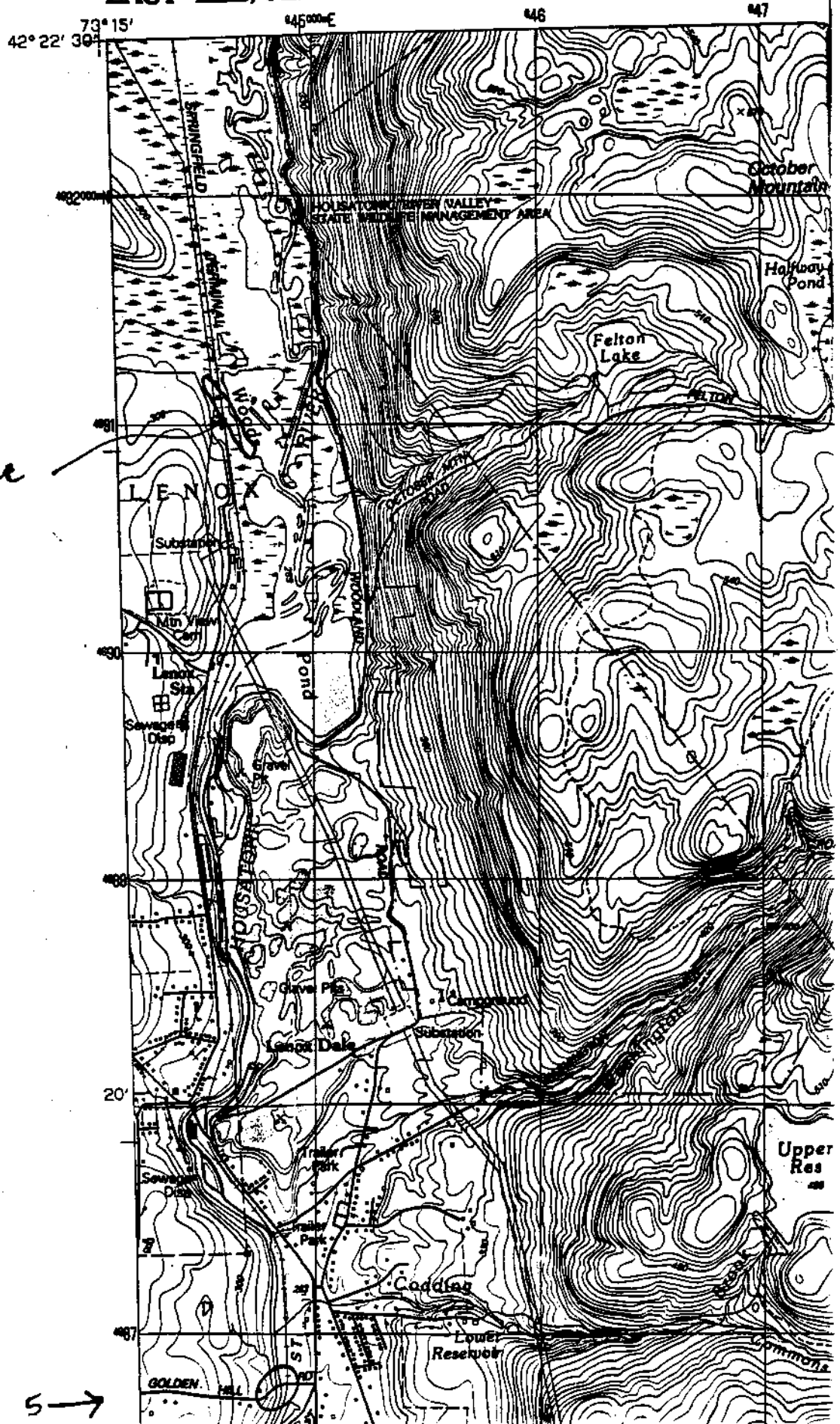
14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 9.2.98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

EAST LEE, MASSACHUSETTS



BALD ESQUIRE

5 →

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: T. Lortie

Address: 122 Main St., #3
Topsham, ME 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
Bald Eagle - adult

Date and Time of observation:
2/11/98 ~2:00 PM

1. Location where species was observed:

a) Town: Lee County Berkshire USGS Map: East Lee

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: From New Lenox Rd. turn south onto October Mountain Rd. Follow to Woods Pond, dirt road circles southern end of Woods Pond.

2. Number of individuals observed: 1

3. Was a positive ID possible? Y Based on what field marks? white head & tail; large size; flight pattern

Were photographs taken? N
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: adult; unknown sex

5. Evidence (if any) of breeding activity at this site: N

(OVER)

6. Have you observed this species at this site in previous years? N

If yes, please give details: _____

7. Description of habitat at this site: Woods Pond is an impoundment on the Housatonic River. The ponded area is dominated by PAB habitat.

8. Observed or potential threats to the species or its habitat at this site: e

9. Landowner's name and address, if known: _____

10. Additional observations/comments: e

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- ✓ Environmental Consultant
- ✓ Degree in Biology: ✓ Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: Certified Wildlife Biologist

12. Briefly explain your previous field experience with this species:

Regularly observe eagles in Maine.

13. List names and qualifications of other observers (if any): _____

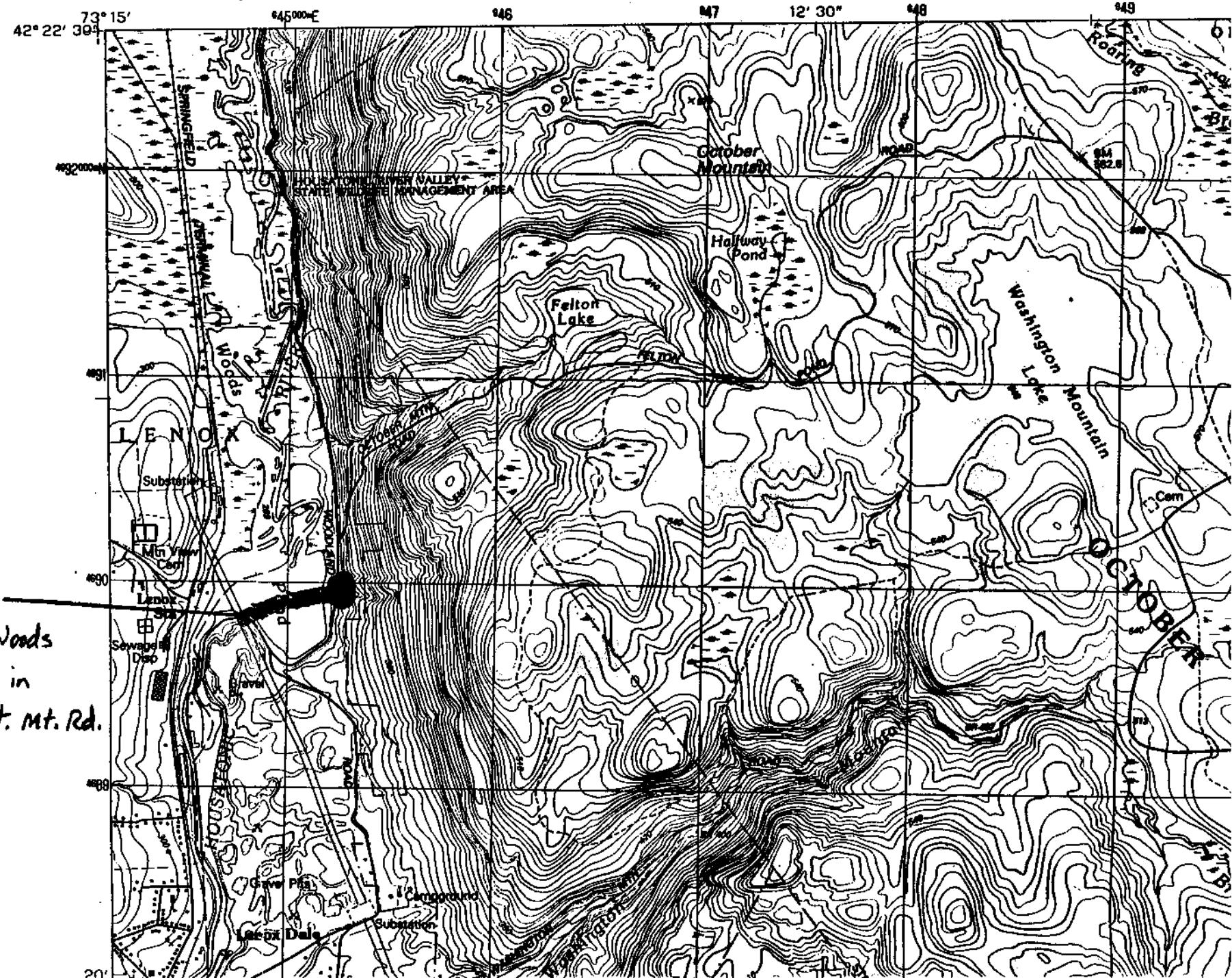
14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature J.L.R Date: 1/19/99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

EAST LEE, MASSACHUSETTS



Bald Eagle
Flying over Woods
Pond - Perched in
tree near Oct. Mt. Rd.

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Karol Worden

Address: Woodlot Alternatives Inc
Topsham, Maine

Phone: ——— (H) (207) 729-1199 (W)

Species observed: Bald Eagle (Haliaeetus leucocephalus)

Date and Time of observation: August 18, 1999 / 1345

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: East Lee, Mass.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: East on Housatonic Street toward Woods Pond, north on Willow Creek to its termination, east over the bank to the railroad tracks and approximately 1/4 mile north

2. Number of individuals observed: 1 (one)

3. Was a positive ID possible? Yes Based on what field marks? Body size, shape and coloration (brown body and white head and tail)

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Adult, but exact age unknown and sex unknown

5. Evidence (if any) of breeding activity at this site: None observed

(OVER)

6. Have you observed this species at this site in previous years? No

If yes, please give details: _____

7. Description of habitat at this site: PEM and open water on both sides of railroad tracks

8. Observed or potential threats to the species or its habitat at this site: None

9. Landowner's name and address, if known: UnKnown

10. Additional observations/comments: None

11. Qualifications of observer (check all that apply):
- ✓ Amateur naturalist. Years of experience: 10
- ____ Conservation Commission member
- ____ Biology/science teacher
- ____ Environmental Consultant
- ✓ Degree in Biology: ____ Bachelor's ✓ Master's ____ Ph. D.
- ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: Observed in the wild and in captivity

13. List names and qualifications of other observers (if any): Chris Werner, B.S. in Biology - Woodlot Alternatives

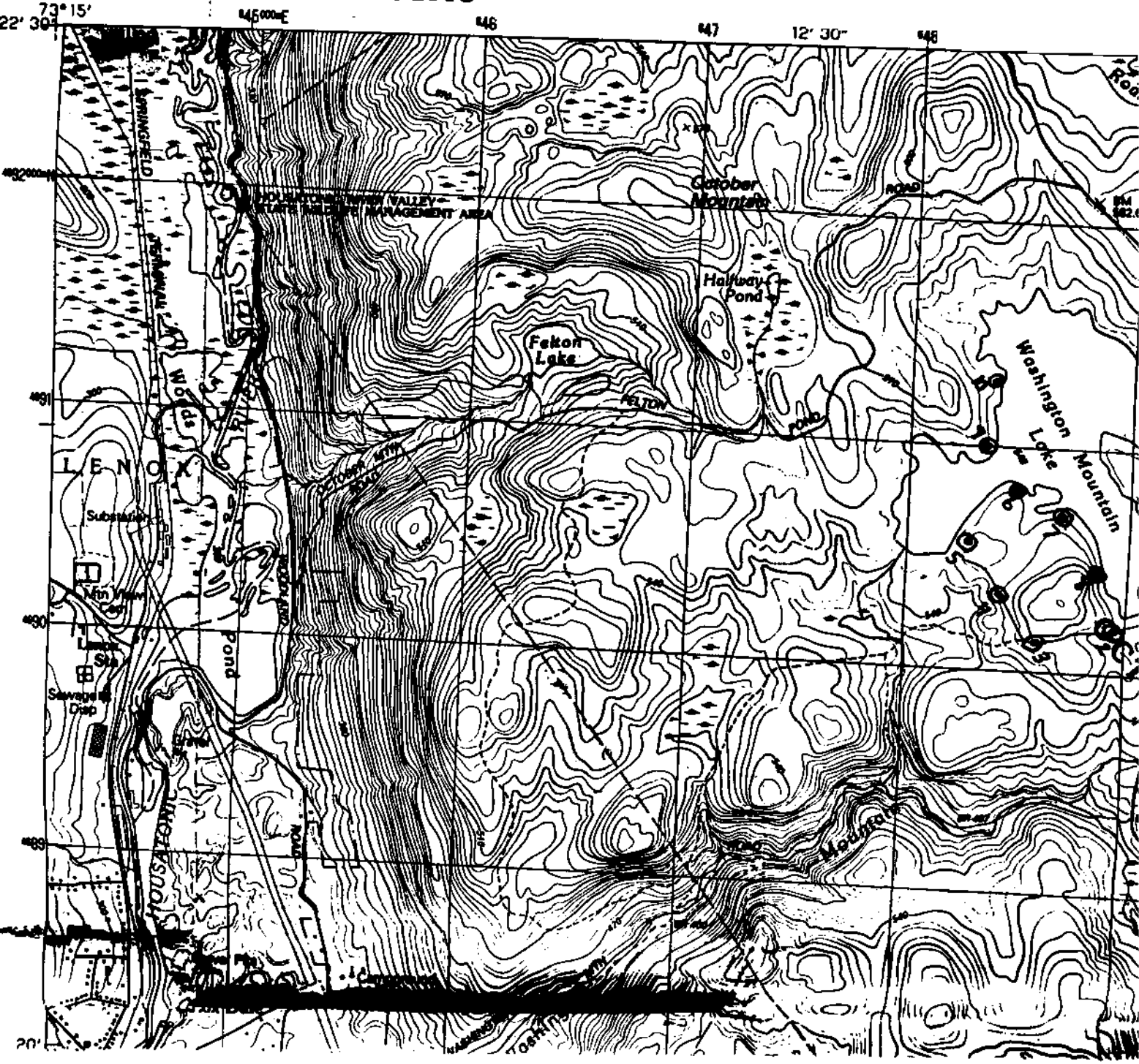
14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Karol A. Worden Date: 8-19-99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

EAST LEE, MASSACHUSETTS



Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: CHRISTINA WERNER

Address: ~~Woodlot Alternatives, Inc.~~
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-721-1199 (W)

Species observed:
BALD EAGLE (*HALIAEETUS LEUCOCEPHALUS*)

Date and Time of observation:
14 APRIL 2000

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: EAST LEE

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FROM RT 20 IN LEE TAKE HOUSATONIC STREET EAST TO LENOX RAILROAD STATION AND TURN LEFT ONTO WILLOW CREEK RD. FOLLOW WILLOW CREEK RD UNTIL IT ENDS IN PARKING LOT, CONTINUE ALONG POWERLINE RIGHT OF WAY APPROX. 500 M NORTH TO LARGE BACKWATER ON EAST SIDE OF RR TRACKS.

2. Number of individuals observed: ONE

3. Was a positive ID possible? YES Based on what field marks? SIZE, PLUMAGE

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: IMMATURE - SMALL AMOUNT OF WHITE ON HEAD, DARK TAIL SEX UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: SPECIES OBSERVED BY MYSELF AND OTHER WOODLOT ALTERNATIVES EMPLOYEES IN 1998, 1999, & 2000.

7. Description of habitat at this site: BACKWATER HABITAT NORTH OF WOODS POND, PRIMARILY DEEP EMERGENT MARSH DOMINATED BY LYTHRUM SALICARIA, TYPHA LATIFOLIA, SCIRPUS CYPERINUS, SPHAGNUM EUREKARUM

8. Observed or potential threats to the species or its habitat at this site:

NONE OBSERVED

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: INDIVIDUAL PERCHED ON SNAG ON WEST SIDE OF BACKWATER AND CIRCLING ABOVE BACKWATER.

11. Qualifications of observer (check all that apply):

____ Amateur naturalist. Years of experience: ____

____ Conservation Commission member

____ Biology/science teacher

✓ Environmental Consultant

✓ Degree in Biology: ✓ Bachelor's ____ Master's ____ Ph. D.

____ Other. Please specify: ____

12. Briefly explain your previous field experience with this species:

2+ YRS EXPERIENCE AS FIELD BIOLOGIST, NUMEROUS BALD EAGLE SIGHTINGS

13. List names and qualifications of other observers (if any): NONE

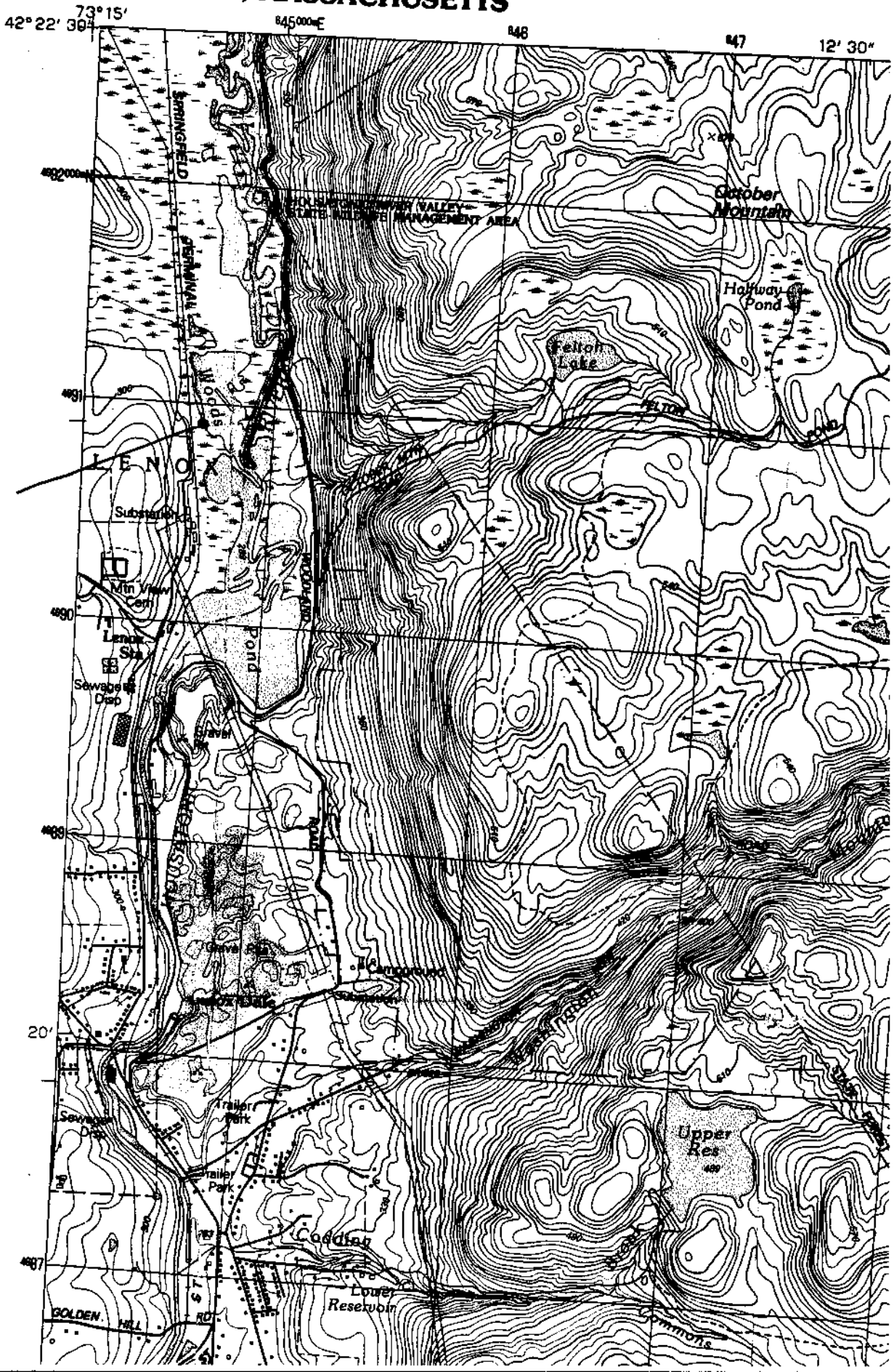
14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Christ M. W. Date: 20 MARCH 2001

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

EAST LEE, MASSACHUSETTS



BALD EAGLE

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
BALD EAGLE (HALIAEETUS LEUCOCEPHALUS)

Date and Time of observation:
23MAR00 1000

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: EAST LEE

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FROM ROUTE 20 IN LEE, TAKE HOUSATONIC STREET EAST TO LENOX STATION (RAILROAD STATION) AND TAKE LEFT, TRAVEL NORTH ALONG WILLOW CREEK ROAD. OBSERVATION OF BIRD ON RIGHT

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, FLIGHT PATTERN, PERCHING POSTURE

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE APPEARED AS SUB-ADULT. VERY LITTLE WHITE ON HEAD, DARK TAIL.

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: SPECIES OBSERVED BY OTHER WOODLOT ALTERNATIVE BIOLOGISTS IN 1998 AND 1999 IN THE VICINITY OF WOODS POND.

7. Description of habitat at this site: BACKWATER HABITAT OF WOODS POND WITH EMERGENT VEGETATION. MAINLY PURPLE LOOSESTRIF (LYTHRUM SALICARIA) WITH ADJACENT FLOODPLAIN FOREST NEARBY

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: INDIVIDUAL PERCHED ON SNAG LOCATED IN BACKWATER, WEST OF RAILROAD TRACKS.

11. Qualifications of observer (check all that apply):

____ Amateur naturalist. Years of experience: ____
____ Conservation Commission member
____ Biology/science teacher
X Environmental Consultant
X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
X Other. Please specify: AVIAN BIOLOGIST 6+ YEARS EXPERIENCE

12. Briefly explain your previous field experience with this species:

AVIAN BIOLOGIST FOR 6+ YEARS, AVID BIRDER

13. List names and qualifications of other observers (if any):

CHRISTINA WERNER - BIOLOGIST, WOODLOT ALTERNATIVES

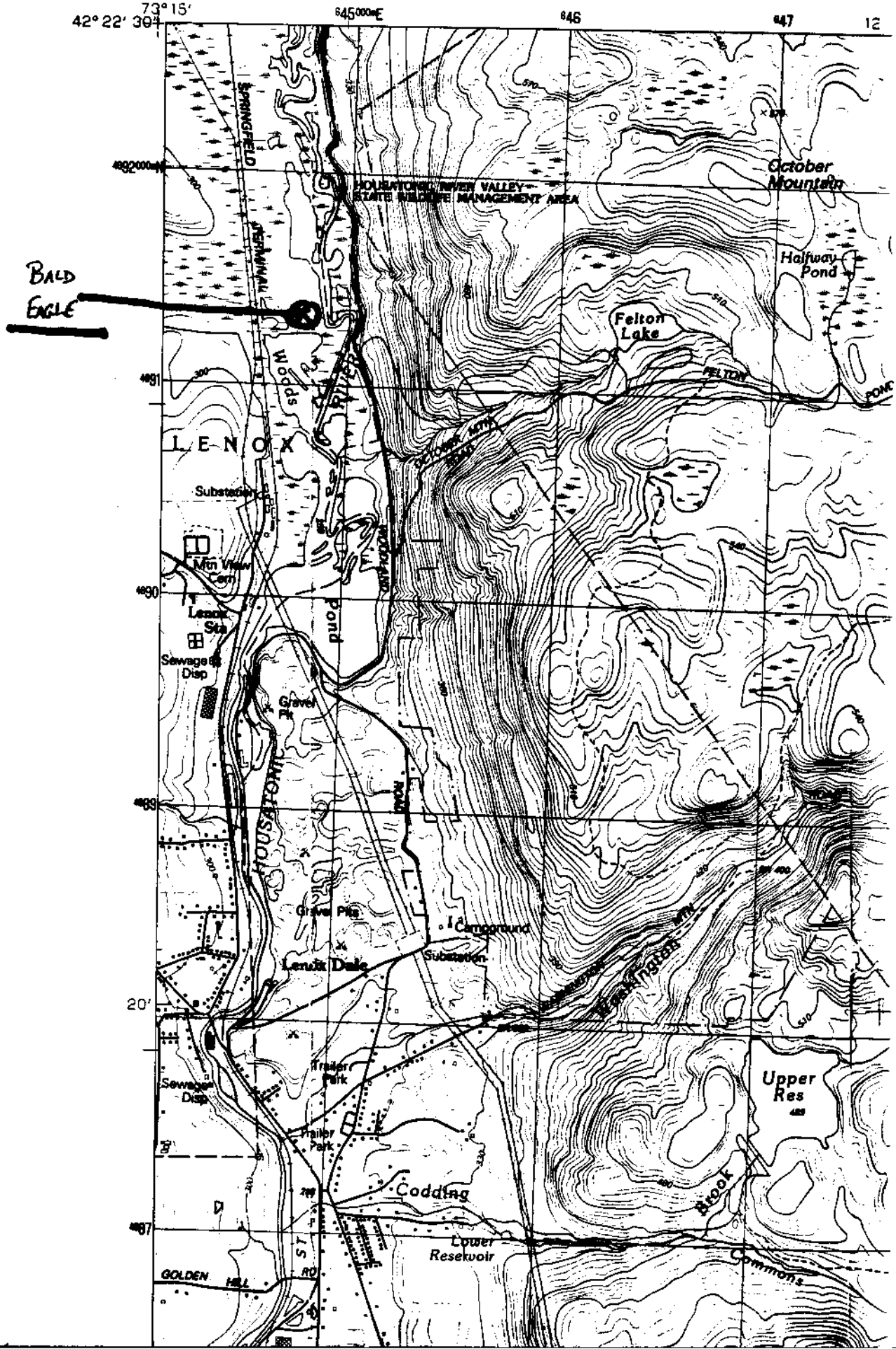
14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 27MAR00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

EAST LEE, MASSACHUSETTS



BALD EAGLE

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: JOHN LORTIE

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
BALD EAGLE (HALIAEETUS LEUCOCEPHALUS)

Date and Time of observation:
AM 23AUG00

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: EAST LEE, MASS.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: ACCESS HOUSATONIC HOUSATONIC RIVER FROM DECKER LAUNCH ON SOUTH SIDE OF NEW LENOX ROAD. OBSERVATION WAS AT CONFLUENCE OF HOUSATONIC RIVER AND YOKUM BROOK, APPROXIMATELY 2700m DOWNSTREAM FROM CANOE LAUNCH

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE (WHITE HEAD + TAIL, DARK BODY), FLIGHT PATTERN (FLAT-WINGED SOAR), SIZE

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE - APPEARED AS FULL ADULT, SEX-UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: SPECIES OBSERVED ALONG RIVER IN 1998, 1999, 2000 BY WOODLOT ALTERNATIVES BIOLOGISTS.

7. Description of habitat at this site: RIVER HABITATS INCLUDE EMERGENT MARSH, SCRUB SHRUB HABITAT, WET MEADOWS, FLOODPLAIN AND UPLAND FOREST

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: STATE OF MASSACHUSETTS - HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: BIRD OBSERVED SOARING

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ✓ Biology/science teacher
   - ____ Environmental Consultant
   - ____ Degree in Biology: ✓ Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: > 20 years field Experience

12. Briefly explain your previous field experience with this species:

I have observed this species for > 20 years.

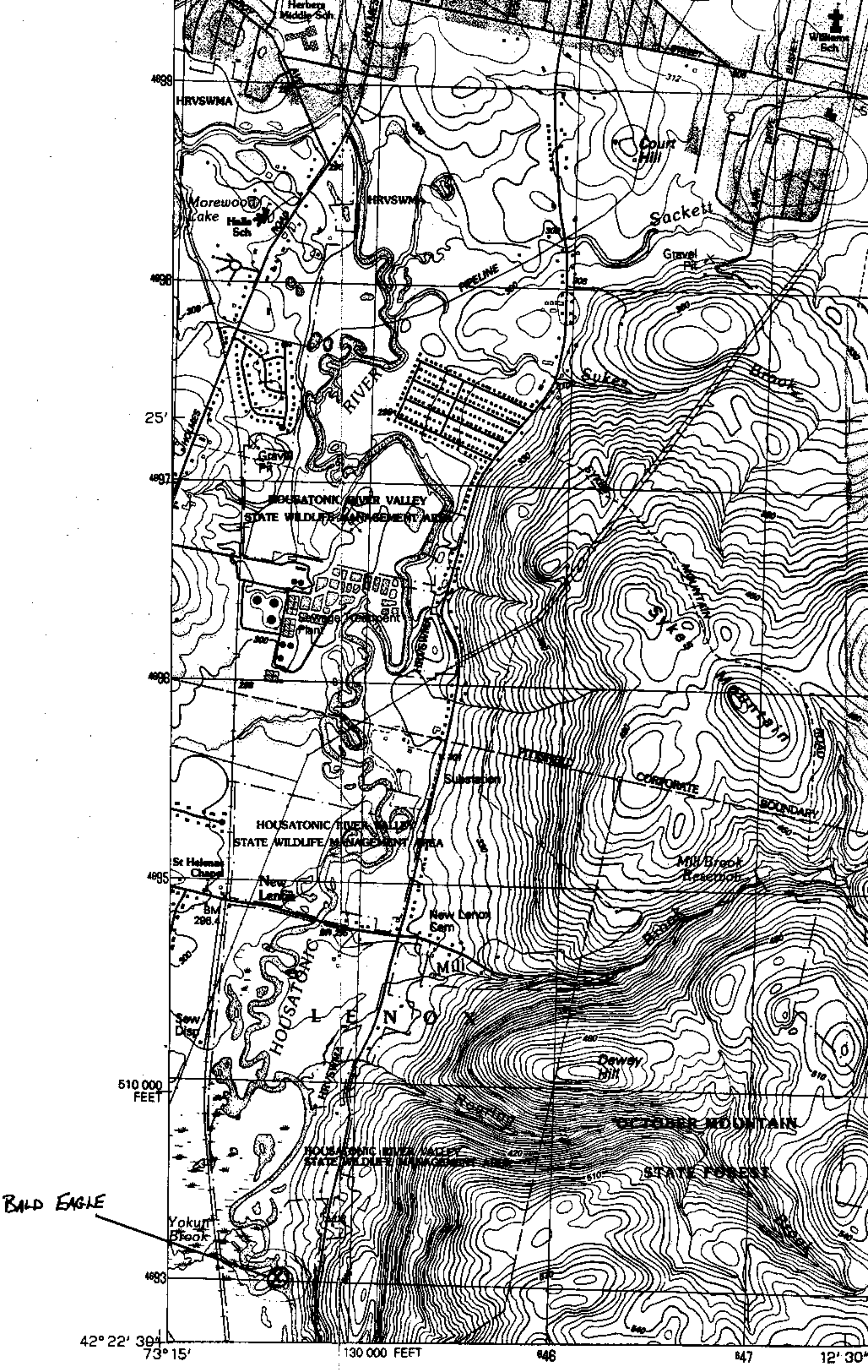
13. List names and qualifications of other observers (if any):

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 11/4/00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



Herberg Middle Sch
Williams Sch
HRVSWMA
Court Hill
Morewood Lake
Sackett
Gravel Pit
PIPELINE
Sykes
Brook
RIVER
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes Mountain
Substation
CORPORATE
BOUNDARY
St Helenas Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
Mill
Brook
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
Roaring
OCTOBER MOUNTAIN
STATE FOREST
Yokun Brook
BALD EAGLE
25′
510 000 FEET
42° 22′ 30″
73° 15′
130 000 FEET
646
647
12′ 30″

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
BALD EAGLE (HALIAEETUS LEUCOCEPHALUS)

Date and Time of observation:
24 AUG 00 1200

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: EAST LEE, MASS.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: ACCESS HOUSATONIC RIVER FROM DECKER CANOE LAUNCH ON SOUTH SIDE OF NEW LENOX ROAD. OBSERVATION WAS DOWNSTREAM OF CONFLUENCE WITH ROARING BROOK.

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE (WHITE HEAD + TAIL, DARK BODY), FLIGHT PATTERN (FLAT-WINGED SOAR), SIZE

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE - APPEARED AS FULL ADULT PLUMAGE
SEX - UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? YES.

If yes, please give details: SPECIES OBSERVED ALONG RIVER IN 1998, 1999 AND 2000 BY WOODLOT ALTERNATIVES BIOLOGISTS

7. Description of habitat at this site: RIVER HABITATS INCLUDE EMERGENT MARSH, SCRUB SHRUB HABITAT AND FLOODPLAIN AND UPLAND FOREST.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: STATE OF MASSACHUSETTS - HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: BIRD OBSERVED SOARING

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - X Other. Please specify: AVIAN BIOLOGIST 6+ YRS. EXPERIENCE

12. Briefly explain your previous field experience with this species: AVIAN BIOLOGIST, HAWK MIGRATION COUNTER, AND BIRDER

13. List names and qualifications of other observers (if any): JENN LORTIE - BIOLOGIST, WOODLOT ALTERNATIVES; DAVE WAGNER - RF WESTON, INC.

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 2OCT00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

● INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1988

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: BALD EAGLE (HALIAEETUS LEUCOCEPHALUS)

Date and Time of observation: 15 APRIL 2000 0900

1. Location where species was observed:

a) Town: Sheffield County BERKSHIRE USGS Map: GREAT BARRINGTON MASS.-N.Y.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FROM GREAT BARRINGTON, TRAVEL SOUTH ON ROUTE 7, MAKE A LEFT ONTO BRUSH HILL ROAD (Holmes Road). MAKE ANOTHER LEFT ONTO BRUSH HILL ROAD AND CONTINUE ~ 0.5 MILES TO METAL GATE ON RIGHT. CONTINUE THRU GATE AND FOLLOW ROAD TO WATER (Turkenite Pond)

2. Number of individuals observed: ONE

3. Was a positive ID possible? YES Based on what field marks? _____

PLUMAGE (WHITE HEAD + TAIL, DARK BODY + WINGS), FLIGHT PATTERN (FLAT-WINGED SOAR)

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ALMOST ADULT - WHITE HEAD/TAIL, AND DARK BODY, BUT SOME WHITE FEATHERS PRESENT ON UNDERWING COVERTS

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: A SHALLOW POND DOMINATED BY SUBMERGED AQUATIC VEGETATION WITH POCKETS OF EMERGENT MARSH AND SHRUB SWAMP WETLANDS AROUND THE PERIPHERY. AN UPLAND FOREST SURROUNDS THE POND.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: JWeemile Pond STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: NONE

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   X Other. Please specify: AVIAN BIOLOGIST FOR 6+ YEARS

12. Briefly explain your previous field experience with this species: FIELD BIOLOGIST WITH 8 YEARS EXPERIENCE, AVIAN BIOLOGIST FOR 6 YRS., AVID BIRDER

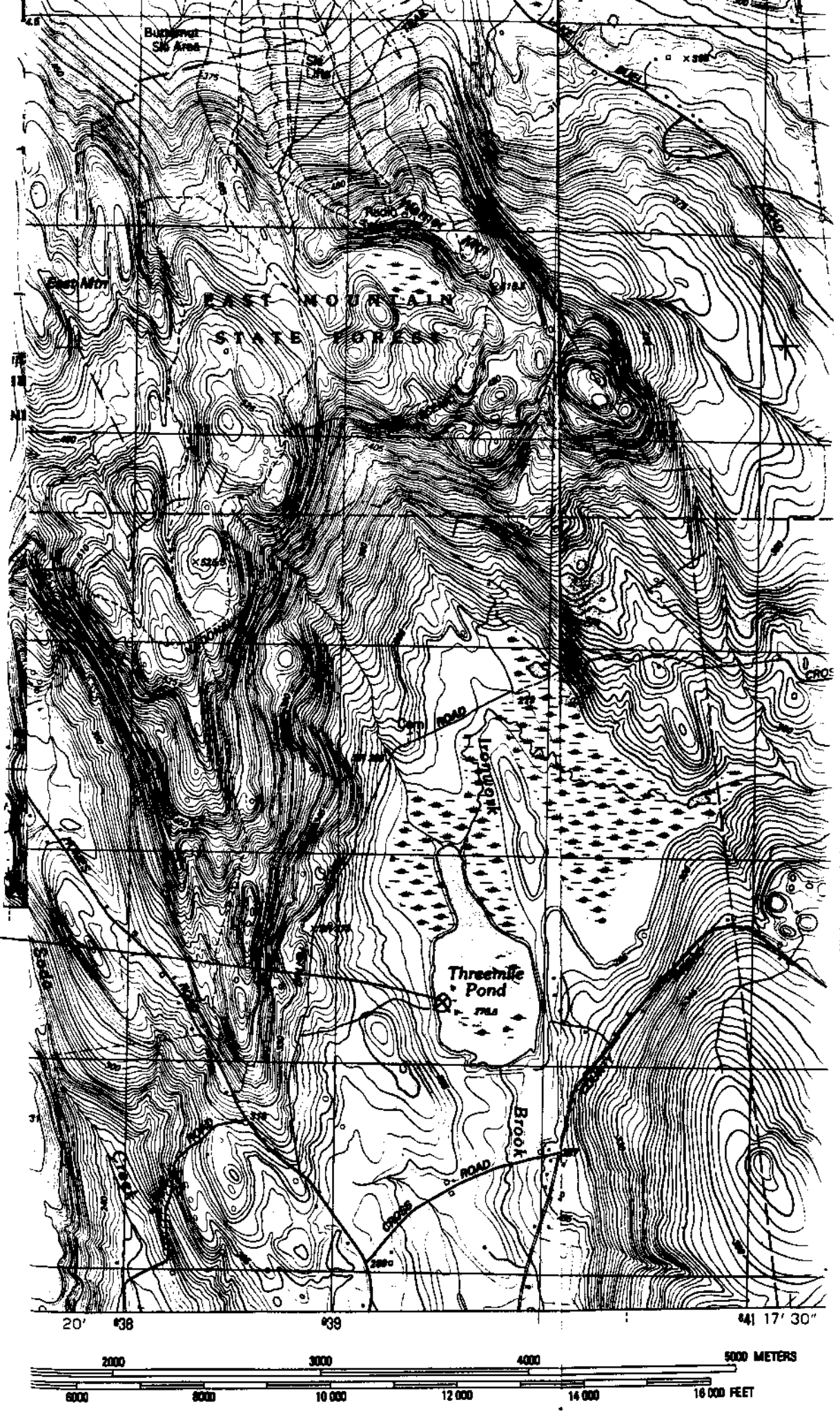
13. List names and qualifications of other observers (if any): NONE

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 16 APRIL

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


EAST MOUNTAIN
STATE FOREST
Threemile
Pond
Brook
ROAD
Creek
20'
41° 17' 30"
2000
3000
4000
5000 METERS
6000
8000
10 000
12 000
14 000
16 000 FEET

BALD EAGLE

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KANWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:

BLACKPOLL WARBLER (DENDROICA STRIATA)

Date and Time of observation:

28 MAY 99 AM

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: PITTSFIELD EAST

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: TRAVEL SOUTH ALONG RAILROAD TRACKS TO YOKUM BROOK. BIRD OBSERVED ON EAST SIDE OF TRACKS NORTH OF YOKUM BROOK.

2. Number of individuals observed: ONE

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, VOCALIZATION

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT MALE

5. Evidence (if any) of breeding activity at this site: NONE

5

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: TRANSITIONAL FLOODPLAIN FOREST AND RED MAPLE SWAMP ADJACENT TO THE HOUSATONIC RIVER

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: BIRD OBSERVED VOCALIZING AND FORAGING

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: BIRD BANDER AT MANOMET CENTER FOR CONSERVATION SCIENCES, AVID BIRDER

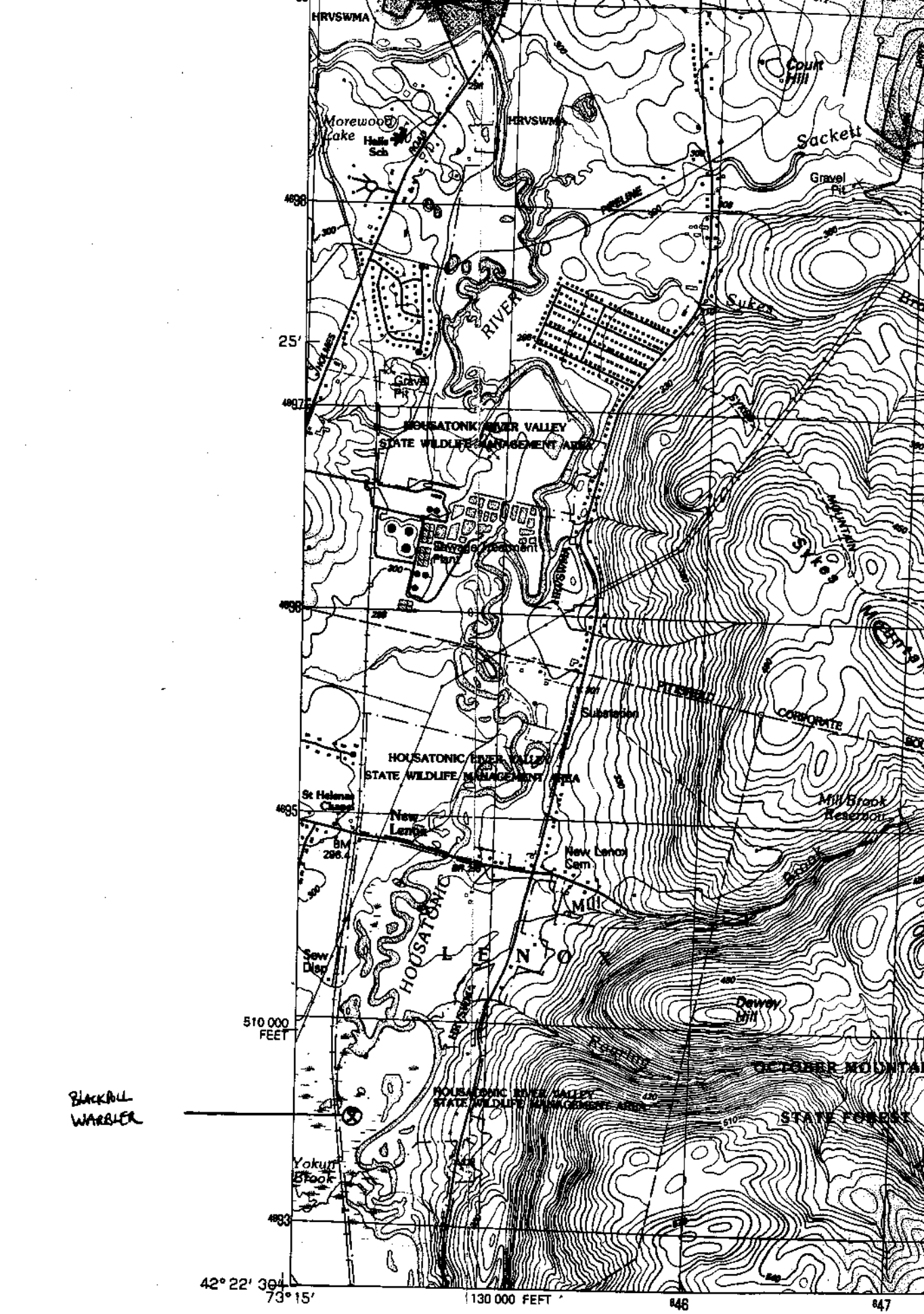
13. List names and qualifications of other observers (if any): ARTHUR HAMES - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 20MAR01

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



BLACKPOLL WARBLER

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1988

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:

BLACKPOLL WARBLER (DENDROICA STRIATA)

Date and Time of observation:

18 MAY 99 AM

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD EAST

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: CANOE MEADOWS (MASSACHUSETTS AUDUBON SOCIETY) IS LOCATED ON THE EAST SIDE OF HOLMES ROAD, JUST NORTH OF THE BRIDGE CROSSING THE HOUSATONIC RIVER

2. Number of individuals observed: ONE

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, VOCALIZATION

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT MALE

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: TRANSITIONAL AND HIGH-TERRACE FLOODPLAIN FOREST ADJACENT TO THE HOUSATONIC RIVER.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: MASSACHUSETTS AUDUBON SOCIETY

10. Additional observations/comments: OBSERVED VOCALIZING AND FORAGING

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: BIRD BANDER AT MANOMET CENTER FOR CONSERVATION SCIENCES, AVID BIRDER

13. List names and qualifications of other observers (if any): EUGENIE MOORE - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 20 MAR 01

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


BLACKPOLL WARBLER
PITTSFIELD
BEATTLE BROOK PARK
Goodrich Pond
Gravel Pits
Substation
Fire Sta
Dennin Park
St Luke's Hospital
Eagremont Sch
Herberg Middle Sch
Williams Sch
Morewood Lake
Halls Sch
Count Hill
Sackett
Sackett Brook Park
East Part Cem
HRVSWMA
Gravel Pit
PIPELINE
Sukes Brook
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Substation
CORPORATE BOUNDARY
Mill Brook Reservoir
St Helena's Chapel
New Lenox
New Lenox Cem
Sew Disp
HOUSATONIC
L E N O X
Farnham Reservoir
Dewey
20 KM TO
47'30"
25'

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KACWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
BLACKPOLL WARBLER (DENDROICA STRIATA)

Date and Time of observation:
17MAY 99, 20MAY 99 AM

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD EAST

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FOLLOW SOUTH ON BIKE TRAIL THAT BEGINS ON WEST SIDE OF HOUSATONIC RIVER AT POMEROY AVE. BRIDGE

2. Number of individuals observed: ONE

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, VOCALIZATIONS

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT MALE

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: TRANSITIONAL FLOODPLAIN FOREST ADJACENT TO THE HOUSATONIC RIVER

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: BIRD OBSERVED VOCALIZING AND FORAGING

11. Qualifications of observer (check all that apply):
   _____ Amateur naturalist. Years of experience: _____
   _____ Conservation Commission member
   _____ Biology/science teacher
   _____ Environmental Consultant
   X Degree in Biology: X Bachelor's _____ Master's _____ Ph. D.
   _____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: _____

BIRD BANDER AT MANOMET CENTER FOR CONSERVATION SCIENCES, AVID BIRDER

13. List names and qualifications of other observers (if any): _____

JOHN LORTIE, ARTHUR NAMES, EUGENIE MOORE, KAROL WARDEN - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 20 MAR 01

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progrm
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


BLACKPOLL WARBLER
PITTSFIELD
BEATTLE BROOK PARK
Gravel Pits
Substation
Goodrich Pond
Burbank
Fire Sta
Dorming Park
Fenn Park
Fenn Sch
Eremont Sch
Harbers Middle Sch
Williams Sch
Substa
East Part Cem
Court Hill
Morewood Lake
Hale Sch
HRVSWMA
Sackett
Sackett Brook Park
Gravel Pit
PIPELINE
RIVER
Sykes Brook
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Salvage Yard
Salvage Yard Pond
Sykes Mtn
Mill Brook Reservoir
CORPORATE BOUNDARY
St Helena Chapel
New Lenox
New Lenox Cem
Sew Disp
HOUSATONIC
L E N O X
Farnham Reservoir
20 KM TO
4700
4695
4690
4685
25'

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
BLACKPOLL WARBLER (DENDROICA STRIATA)

Date and Time of observation:
17MAY 99 AM

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: PITTSFIELD EAST

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FROM THE NEW LENOX ROAD BRIDGE, FOLLOW A DIRT ROAD NORTH ALONG THE WEST SIDE OF THE HOUSATONIC RIVER

2. Number of individuals observed: ONE

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, VOCALIZATION

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT MALE

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? NONE

If yes, please give details: _____

7. Description of habitat at this site: TRANSITIONAL FLOODPLAIN FOREST ADJACENT TO THE HOUSATONIC RIVER

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: BIRD OBSERVED VOCALIZING AND FORAGING

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: BIRD BANDER AT MANOMET CENTER FOR CONSERVATION SCIENCES, AVID BIRDER

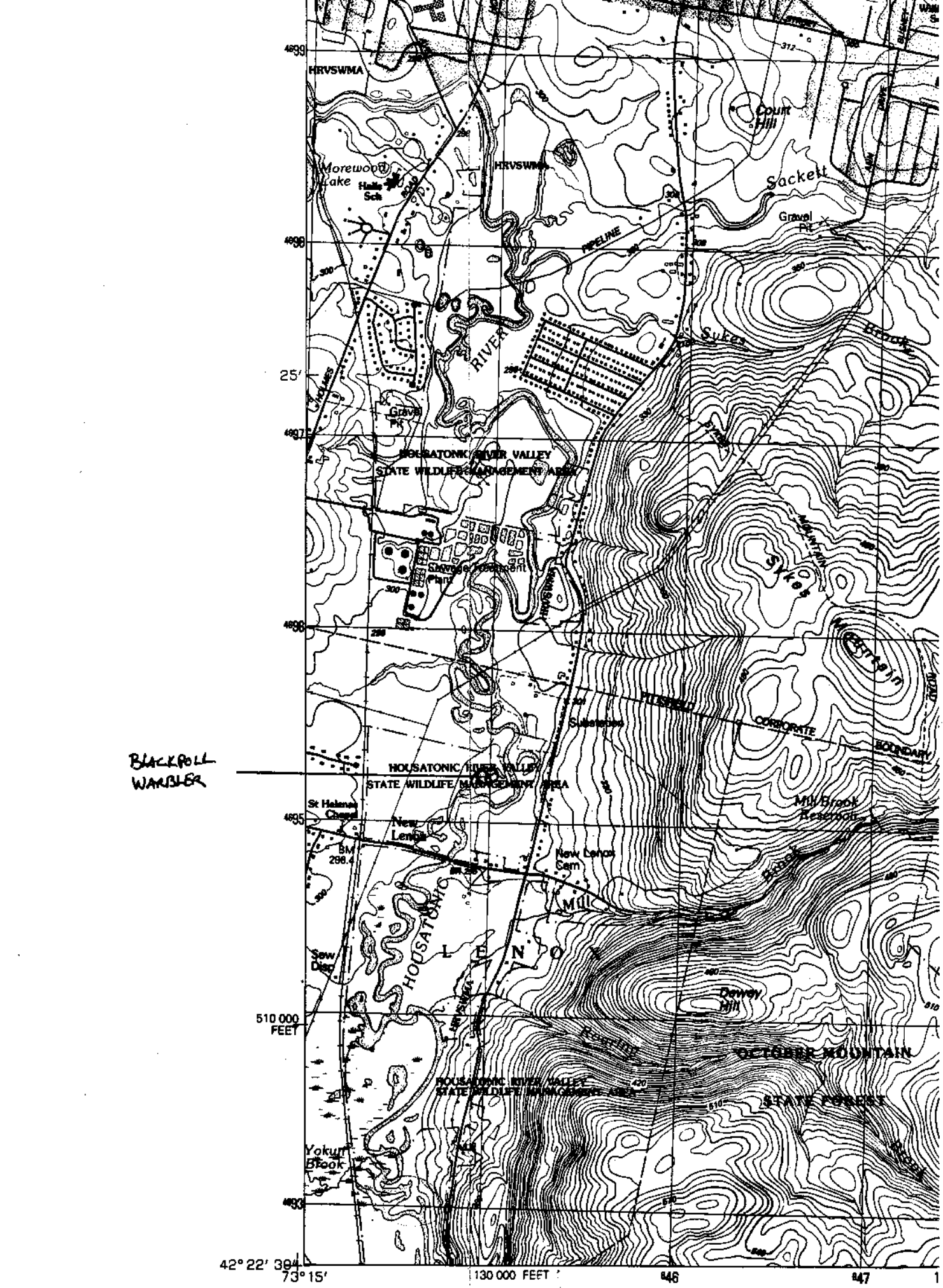
13. List names and qualifications of other observers (if any): KAROL WORDEN, EUGENIE MOORE – WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 21 MAR 01

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1958

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
BLACKPOLL WARBLER (DENDROICA STRIATA)

Date and Time of observation:
22 MAY 00

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: EAST LEE, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: TRAVEL NORTH ALONG RAILROAD TRACKS FROM LENOX STATION

2. Number of individuals observed: ONE

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, VOCALIZATION

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT MALE

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? No

If yes, please give details: _____

7. Description of habitat at this site: SPRUCE-FIR-NORTHERN HARDWOOD FOREST ADJACENT TO BACKWATER AREAS OF WOODS POND

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: BIRD OBSERVED VOCALIZING AND FORAGING

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: BIRD BANDER AT MANOMET CENTER FOR CONSERVATION SCIENCES, AVID BIRDER

13. List names and qualifications of other observers (if any): ARTHUR HAINES - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 21MAR01

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

EAST LEE, MASSACHUSETTS

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: 207.846.6764 (H) 207.729.1199 (W)

Species observed: Common Moorhen

Date and Time of observation: 6.10.98 to 7.9.98

1. Location where species was observed:

a) Town: Lenox & Lee County Berkshire Co. USGS Map: East Lee

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Birds seen on a stretch of the Housatonic River from the North end of Woods Pond, North ±1.25 miles (see map)

2. Number of individuals observed: usually only 1/day, 1 observation was of 2 individuals.

3. Was a positive ID possible? Yes Based on what field marks? close views of side plumage & nasal plate

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: unknown

5. Evidence (if any) of breeding activity at this site: Birds were responding to broadcast calls during the nesting season. No broods were observed.

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BIRDS USUALLY OBSERVED IN BACKWATER AREAS DOMINATED BY DENSE SUBMERGED VEGETATION & FRINGES OF EMERGENT VEG. (LYTHRUM & TYPHA)

8. Observed or potential threats to the species or its habitat at this site: —

9. Landowner's name and address, if known: —

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: HAVE SURVEYED MARSH BIRDS IN THE PAST.

13. List names and qualifications of other observers (if any): _____

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 6·10·98
7·9·98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

EAST LEE, MASSACHUSETTS

COMMON MOORHEN

6.10.98 (1)

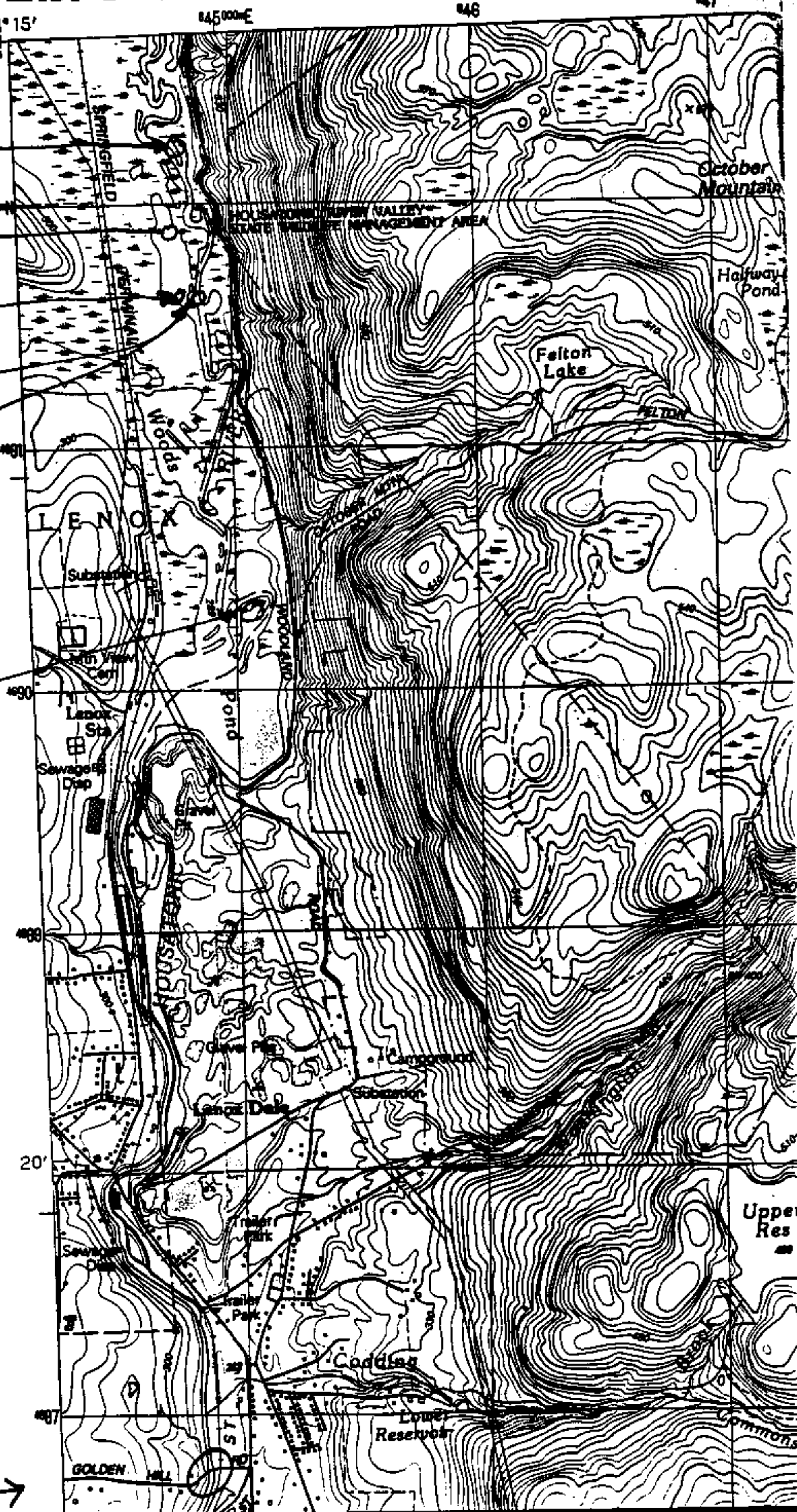
6.23.98 (1)

7.9.98 (2)

6.18.98 (1)
&
6.25.98 (1)

7.9.98 (1)

5 →



73°15'
42°22'30"
845000mE
846
847
October Mountain
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Halfway Pond
Felton Lake
FELTON
SPRINGFIELD
TERMINAL
Woods
LENOX
Substation
Mtn View Cem
Lenox Sta
Sewage Disp
Gravel Pit
Pond
Woods Pond
WOODLAND
ROAD
Campground
Substation
Lenox Dale
20'
Trailer Park
Sewage Disp
Trailer Park
Codding
Lower Reservoir
Upper Res
Commons
GOLDEN
HILL

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: WOODLOT ALTERNATIVES

122 MAIN ST., No. 3 TOPSHAM, ME 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: COMMON MOORHEN (GALLINULA CHLOROPUS)

Date and Time of observation: 7 JUNE 99 1300

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: ~~PITTSFIELD EAST~~ EAST LEE, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: ALONG LARGE BACKWATER (approx. 600 meters) NORTH OF WOODS POND, ON THE HOUSATONIC RIVER

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? VOCALIZATION

Were photographs taken? _____
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT - JUDGING BY VOCALIZATION AND TIME OF YEAR

5. Evidence (if any) of breeding activity at this site: ~~NONE~~ NONE

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: WADING BIRD SURVEYS IN 1998 IN SAME AREA

7. Description of habitat at this site: BACKWATER WITH BANK COVERED WITH EMERGENT VEGETATION.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: MULTIPLE VOCALIZATIONS HEARD IN AREA; ALL NON-OVERLAPPING.

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   X Other. Please specify: ORNITHOLOGIST FOR 6 YRS.

12. Briefly explain your previous field experience with this species:

AVID BIRDER, ~~OBSERVER~~ VERY FAMILIAR WITH THIS SPECIES AND ITS VOCALIZATIONS

13. List names and qualifications of other observers (if any):

VICKI SCHOONMAKER - BIOLOGIST - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

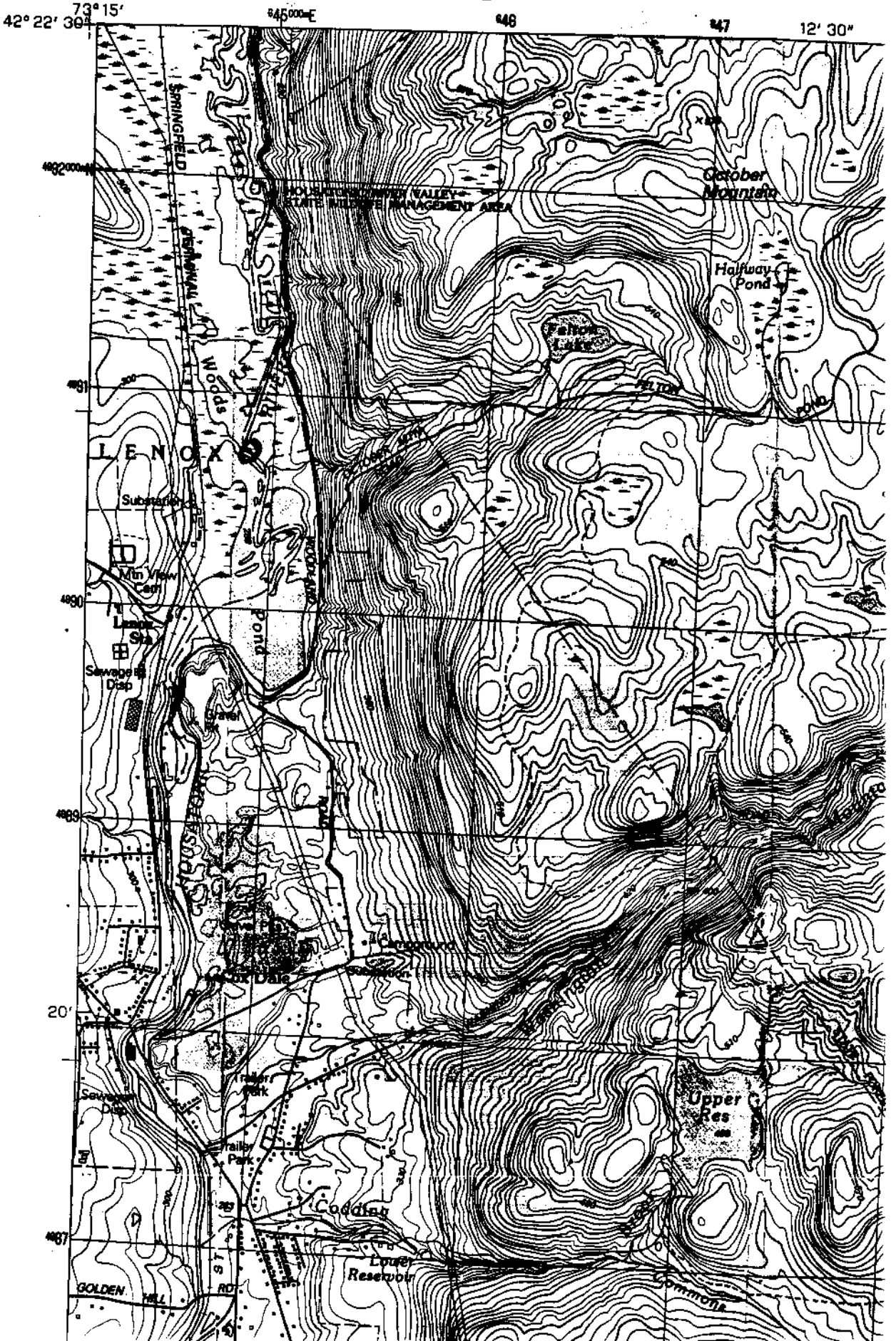
Signature [signature] Date: 16 JUNE 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

Moorhen

EAST LEE, MASSACHUSETTS



Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: John Lerthe

Address: Woodlot Alt., Inc.
132 Main St, Topsham ME

Phone: _____ (H) 207 729 1199 (W)

Species observed:
Common Moorhen (Gallinula chloropus)

Date and Time of observation:
July 1, 1999 ~9:30 PM
& July 2, 1999 ~10:30 AM

1. Location where species was observed:

a) Town: Pittsfield/Lennox County Berkshire USGS Map: East Lee, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Backwater upstream of Weeds Pond (approx. 600 m) on east side of the river

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? Call

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Unknown

5. Evidence (if any) of breeding activity at this site:
Unknown

(OVER)

6. Have you observed this species at this site in previous years? Yes

If yes, please give details: Observed in 1998 during wading bird playback call surveys

7. Description of habitat at this site: Riverine aquatic bed, Riverine emergent and Palustrine scrub-shrub.

8. Observed or potential threats to the species or its habitat at this site: PCB contamination

9. Landowner's name and address, if known: State of Mass.

10. Additional observations/comments:

11. Qualifications of observer (check all that apply):

____ Amateur naturalist. Years of experience: ____
____ Conservation Commission member
____ Biology/science teacher
✓ Environmental Consultant
✓ Degree in Biology: ___✓ Bachelor's ____ Master's ____ Ph. D.
____ Other. Please specify: Certified Wildlife Biologist 20+ yrs exp.

12. Briefly explain your previous field experience with this species:

Have been performing wading bird surveys ≥15yrs, Have seen species closely in FL

13. List names and qualifications of other observers (if any):

Woodlot Alternatives

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

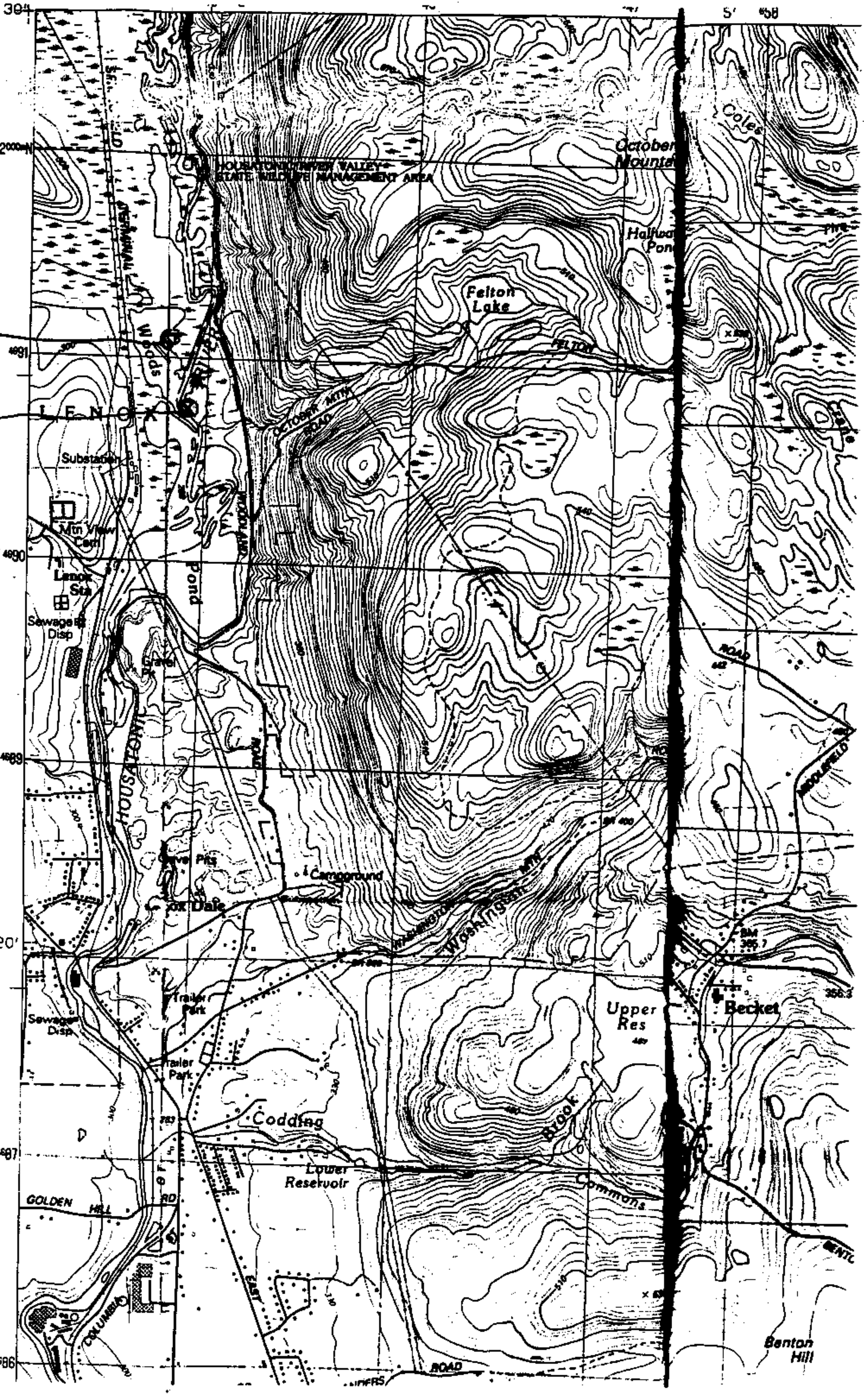
Signature _____ Date: 7/2/09

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro. MA 01581
508-792-7270 ext. 200

American Bittern
7/1/99

Common Moorhens
7/1&2/99


42° 22' 30"
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
October Mountain
Coles
Halfway Pond
Felton Lake
FELTON
Woods
L E N O X
OCTOBER MTN ROAD
Substation
Mtn View Cem
Lenox Sta
Sewage Disp
Gravel Pit
Pond
WOODLAND ROAD
HOUSATONIC
Gravel Pits
Campground
Cox Dale
20'
WASHINGTON MTN
Washington Mtn
Trailer Park
Sewage Disp
Upper Res
Becket
Codding
Brook
Lower Reservoir
Commons
GOLDEN HILL RD
COLUMBIA
EAST
ROAD
Benton Hill
4692000mN
4691
4690
4689
4687
4686

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Karol Worden

Address: Woodlot Alternatives
Topsham Maine

Phone: 207 924-6291 (H) 207 729-1199 (W)

Species observed:
Common Moorhen (Gallinula chloropus)

Date and Time of observation:
June 16, 1999 / 1230

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: East Lee, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Site is part of a backwater northeast of the main body of Woods Pond just north of where unnamed stream empties into backwater

2. Number of individuals observed: 1 (one)

3. Was a positive ID possible? Yes Based on what field marks? Identification based on call only.

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Unknown

5. Evidence (if any) of breeding activity at this site: Unknown

(OVER)

6. Have you observed this species at this site in previous years? No

If yes, please give details: _____

7. Description of habitat at this site: Palustrine scrub / shrub

8. Observed or potential threats to the species or its habitat at this site: None observed

9. Landowner's name and address, if known: UnKnown

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):
- ✓ Amateur naturalist. Years of experience: 10
- ____ Conservation Commission member
- ____ Biology/science teacher
- ✓ Environmental Consultant
- ✓ Degree in Biology: ____ Bachelor's ✓ Master's ____ Ph. D.
- ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: None

13. List names and qualifications of other observers (if any): _____

WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Karol A. Worden Date: 6-22-99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

Common Moorhen

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kawalecky

Address: Wildlife Alternatives
122 Main St No. 3 Topsham, ME 04086

Phone: 207-929-1194 (H) _____ (W)

Species observed:
Common Moorhen (Gallinula chloropus)

Date and Time of observation:
16 Jun 99 - 1000

1. Location where species was observed:

a) Town: Washington County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot:
Washington Lake, on top of Oct. Mtn. (State Forest)
From parking area walk ≈400 metus along grassy road to trailhead leading down to lake. Follow trail across boardwalk & 200 m along northern shore of the lake

2. Number of individuals observed: one Heard

3. Was a positive ID possible? Y Based on what field marks? Vocalization

Were photographs taken? no
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: N/A

5. Evidence (if any) of breeding activity at this site: N/A

(OVER)

Commonwealth of Massachusetts
Division of Fisheries & Wildlife 100 Cambridge St. Boston, MA 02202 (617) 727-9194, -3151

6. Have you observed this species at this site in previous years? YES

If yes, please give details: SURVEYS DURING 1998 IN SAME AREA

7. Description of habitat at this site: MARSH CREATED BY BEAVER ACTIVITY. MIXED EMERGENT VEGETATION

8. Observed or potential threats to the species or its habitat at this site:

N/A

9. Landowner's name and address, if known: STATE OF MASS.

10. Additional observations/comments: VOCALIZATIONS HEARD TWICE DURING MORNING, BOTH FROM SAME AREA

11. Qualifications of observer (check all that apply):

___ Amateur naturalist. Years of experience: 6 YRS.
___ Conservation Commission member
a Biology/science teacher
b Environmental Consultant
a Degree in Biology: a Bachelor's ___ Master's ___ Ph. D.
c Other. Please specify: AVIAN BIOLOGIST 6 YRS.

12. Briefly explain your previous field experience with this species:

ACCOMPLISHED BIRDER, AVIAN BIOLOGIST

13. List names and qualifications of other observers (if any):

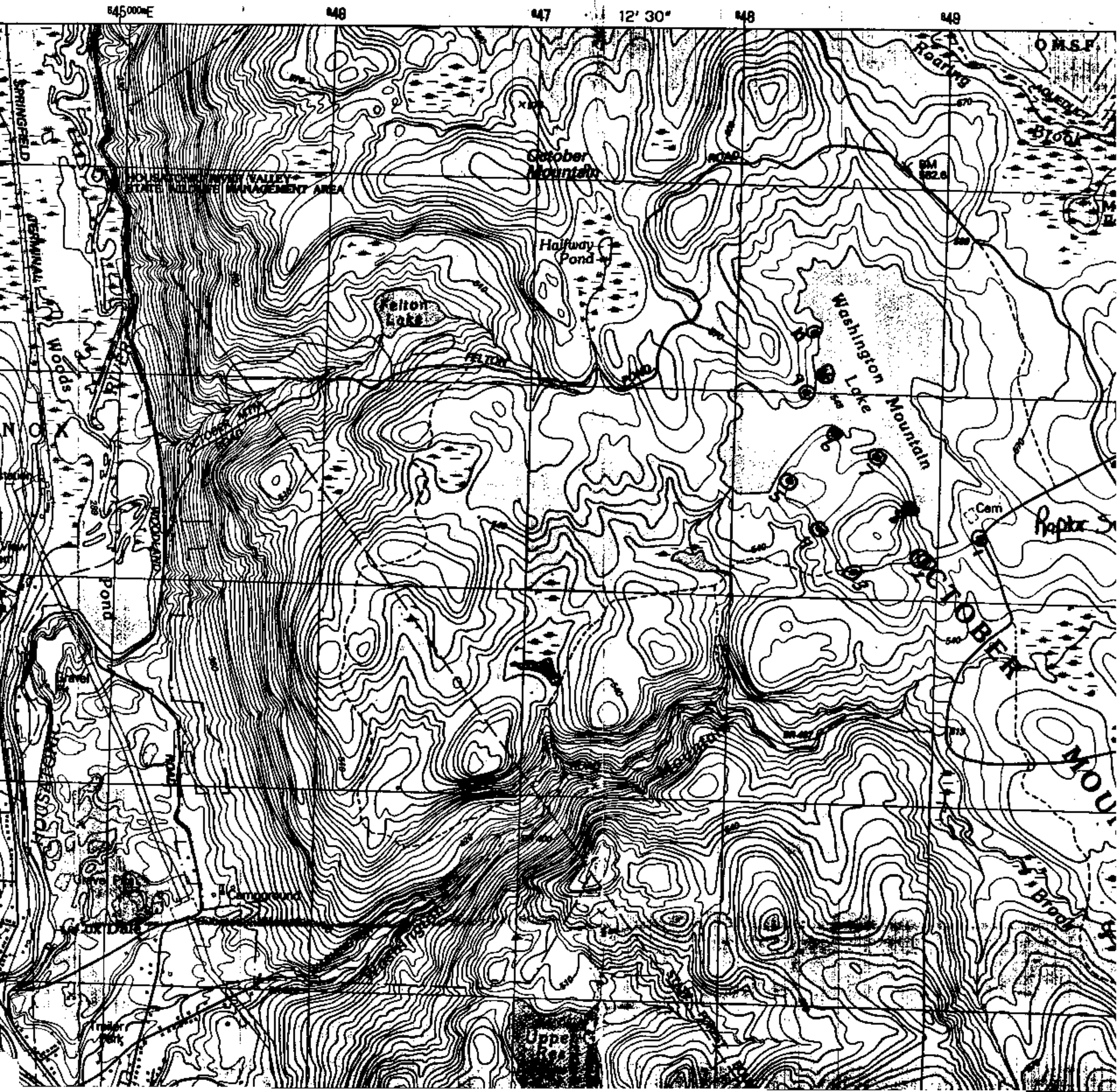
JOHN LORTIE - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 16 JUN 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



12′ 30″
October Mountain
Halfway Pond
Felton Lake
Washington Lake Mountain
OCTOBER
Roaring Brook
ROAD
Cem
Campground
Gravel Pit
Trailer Park
Pond
Woods
SPRINGFIELD
STATE WILDLIFE MANAGEMENT AREA

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KNEWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
COOPER'S HAWK (ACCIPITER COOPERII)

Date and Time of observation:
15 JUN 1999 0735

1. Location where species was observed:

a) Town: SHEFFIELD County BERKSHIRE USGS Map: GREAT BARRINGTON, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: BIRD OBSERVED ALONG BRUSH HILL ROAD ON WAY TO THREE-MILE POND WMA

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? VOCALIZATION

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT

5. Evidence (if any) of breeding activity at this site: YES. TIMING OF OBSERVATION (15 JUNE), & INCREASED LEVEL OF RESPONSIVENESS TO COOPER'S HAWK PLAYBACK TAPE.

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: FORESTED UPLAND ADJACENT TO OLD FIELDS AND SHALLOW POND (THREE-MILE POND).

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: STATE OF MASSACHUSETTS

10. Additional observations/comments: BIRD RECORDED WHILE CONDUCTING RAPTOR (HAWK) PLAYBACK SURVEYS.

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   q Environmental Consultant
   x Degree in Biology: x Bachelor's ____ Master's ____ Ph. D.
   x Other. Please specify: AVIAN BIOLOGIST 7 YEARS

12. Briefly explain your previous field experience with this species: BIRD BANDER AT MANOMET BIRD OBSERVATORY FOR 2 YRS., AVID BIRDER

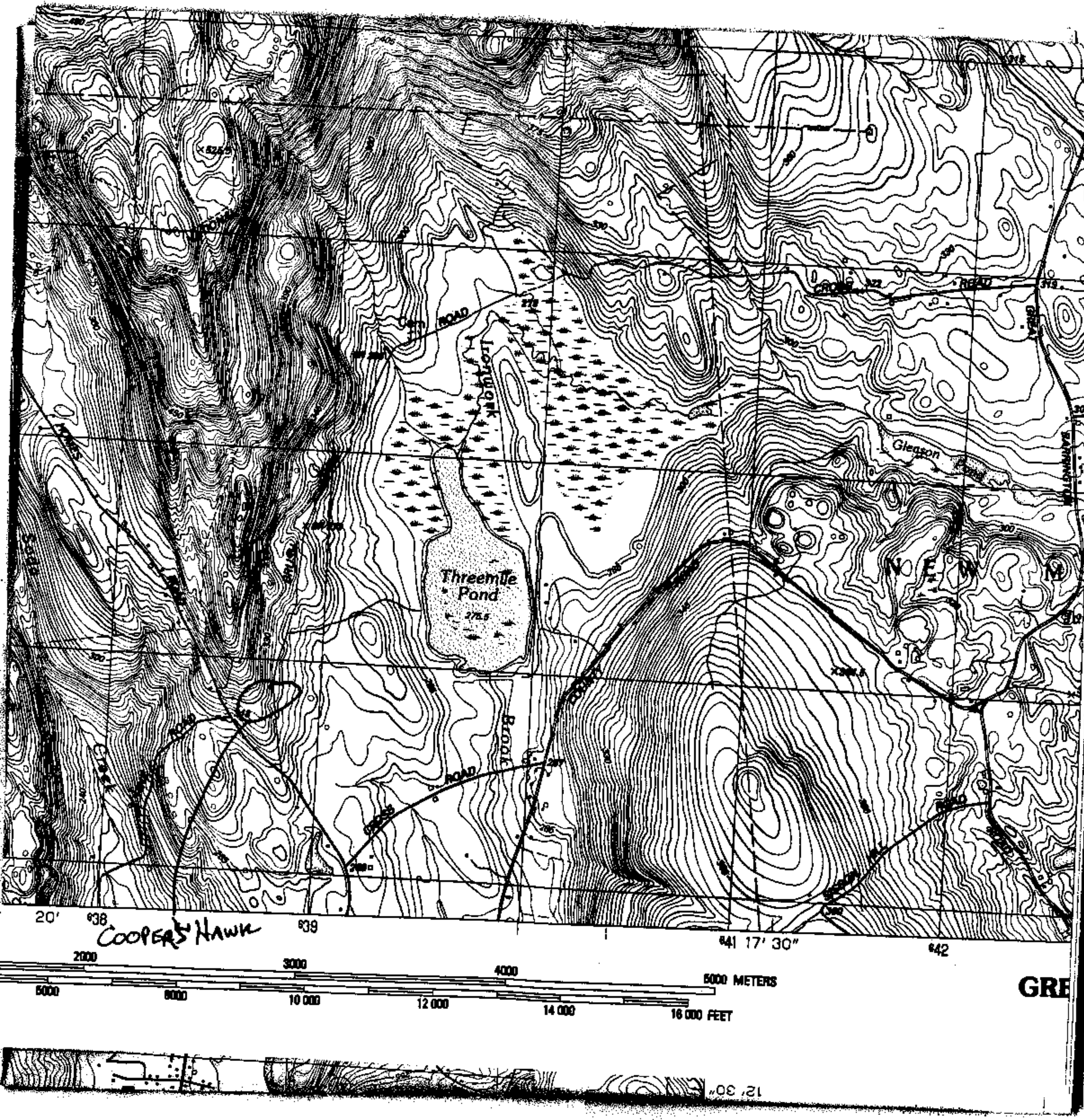
13. List names and qualifications of other observers (if any): NONE

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 7 MAR 00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


Threemile Pond
275.5
Gleason Pond
CROSS
ROAD
Cem
ROAD
Brook
Creek
N E W M
BARRINGTON
20′
638
639
641 17′ 30″
642
COOPER'S HAWK
2000
3000
4000
5000 METERS
5000
8000
10 000
12 000
14 000
16 000 FEET
GRE
15′ 30″

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Karwacki

Address: Woodlot Alternatives
122 Main St., No. 3 Topsham, ME 04086

Phone: 207-729-1199 (W) _____

Species observed:
Cooper's Hawk (Accipiter cooperii)

Date and Time of observation:
16 Jun 99 - 1200

1. Location where species was observed:

a) Town: Washington County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Washington Lake. On top of October Mtn. (State Forest) Located approximately 1 Km northeast of the parking area.

2. Number of individuals observed: one

3. Was a positive ID possible? Yes Based on what field marks? Flight Pattern (Soaring & Gliding), Tail Shape, Body Size (Rel. to BWHA with which it was interacting), Plumage Pattern

Were photographs taken? no

If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Adult

5. Evidence (if any) of breeding activity at this site: Territorial defense - attacked & chased BWHA, then returned to forest edge

(OVER)

Commonwealth of Massachusetts
Division of Fisheries & Wildlife 100 Cambridge St. Boston, MA 02202 (617) 727-9194, -3151

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: MARSH CREATED BY BEAVER ACTIVITY. MUCH EMERGENT VEG., BORDERED BY MIXED HARDWOOD/SOFTWOOD MATURE FOREST.

8. Observed or potential threats to the species or its habitat at this site: N/A

9. Landowner's name and address, if known: STATE OF MASS.

10. Additional observations/comments: NONE

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: 6
   ____ Conservation Commission member
   9 Biology/science teacher
   9 Environmental Consultant
   9 Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   X Other. Please specify: AVIAN BIOLOGIST FOR 6 YRS.

12. Briefly explain your previous field experience with this species:

ACCOMPLISHED BIRDER, AVIAN BIOLOGIST

13. List names and qualifications of other observers (if any):

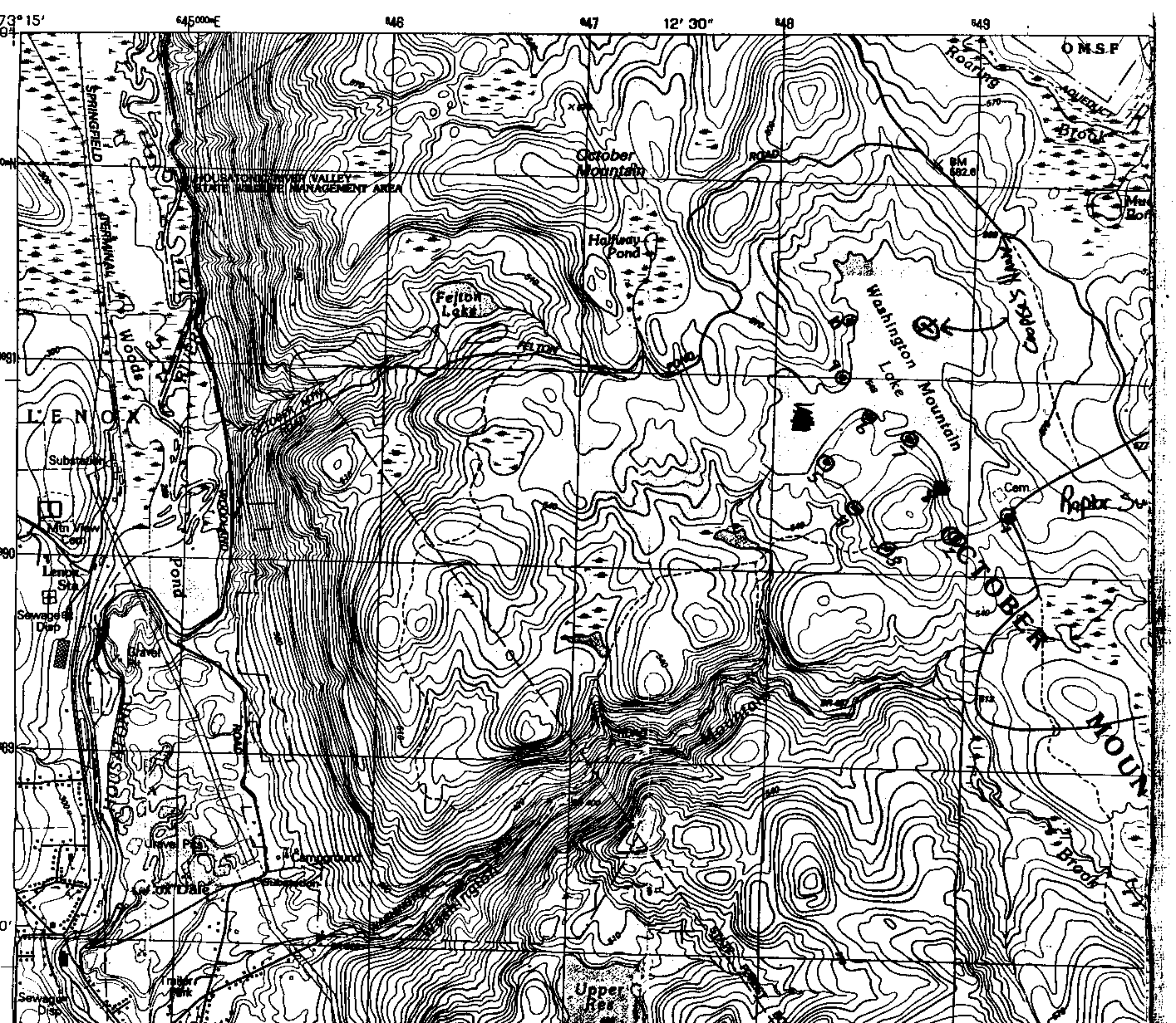
JOHN LORTIE - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 16 JUN 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



73°15'
645000mE
846
847
12'30"
848
849
O M S F
Roaring Brook
AQUEDUCT
October Mountain
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
SPRINGFIELD TERMINAL
Halfway Pond
Felton Lake
FELTON ROAD
ROAD
BM 602.6
Washington Mountain Lake
COOPER'S HAWK
Cem.
Raptor Su
OCTOBER MOUN
L E N O X
Woods Pond
Substation
Mtn View Cem
Lenox Sta
Sewage Disp
Gravel
WOODLAND ROAD
Campground
Trailer Park
Upper Res
Brook

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
COOPER'S HAWK (ACCIPITER COOPERII)

Date and Time of observation:
17MAY 99 PM

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: EAST LEE, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: TRAVEL EAST ALONG NEW LENOX ROAD TO THE WOODLAND ROAD. TRAVEL SOUTH ALONG THE WOODLAND ROAD.

2. Number of individuals observed: ONE

3. Was a positive ID possible? YES Based on what field marks? FLIGHT/SOARING PATTERN, TAIL SHAPE (ROUNDED), HEAD PROTECTION

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? No

If yes, please give details: _____

7. Description of habitat at this site: Low Gradient Stream with adjacent Transitional Floodplain Forest Community

8. Observed or potential threats to the species or its habitat at this site: None

9. Landowner's name and address, if known: _____

Housatonic River Valley State Wildlife Management Area

10. Additional observations/comments: Bird observed soaring over the Housatonic River

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - 9 Environmental Consultant
   - 9 Degree in Biology: A Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: _____

Bird Bander, Avian Biologist, Avid Birder

13. List names and qualifications of other observers (if any): _____

Karol Worden - Woodlot Alternatives

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

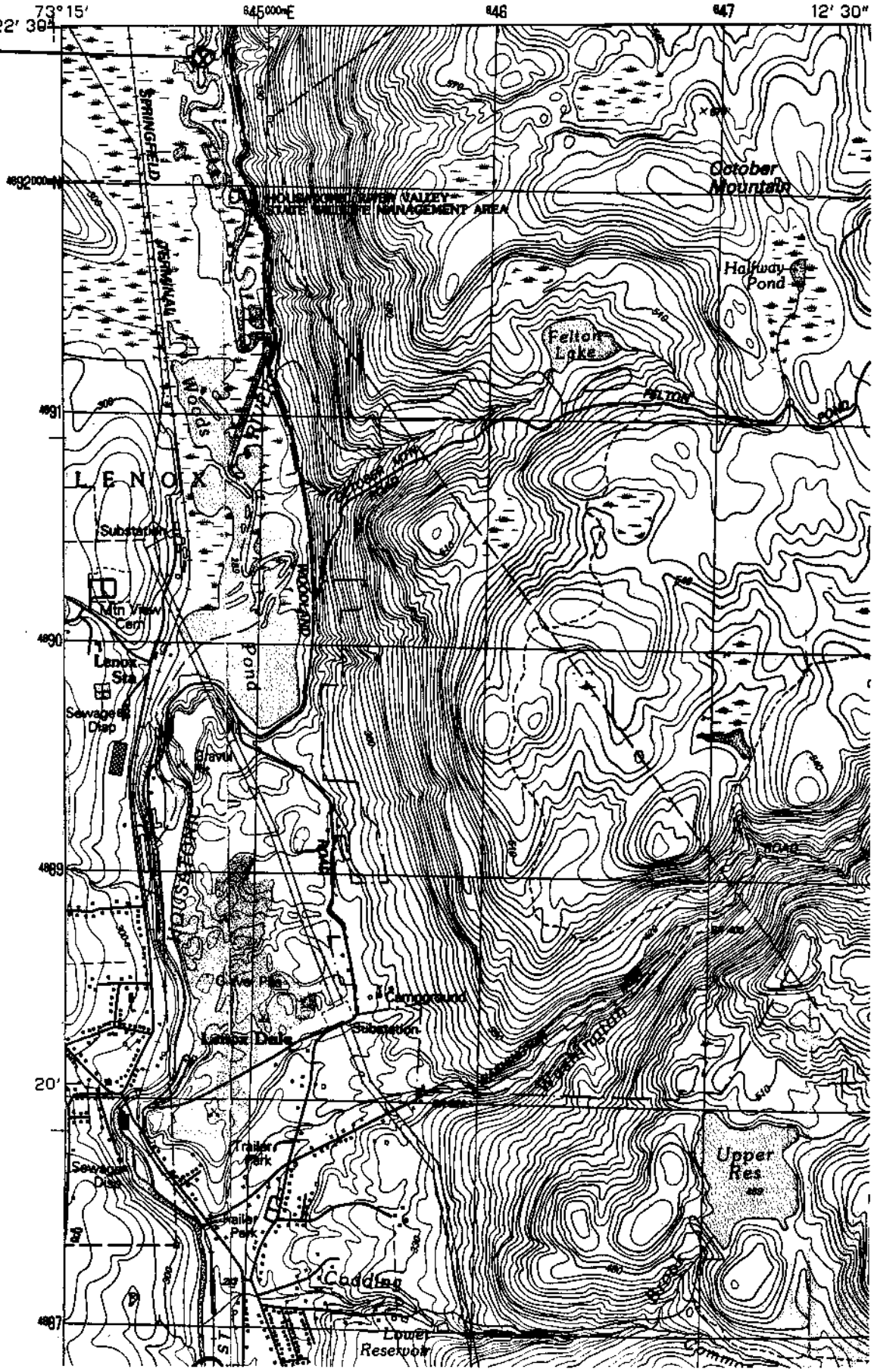
Signature [signature] Date: 2/1/Mar01

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

EAST LEE, MASSACHUSETTS

Cooper's Hawk



Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: CHRIS WERNER

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: COOPER'S HAWK

Date and Time of observation: 29 MARCH 2000 ~15:00

1. Location where species was observed:

a) Town: NEW LENOX County BERKSHIRE USGS Map: PITTSFIELD EAST

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: PARK AT CANOE LAUNCH OFF NEW LENOX RD, FOLLOW RIVER ~ 500 M SOUTH

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? SIZE, COLORATION, CALL

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT

5. Evidence (if any) of breeding activity at this site: NONE OBSERVED

(OVER)

6. Have you observed this species at this site in previous years? _____

If yes, please give details: _____

7. Description of habitat at this site: _____

OPEN WET MEADOW w/ SCATTED SHRUB/SCRUB

8. Observed or potential threats to the species or its habitat at this site:

NONE OBSERVED

9. Landowner's name and address, if known: HOUSATONIC RIVER VALLEY WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):

_____ Amateur naturalist. Years of experience: _____
_____ Conservation Commission member
_____ Biology/science teacher
X Environmental Consultant
X Degree in Biology: X Bachelor's _____ Master's _____ Ph. D.
_____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species:

PREVIOUS HAWK SURVEYS

13. List names and qualifications of other observers (if any): _____

DOUG STEWARD ENVIRONMENTAL CONSULTANT

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Christine M. W... Date: 4/01/00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

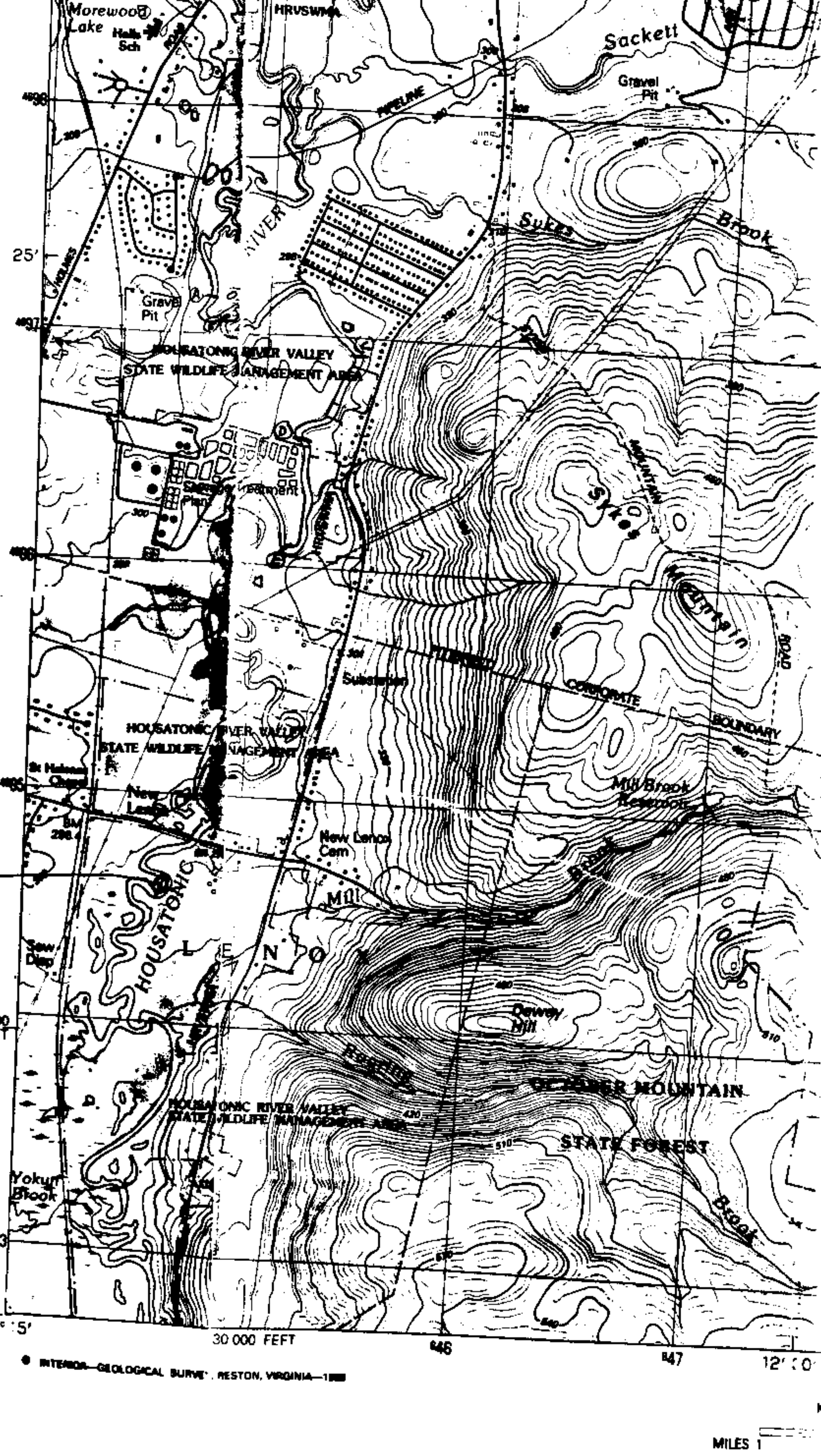
MA Natural Heritage and Endangered Species Progra
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

A - Cobble/sand [illegible] Backpack [illegible]

☐ = Sand bottom, Shallow Backpack [illegible]

Δ: [illegible]

COOPER'S HAWK



Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kamnacky

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
Cooper's Hawk (Accipiter cooperii)

Date and Time of observation:
4 MAY 2000 0900

1. Location where species was observed:

a) Town: Washington County BERKSHIRE USGS Map: EAST LEE, MASS.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FROM NEW LENOX ROAD IN PITTSFIELD, TRAVEL SOUTH ALONG WOODLAND ROAD (DIRT RD. ALONG WEST SIDE OF OCT MTN. STATE FOREST) AND MAKE LEFT ONTO OCTOBER MOUNTAIN ROAD.

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, SIZE, TAIL SHAPE (LONG, ROUNDED), FLIGHT PATTERN, HABITAT

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE - SECOND YEAR BIRD (VERTICAL BARRING ON BREAST, PALE BROWN PLUMAGE. SEX - UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: MATURE FOREST DOMINATED BY HARDWOOD TREES WITH PATCHES OF CONIFERS. ELEVATION ca. 1700 FEET

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: OCTOBER MOUNTAIN STATE FOREST – STATE OF MASSACHUSETTS

10. Additional observations/comments: BIRD OBSERVED ALONG EDGE OF ROADSIDE, WHERE IT PERCHED ~10 FEET UP TREE. BIRD OBSERVED FROM 15 FEET AWAY

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- X Other. Please specify: AVIAN BIOLOGIST FOR 6+ YEARS

12. Briefly explain your previous field experience with this species: BIRD BANDER AT MANOMET BIRD OBSERVATORY, AVID BIRDER,

13. List names and qualifications of other observers (if any): CHRIS WERNER – BIOLOGIST, WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

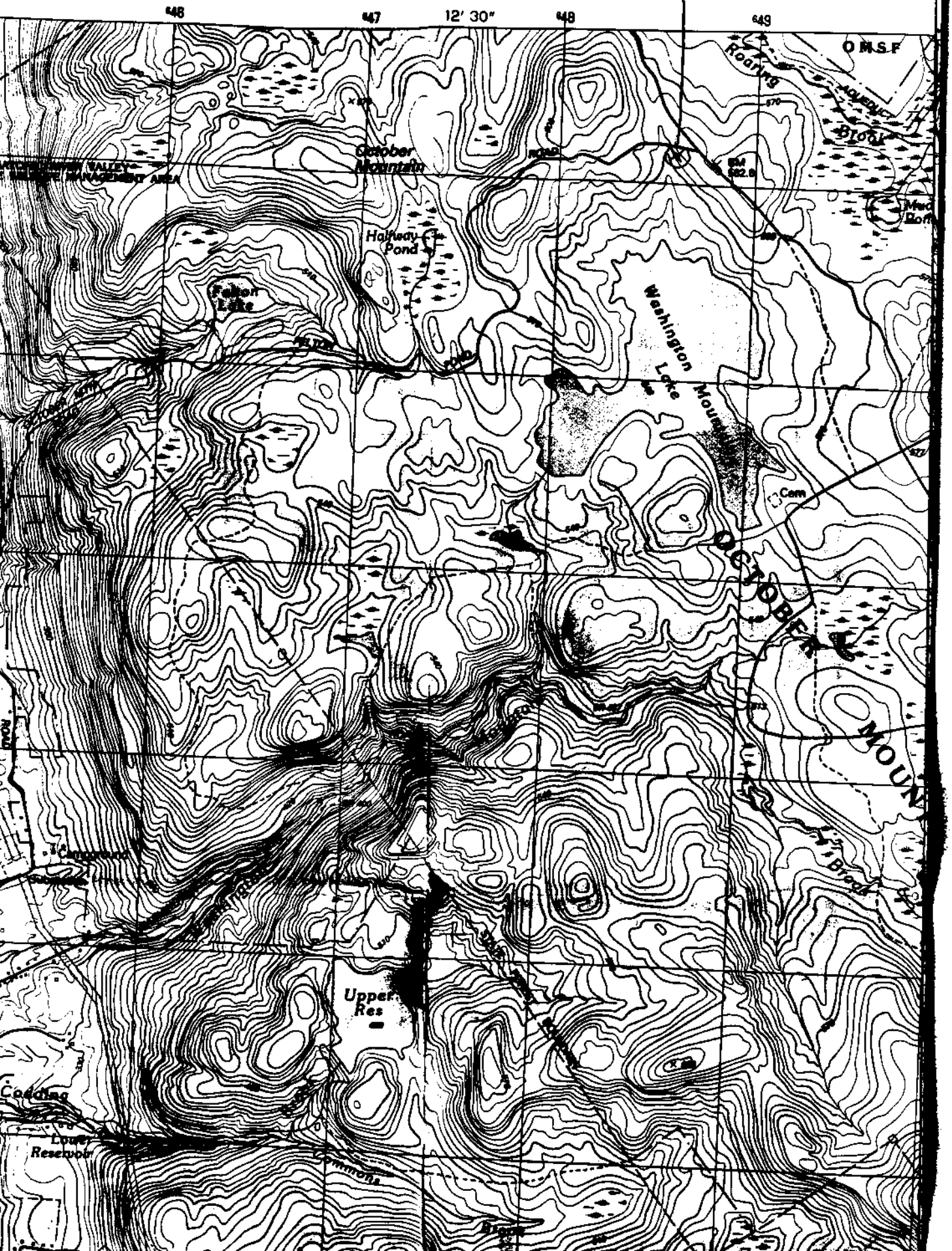
Signature _____ Date: 5/14/00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

SACHUSETTS

Cooper's Hawk



Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
COOPER'S HAWK (ACCIPITER COOPERII)

Date and Time of observation:
31AUG00 1000

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: EAST LEE, MASS.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: ACCESS HOUSATONIC RIVER FROM DECKER CANOE LAUNCH ON SOUTH SIDE OF NEW LENOX ROAD. TRAVEL UPSTREAM.

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? FLIGHT PATTERN, TAIL SHAPE (ROUNDED TIP), SIZE (SIMILAR TO MOBBING CROWS), HEAD DID NOT PROJECT IN FRONT OF LEADING EDGE OF WINGS

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE-UNKNOWN, SEX-UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: SPECIES OBSERVED ALONG RIVER IN VICINITY, SOARING, IN 1999 BY WOODLOT ALTERNATIVE BIOLOGISTS,

7. Description of habitat at this site: RIVER HABITATS INCLUDE EMERGENT MARSH, SCRUB SHRUB HABITAT AND FLOODPLAIN AND UPLAND FOREST.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: STATE OF MASSACHUSETTS — HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: BIRD OBSERVED SOARING, BEING MOBBED BY CROWS

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   X Other. Please specify: AVIAN BIOLOGIST 6+ YRS. EXPERIENCE

12. Briefly explain your previous field experience with this species: AVIAN BIOLOGIST, BIRD BANDER, HAWK MIGRATION COUNTER, AVID BIRDER

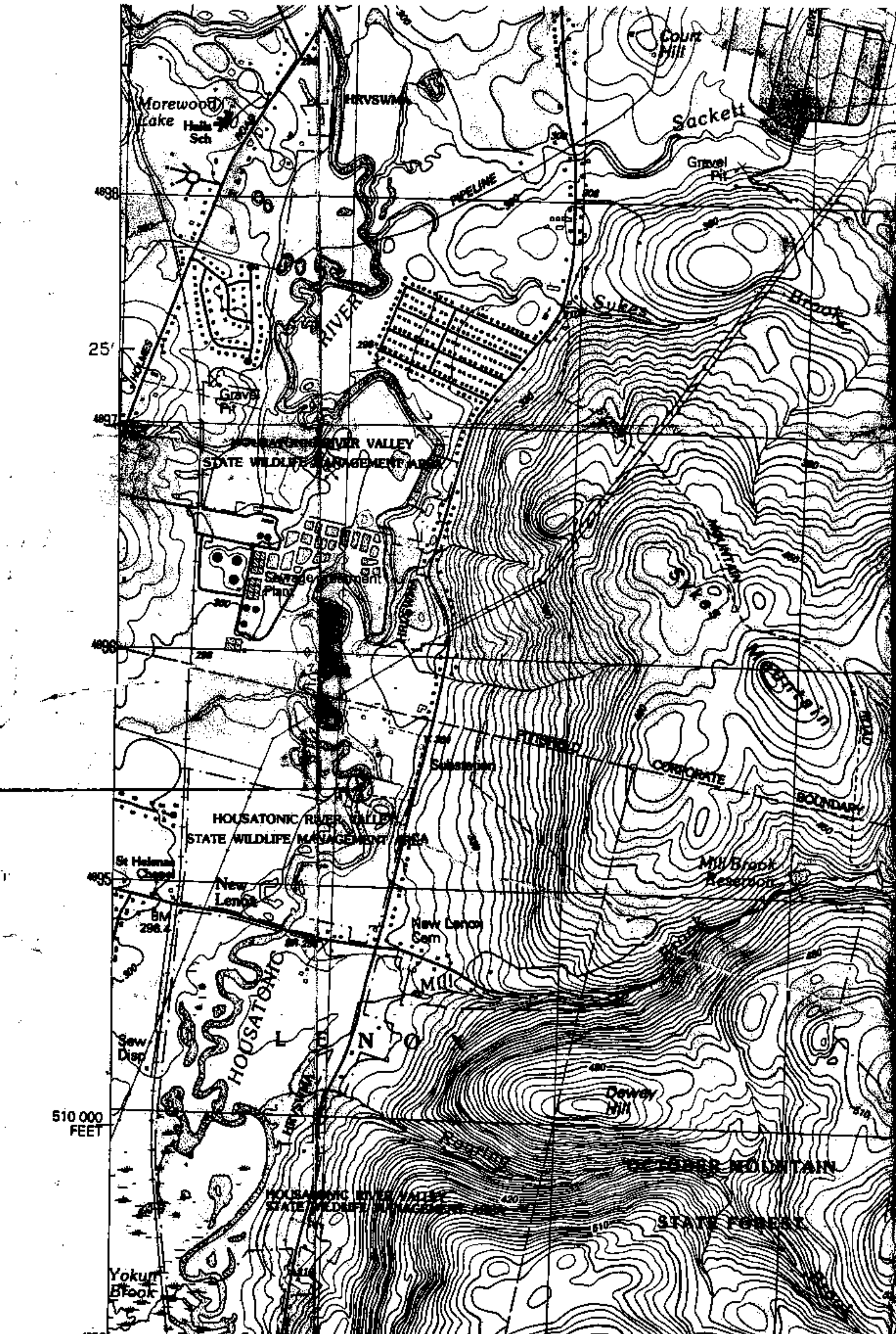
13. List names and qualifications of other observers (if any): NOAH GERMAN - RF WESTON, INC.

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 2 OCT 00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


Court Hill
Morewood Lake
Hale Sch
HRVSWMA
Sackett
Gravel Pit
PIPELINE
Sykes Brook
RIVER
25'
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
CORPORATE BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Mill Brook Reservoir
St Helenas Chapel
New Lenox
BM 298.4
New Lenox Sem
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN
STATE FOREST
Yokun Brook
42° 22' 30"
73° 15'
30 000 FEET
646
647
12'

COOPER'S HAWK

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1989

MILES 1

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Arthur Haines

Address: ~~Woodlot Alternatives, Inc.~~
122 Main Street
Topsham, Maine 04086

Phone: 207-865-4283 (H) 207-729-1199 (W)

Species observed: Coopers Hawk (Accipiter cooperi)

Date and Time of observation: 9 May 2000, Morning

1. Location where species was observed:

a) Town: Washington County Berkshire USGS Map: East Lee (1:25,000)

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Follow the Woodland Road south to an east (right) turn up the October Mountain Road. Follow this Road (which becomes the Felton Pond Road then the County Road) to the height of land (with views of Mount Greylock. Birds seen in Roadside trees.

2. Number of individuals observed: 2

3. Was a positive ID possible? yes Based on what field marks? Size and Morphology of birds (crow-sized accipiter with rounded tail).

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Adult birds based on horizontal red-brow chest and belly markings

5. Evidence (if any) of breeding activity at this site: Potentially based on two closely associated birds which departed together.

(OVER)

6. Have you observed this species at this site in previous years? yes

If yes, please give details: Associates have seen this species in local area prior to this sighting.

7. Description of habitat at this site: Northern hardwood forest with a cleared area for roadside views.

8. Observed or potential threats to the species or its habitat at this site: None observed

9. Landowner's name and address, if known: October Mountain State Forest

10. Additional observations/comments: Pair were observed roosting in a large sugar maple overlooking a cleared area downslope.

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: ____

12. Briefly explain your previous field experience with this species: Occasional sightings of this species in the Housatonic River Watershed

13. List names and qualifications of other observers (if any): None

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Chris Haines Date: 5 October 2000

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


October Mountain
Clapp Pond
PITTSFIELD STATE WATERSHED AREA
Sandwash Reservoir
Cooper's Hawk
Cem
OCTOBER MOUNTAIN STATE FOREST
Bald Top
BM 574.9
BM 582.6
Upper Res
Brook
Finerty Pond

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Chris Werner

Address: 122 Main St #3
Topsham, ME 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
Four-toed Salamander
(HEMIDACTYLIUM SCUTATUM)

Date and Time of observation:
5 April 99
10 May 99

1. Location where species was observed:

a) Town: Lee County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Follow Railroad tracks south from New Lenox Rd for 1.5 Km. Vernal pool is located directly adjacent to tracks on the east side.

2. Number of individuals observed: 2

3. Was a positive ID possible? yes Based on what field marks? Size, coloration, number of toes

Were photographs taken? _____
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Adults sex unknown

5. Evidence (if any) of breeding activity at this site: None observed

(OVER)

Commonwealth of Massachusetts
Division of Fisheries & Wildlife 100 Cambridge St. Boston, MA 02202 (617) 727-9194, -3151

6. Have you observed this species at this site in previous years? no

If yes, please give details:

7. Description of habitat at this site: Small vernal pool located in a silver maple floodplain forest, lined by shrub/scrub dominated by Cornus

8. Observed or potential threats to the species or its habitat at this site: None observed

9. Landowner's name and address, if known: Unknown

10. Additional observations/comments: none

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   ✓ Environmental Consultant
   ✓ Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify:

12. Briefly explain your previous field experience with this species:

none

13. List names and qualifications of other observers (if any):

Kurt Karwacky, Environmental Consultant - Woodlot Alternatives

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Christa Wu Date: 23 Nov 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro. MA 01581
508-792-7270 ext. 200

Halls Sch
Sackett Brook
Gravel Pit
PIPELINE
RIVER
Sukes Brook
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Reservoir
Substation
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
BM 298
New Lenox Cem
Mill Brook Reservoir
Brook
Mill
Sew Disp
HOUSATONIC
L E N O X
BM
Farnham Reservoir
Dewey Hill
OCTOBER MOUNTAIN
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
STATE FOREST
Yokun Brook
BM
ROAD
130 000 FEET
73°15′
12′ 30″
INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA
KILOMETERS 1
.5
0
MILES 1
.5
0

Natural Heritage &
Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Chris Werner

Address: 122 Main St #3
Topsham, ME 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
Jefferson's Salamander (AMBYSTOMA JEFFERSONIANUM)

Date and Time of observation:
3 APRIL, 4 APRIL, 9 APRIL, 12 APRIL, 24 APRIL, 24 MAY

1. Location where species was observed:

a) Town: Lee County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Follow RR tracks south from New Lenox Rd for 1.5 Km. Vernal pool is located on the east side directly adjacent to tracks

2. Number of individuals observed: 7 + possible hybrids

3. Was a positive ID possible? Yes Based on what field marks? Size, shape, coloration

Were photographs taken? Yes
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Adults all Females, some possible hybrids

5. Evidence (if any) of breeding activity at this site: Migration to vernal pool durring breeding season, spermatophores seen in pool (Large breeding pop. of A. maculata also present in pool)

(OVER)

6. Have you observed this species at this site in previous years? No

If yes, please give details: _____

7. Description of habitat at this site: Small vernal pool located in a silver maple floodplain forest, edged with Cornus sp. & Salix sp., emergent vegetation present (Scirpus cyperinus, Sium suave, Osmunda regalis, Alisma sp.)

8. Observed or potential threats to the species or its habitat at this site: None observed

9. Landowner's name and address, if known: _____

10. Additional observations/comments: Possible hybridization with A. maculata. Salamanders with both yellow & blue spotting commonly seen.

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- ✓ Environmental Consultant
- ✓ Degree in Biology: ✓ Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: Studied vernal pools throughout Housatonic River floodplain

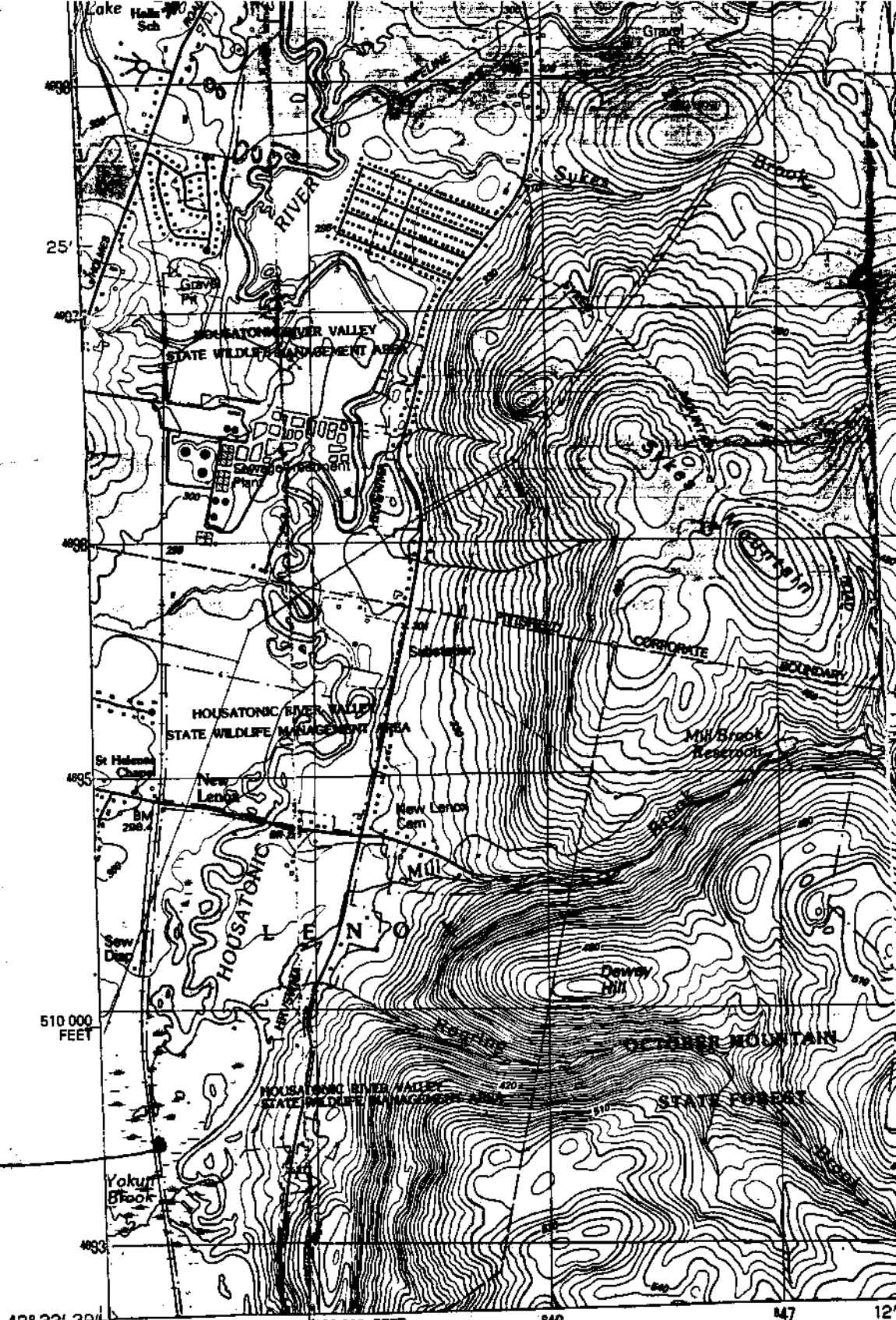
13. List names and qualifications of other observers (if any): Bob Roy, Kurt Karwacky, Karol Worden, Arthur Haines, Mike Thomson - Woodlot Alternative

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Chris Wen Date: 23 Nov 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



Jefferson's Salamander

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Royce

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: 207.846.6764 (H) 207.729.1199 (W)

Species observed: Northern Harrier

Date and Time of observation: 9.8.98 ; ± 3:00 PM

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: East Lee

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Site is a large backwater wetland north of Woods Pond. Can view it via RR bed west of the site or by canoe. Canoes can be launch at Woods Pond or from Roaring Brook Rd (Woodland Rd) east of the river

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? color & white rump

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: adult female

5. Evidence (if any) of breeding activity at this site: no, possibly an early migrant?

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: WAS FLYING OVER & SHRUBS THAT FRINGE THE PALUSTRINE AQUATIC BED WETLAND.

8. Observed or potential threats to the species or its habitat at this site: —

9. Landowner's name and address, if known: —

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):
   ___ Amateur naturalist. Years of experience: ___
   ___ Conservation Commission member
   ___ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: ^ Bachelor's ___ Master's ___ Ph. D.
   ___ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: HAVE CONDUCTED RAPTOR SURVEYS THROUGHOUT THE NORTHEAST.

13. List names and qualifications of other observers (if any): _____

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 9/6/98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

EAST LEE, MASSACHUSETTS

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: 207.846.6764 (H) 207.729.1199 (W)

Species observed: Northern Harrier

Date and Time of observation: 9.15.98 ; ± 2 PM

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: Pittsfield East

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Bird observed south of New Lenox Rd bridge crossing Housatonic River. Access New Lenox Rd. from Rte 7/20 in Lenox. Travel east for ± 0.75 mile to stop sign, go straight for ± 0.6 mile to bridge.

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? color, white rump patch

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: adult male

5. Evidence (if any) of breeding activity at this site: No, may be a migrant. Suitable nesting habitat does exists in area.

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: WET MEADOW HABITAT DOMINATED BY PHALARIS ARUNDINACEA. LOWER BASINS (OLD OXBOWS) WITH LYTHRUM SALICARIA. MARGINS OF SITE WITH SUCCESSIONAL SHRUB HABITAT. SHRUBS INCLUDE CORNUS SERICEA & AMOMUM, ALNUS INCANA, RHAMNUS CATHARTICA & CRATAEGUS PUNCTATA.

8. Observed or potential threats to the species or its habitat at this site: EAST SIDE OF RIVER OLD PASTURE, WEST SIDE IDLE ALTHOUGH UPPER FLOODPLAIN MANAGED FOR HAY & GAME BIRDS.

9. Landowner's name and address, if known: WEST SIDE OF RIVER OWNED BY MADFW (Hws. Riv. Valley WMA).

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):
_____ Amateur naturalist. Years of experience: _____
_____ Conservation Commission member
_____ Biology/science teacher
X Environmental Consultant
X Degree in Biology: X Bachelor's _____ Master's _____ Ph. D.
_____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: HAVE CONDUCTED RAPTOR SURVEYS THROUGHOUT THE NORTHEAST.

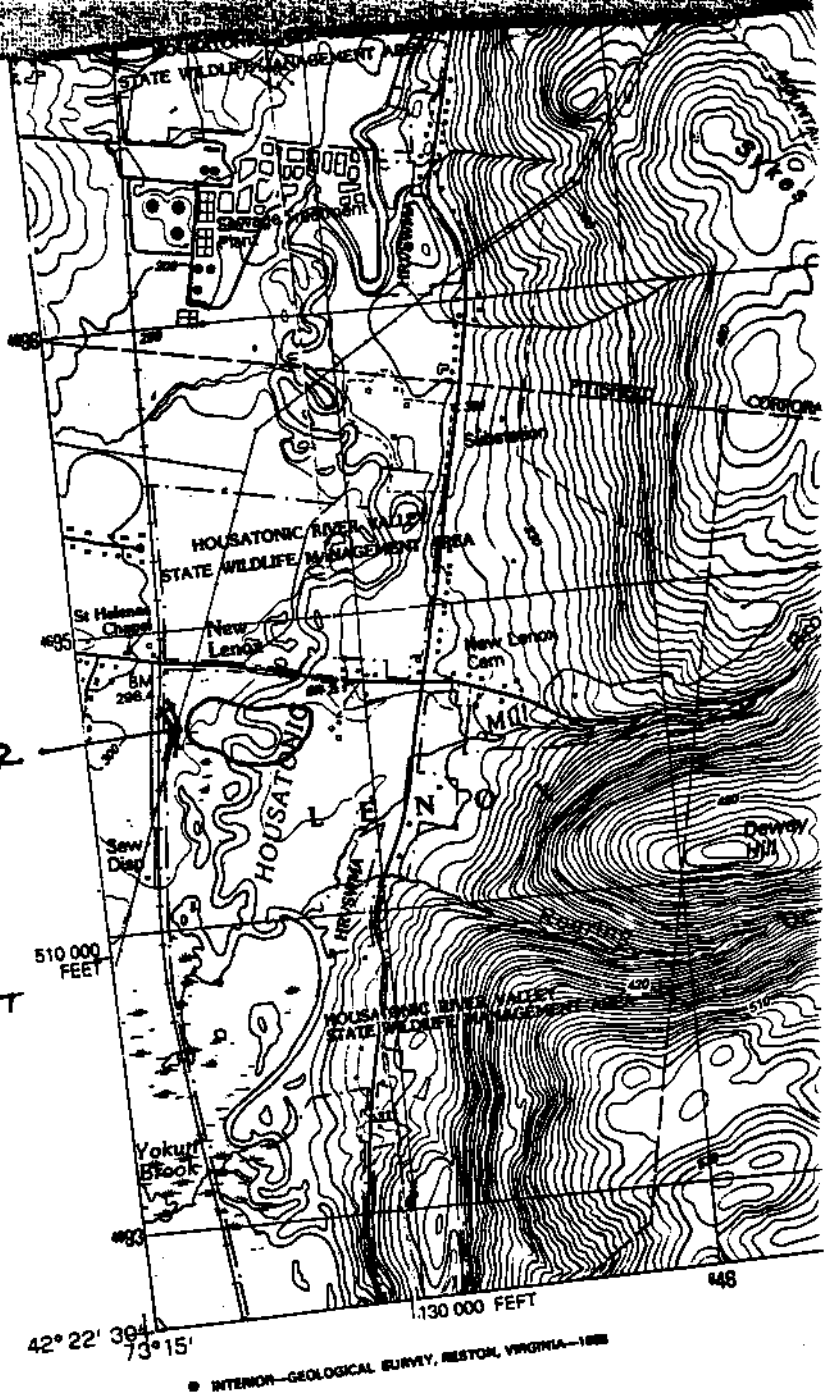
13. List names and qualifications of other observers (if any): _____

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 9/15/98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



NO. HARRIER

USGS PITTSFIELD EAST QUADRANGLE

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: 207-846-6764 (H) 207-729-1199 (W)

Species observed: No. Harrier

Date and Time of observation: 10-15-98

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: Pittsfield East

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Mouth of Yokum Brook accessed via canoe (float downstream from New Lenox Rd) or from railroad tracks.

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks?

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: juv.

5. Evidence (if any) of breeding activity at this site: No

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: HABITATS ALONG RIVER ARE FLOODPLAIN FORESTED ~~WETLANDS~~ WETLANDS. THOSE ALONG TOKUM BROOK ARE PFO EAST OF RR TRACKS, SCRUB-SHRUB, EMERGENT & OPEN WATER WEST OF TRACKS

8. Observed or potential threats to the species or its habitat at this site: —

9. Landowner's name and address, if known: —

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - ____ Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: FAMILIAR W/ NE RAPTORS

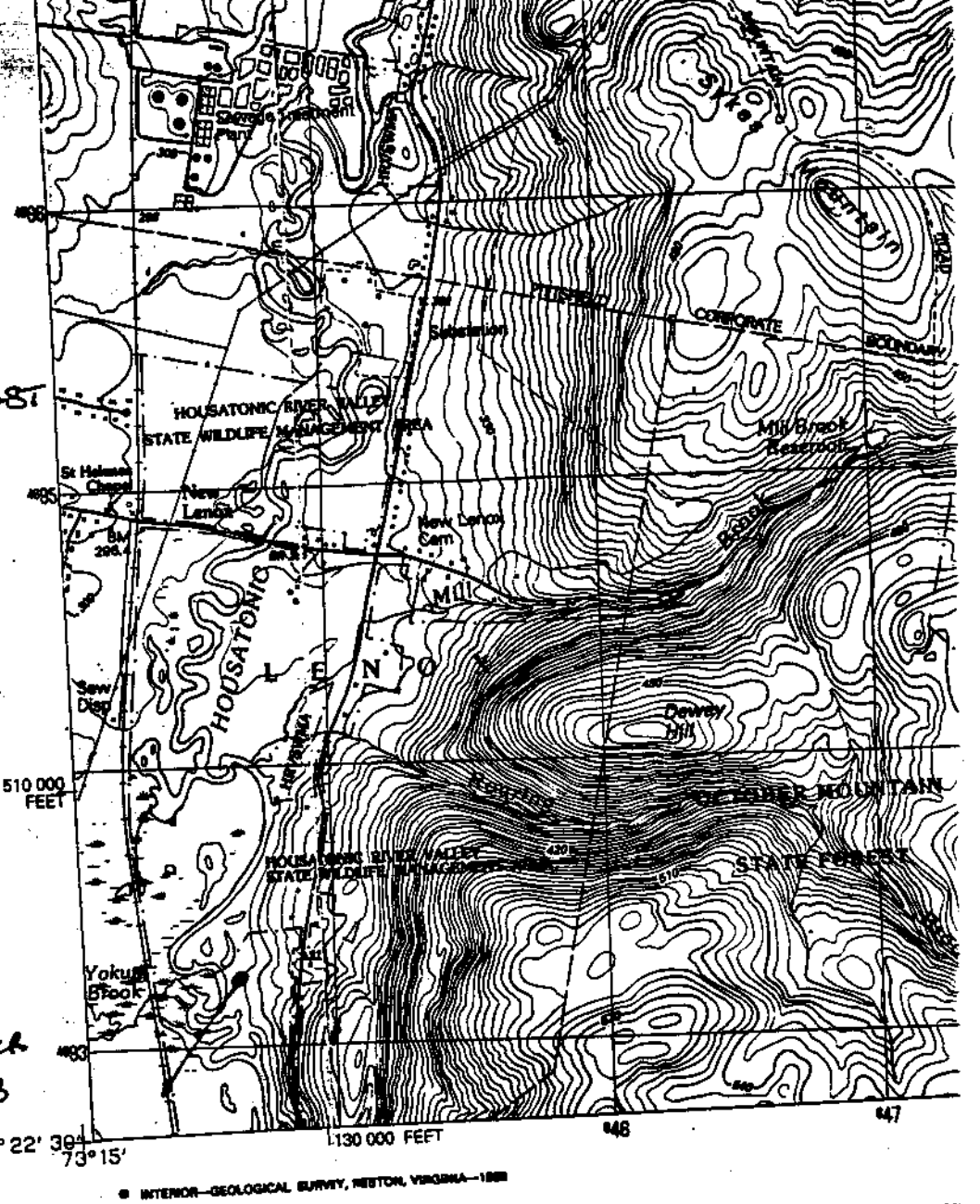
13. List names and qualifications of other observers (if any): _____

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 10-15-98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



USGS PITTSFIELD EAST QUADRANGLE

NO. HORNER
10.15.98

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Chris Werner

Address: 122 Main St #3
Topsham ME 04016

Phone (207) 721-0570 (H) (207) 729-1199 (W)

Species observed: Northern Harrier (Circus cyaneus)

Date and Time of observation: 11 JULY 99 17:45

1. Location where species was observed: Woods Pond

a) Town: Lenox County Berkshire USGS Map: East Lee, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Rt 7 to Housatonic St. Take Housatonic west approx. 1.5 miles. Cross over Willow Creek Rd & you will enter a gravel parking lot next to pond

2. Number of individuals observed: 2

3. Was a positive ID possible? yes Based on what field marks? body shape & size, white underparts, grey back, black-tipped wings

Were photographs taken? no
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: 1 adult male & 1 unkn.

5. Evidence (if any) of breeding activity at this site: none observed

(OVER)

6. Have you observed this species at this site in previous years? no

If yes, please give details: _____

7. Description of habitat at this site: Hardwood ridge on southeast side of Woods Pond

8. Observed or potential threats to the species or its habitat at this site: none

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: Conduct raptor surveys throughout Berkshire county

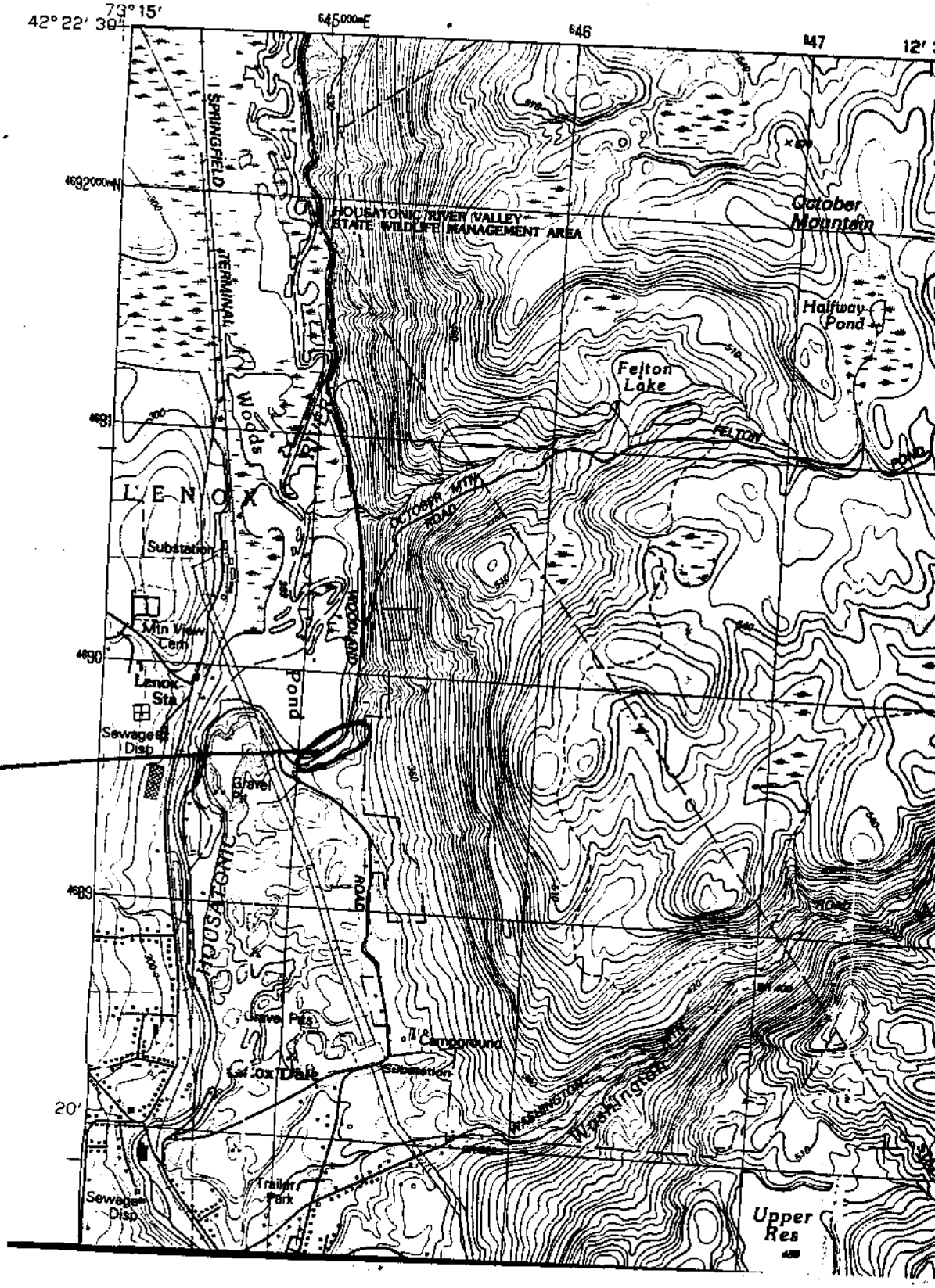
13. List names and qualifications of other observers (if any): Karol Worden Woodlot Alternatives Environmental Consultant, Master's degree in Biology

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Christa Worden Date: 20 JULY 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



Northern Harrier

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: WOODLOT ALTERNATIVES
122 MAIN ST, No. 3 TOPSHAM, ME 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: NORTHERN HARRIER (CIRCUS CYANEUS)

Date and Time of observation: 31AUG-99

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: ~~TAKE~~ MARSH ON [redacted] NORTHWEST CORNER OF PITTSFIELD WASTEWATER TREATMENT FACILITY
PART OF HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, FLIGHT PATTERN, SIZE

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: FEMALE-TYPE (POSSIBLE IMM.), AGE UNKNOWN

5. Evidence (if any) of breeding activity at this site: N/A

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: MARSH/WETLAND SURROUNDED BY GRASSY MEADOW AND FLOODPLAIN FOREST

8. Observed or potential threats to the species or its habitat at this site: N/A

9. Landowner's name and address, if known: [redacted]
STATE OF MASS.

10. Additional observations/comments: FLIGHT IN DIHEDRAL OVER MARSH, WHITE RUMP PATCH

11. Qualifications of observer (check all that apply):
_____ Amateur naturalist. Years of experience: _____
_____ Conservation Commission member
_____ Biology/science teacher
X Environmental Consultant
X Degree in Biology: X Bachelor's _____ Master's _____ Ph. D.
X Other. Please specify: AVIAN BIOLOGIST FOR 6 YEARS, AVID BIRDER

12. Briefly explain your previous field experience with this species: [redacted] OBSERVED MANY TIMES IN VARIOUS LOCATIONS IN USA

13. List names and qualifications of other observers (if any): ARTHUR HAINES BOTANIST - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 3/14/99

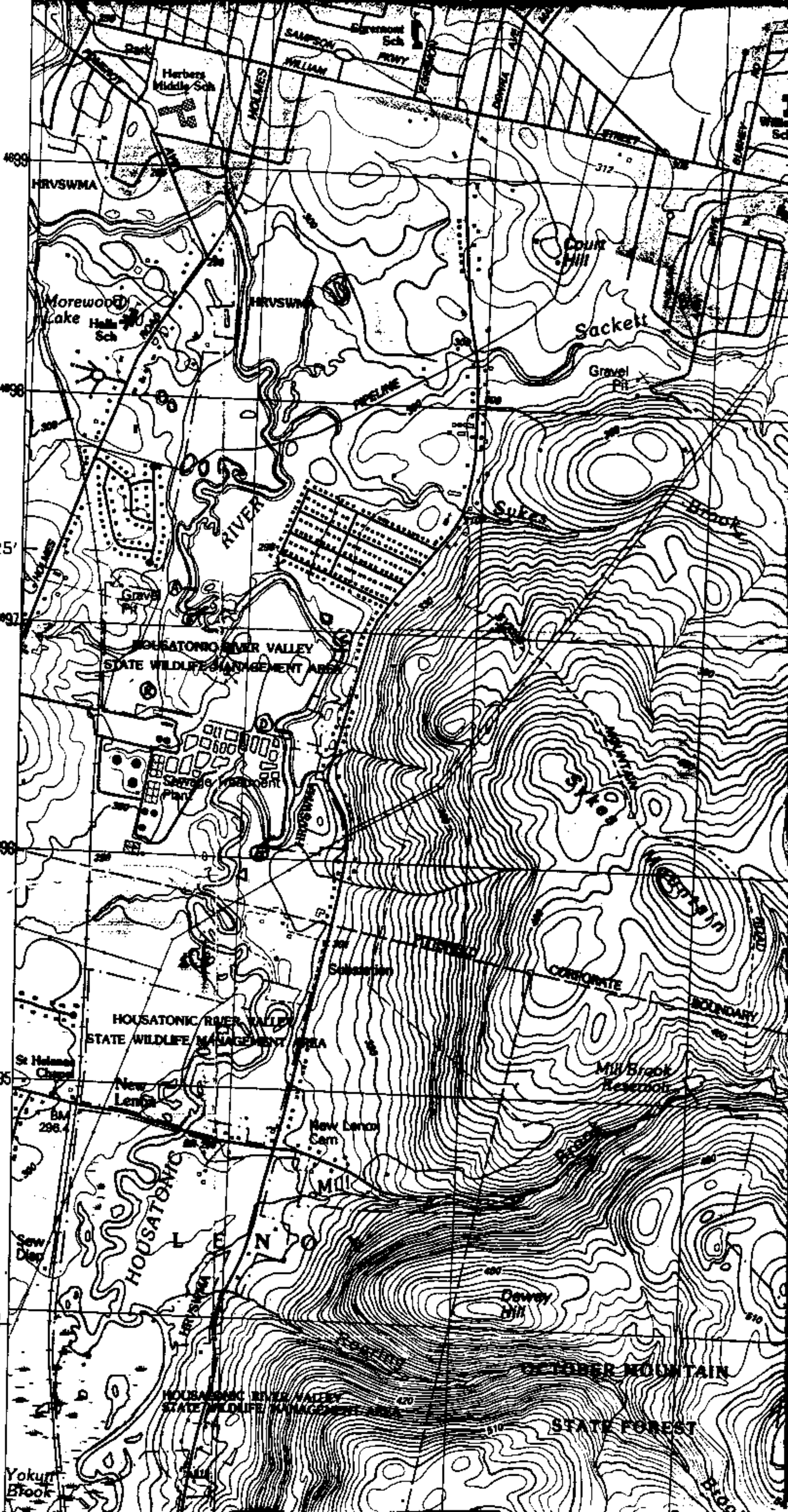
Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

✱ -Cobble / Sand bottom
Backpack fishing

□ = Sand bottom, Shallow
Backpack fishing

Δ = Deep stretch, good area for [illegible]



Park
Herberg Middle Sch
Sampson
William
Pkwy
Holmes
HRVSWMA
Court Hill
Morewood Lake
Sch
Sackett
Gravel Pit
Pipeline
River
Sykes
Brook
25'
Gravel Pit
Housatonic River Valley
State Wildlife Management Area
Sewage Treatment Plant
Corporate
Boundary
Housatonic River Valley
State Wildlife Management Area
St Helenas Chapel
New Lenox
BM 298.4
New Lenox Cem
Mill Brook Reservoir
Mill
Housatonic
L E N O X
Dewey Hill
510 000 FEET
October Mountain
State Forest
Housatonic River Valley
State Wildlife Management Area
Yokun Brook

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kirwacky

Address: Woodlot Alternatives
122 Main St., No. 3 Topsham, ME 04086

Phone: _____ (H) 207-729-2715 (W)

Species observed: Northern Harrier (Circus cyaneus)

Date and Time of observation: 30 Sept 99 - 1400

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Observed at Tweenbrook Farm, located on East New Lenox Road, (approx. 200 meters east of road)

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? Plumage, flight pattern

Were photographs taken? _____
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Age ?, Sex - Female

5. Evidence (if any) of breeding activity at this site: N/A

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: CULTIVATED CORN FIELD, WITH CLEARED AND STANDING CORN

8. Observed or potential threats to the species or its habitat at this site: N/A

9. Landowner's name and address, if known: TWEEN BROOK FARM

10. Additional observations/comments: BIRD OBSERVED FEEDING ON JUVENILE BIRD ON EDGE OF STANDING CORN. BIRD FLUSHED AND RETURNED TO PREY ITEM.

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - 9 Environmental Consultant
   - 3 Degree in Biology: 2 Bachelor's ____ Master's ____ Ph. D.
   - 2 Other. Please specify: AVIAN BIOLOGIST 6 YEARS, AVID BIRDER

12. Briefly explain your previous field experience with this species: OBSERVED MANY TIMES IN FIELD WHILE BIRDING

13. List names and qualifications of other observers (if any): BRIAN TSUNG - WESTON INC., GEOLOGIST

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 1 OCT 99

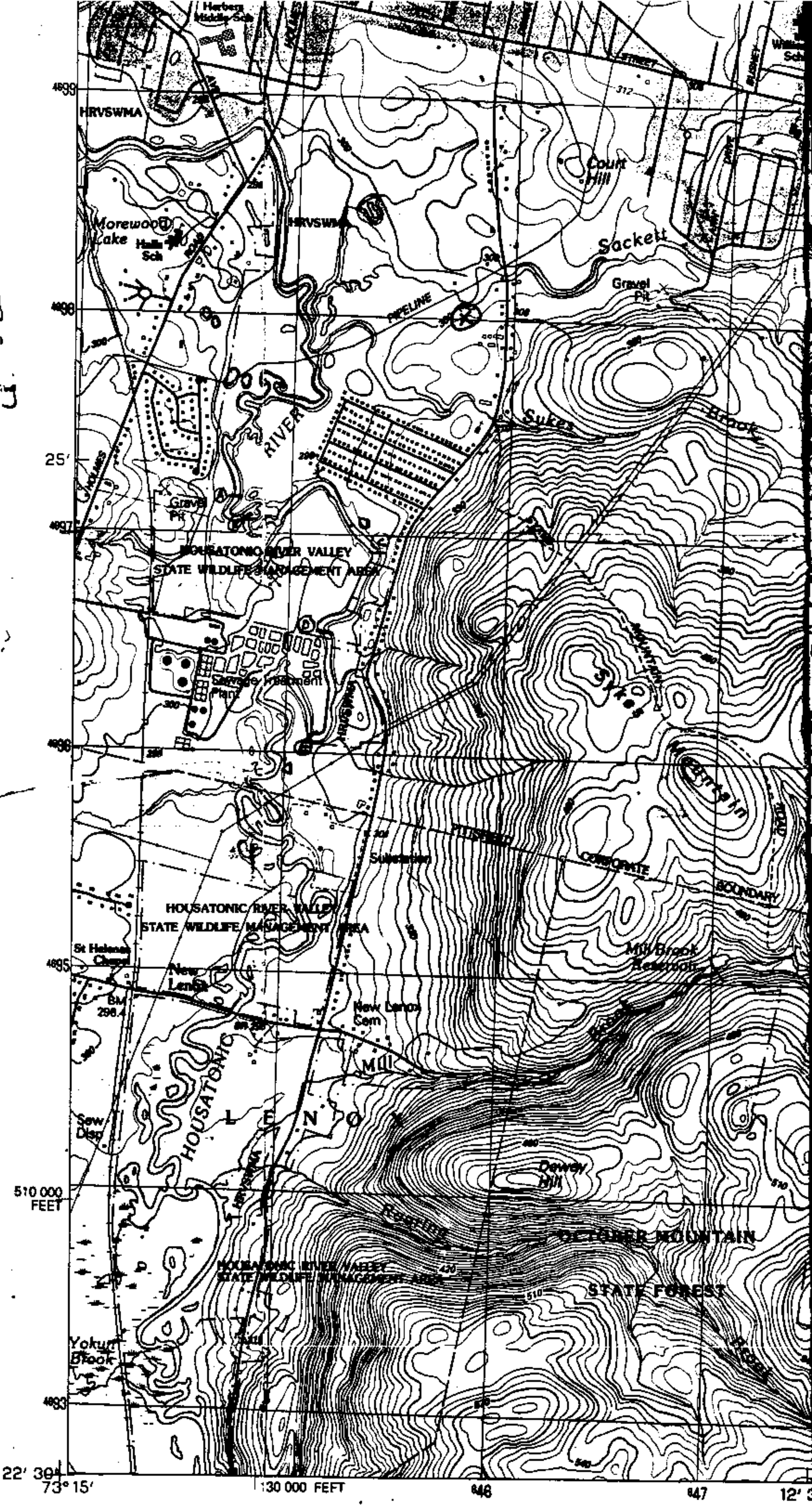
Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

* - Cobble / sand bottom
Backpack fishing

□ = Sand bottom,
Shallow
Backpack fishing

Δ = Deep section
good area for


HRVSWMA
Morewood Lake
Halls Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
Sukes
Brook
RIVER
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Substation
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
BM 298.4
New Lenox Cem
Mill Brook Reservoir
Mill
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
OCTOBER MOUNTAIN
STATE FOREST
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
25′
510 000 FEET
42° 22′ 30″
73° 15′
130 000 FEET
646
647
12′ 3

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kinnicky

Address: Woodlot Alternatives

122 Main St, No. 3 Topsham, ME 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:

Northern Harrier (Circus cyaneus)

Date and Time of observation:

6 Oct 99 1000

1. Location where species was observed: CL

a) Town: Lenox County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Approx. 200 meters south of Decker Canoe Launch (New Lenox Road), east side of Housatonic River

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? _____

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Female type, age unknown

5. Evidence (if any) of breeding activity at this site: N/A

(OVER)

Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: FLOODPLAIN GRASSY FIELD. MAY HAVE BEEN USED FOR AGRICULTURE IN THE PAST

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   X Other. Please specify: ORNITHOLOGIST FOR 6 YEARS.

12. Briefly explain your previous field experience with this species: AVID BIRDER, OBSERVED SPECIES NUMEROUS TIMES

13. List names and qualifications of other observers (if any): ARTHUR HAINES - BOTANIST/NATURALIST - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 3NOV99

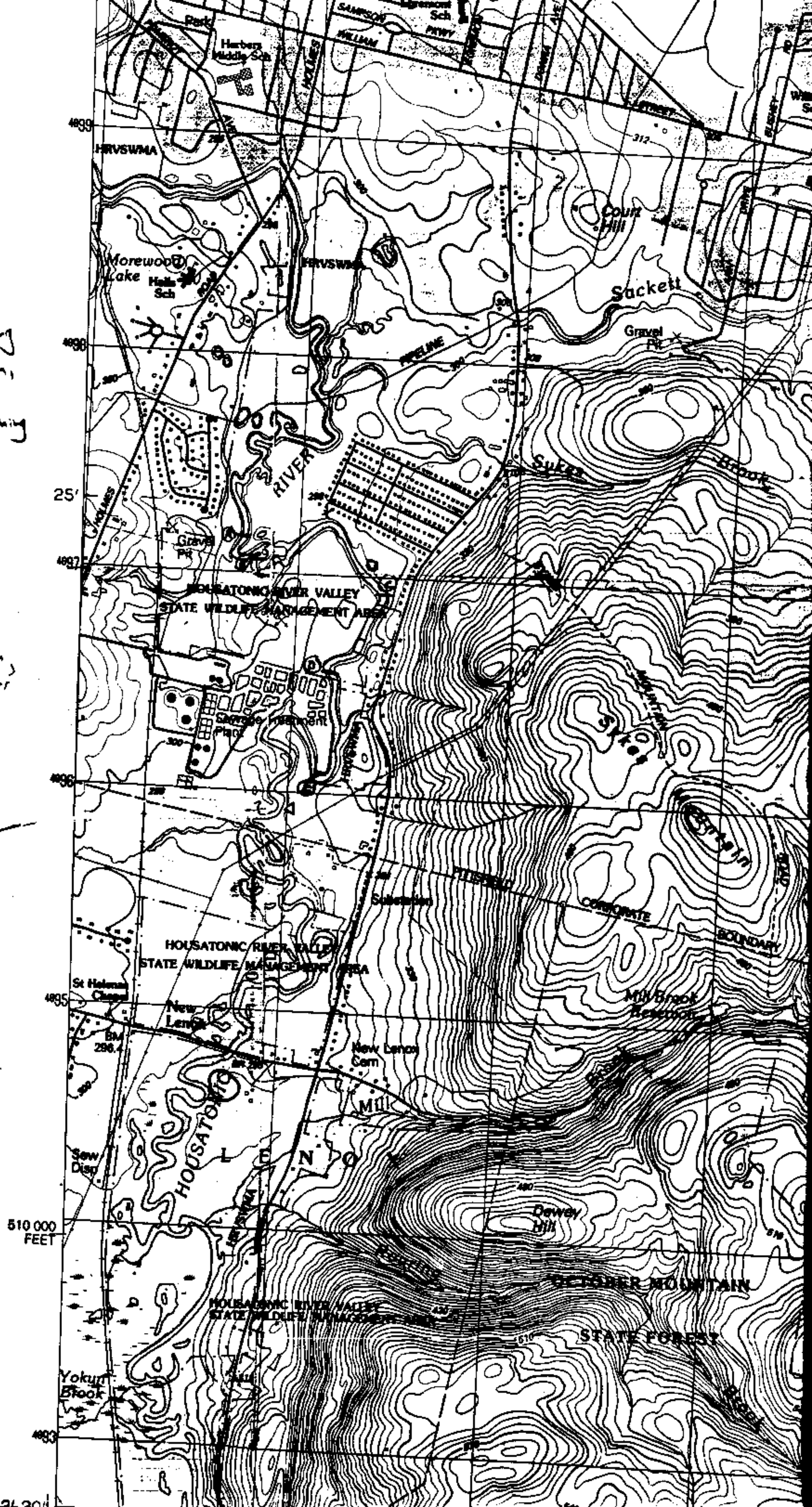
Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

✱ = Cobble/sand bottom
Backpack fishing

□ = Sand bottom,
Shallow
Backpack fishing

Δ = Deep stretch,
good area for
Gill net



Harbert Middle Sch
HRVSWMA
Morewood Lake
Court Hill
Sackett
Gravel Pit
Sykes Brook
RIVER
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Substation
PITTSFIELD CORPORATE BOUNDARY
Mill Brook Reservoir
St Helena Chapel
New Lenox
New Lenox Cem
HOUSATONIC
L E N O X
Dewey Hill
OCTOBER MOUNTAIN
STATE FOREST
Yokun Brook
Sew Disp
510 000 FEET
25′
4899
4898
4897
4896
4895
4893

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kinkaczky

Address: ~~Woodlot Alternatives, Inc.~~ 122 Main Street ~~Topsham, ME 04086~~

Phone: _____ (H) 207-729-1199 (W)

Species observed: Northern Harrier (Circus cyaneus)

Date and Time of observation: 7 Oct 99 0800

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Approx. 400 meters South of Dekker Canoe Launch (off New Lenox Rd.), on west side of Housatonic River.

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? Plumage, flight pattern, habitat

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Female type, age unknown

5. Evidence (if any) of breeding activity at this site: None

(OVER)

6. [illegible] species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: GRASSY FLOODPLAIN FIELD ALONG HOUSATONIC RIVER

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- X Other. Please specify: ORNITHOLOGIST FOR 6 YRS.

12. Briefly explain your previous field experience with this species:

AVID BIRDER, OBSERVED NUMEROUS TIMES IN THE FIELD

13. List names and qualifications of other observers (if any):

ARTHUR HAINES - BOTANIST/NATURALIST - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 3 NOV 99

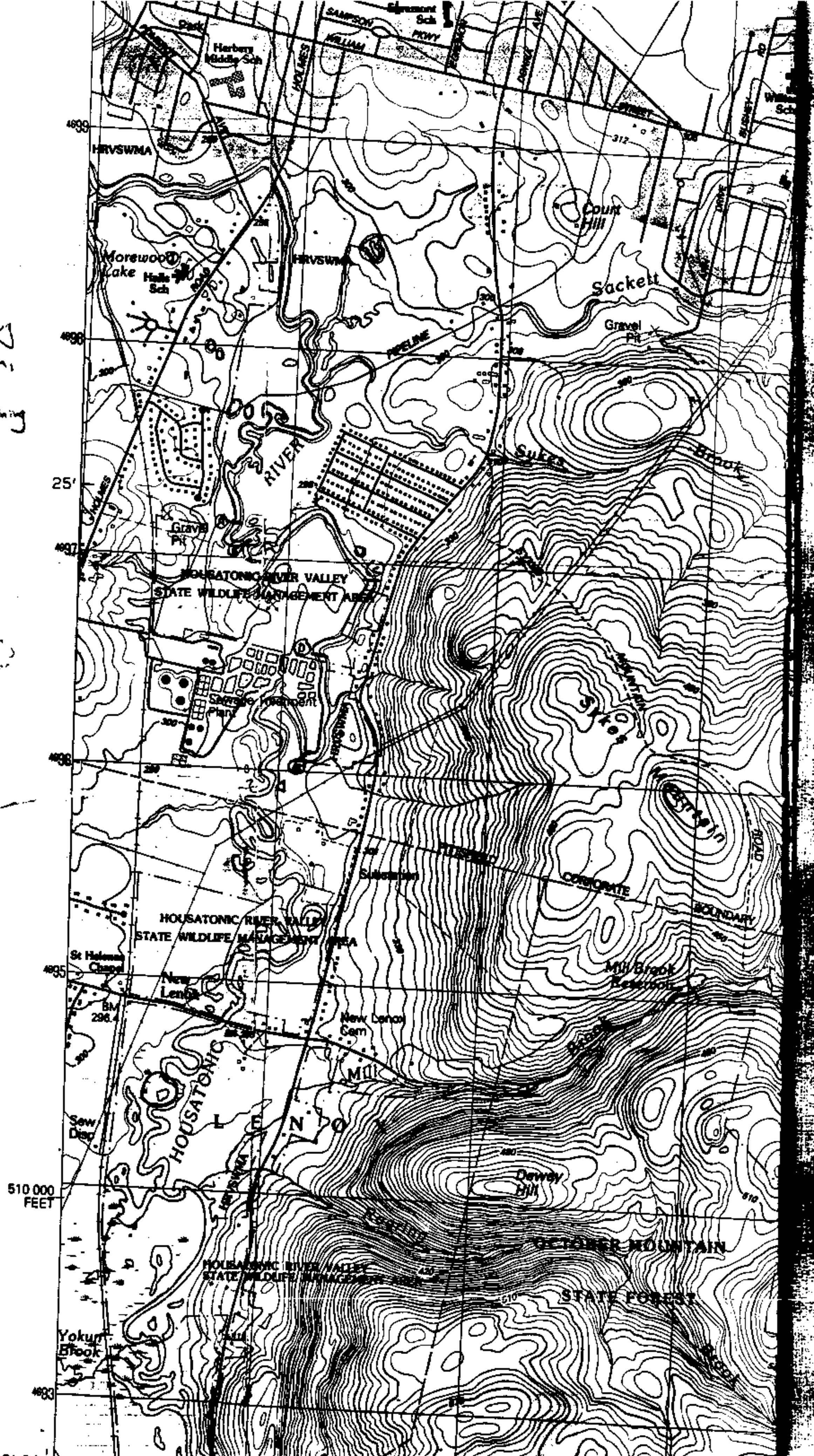
Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

* - Cobble / sand bottom
Backpack fishing

□ = Sand bottom, Shallow
Backpack fishing

Δ = Deep stretch
good area for
C... et



Herberg Middle Sch
SAMPSON
WILLIAM
PKWY
HOLMES
HRVSWMA
Morewood Lake
Halls Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
Sykes
Brook
RIVER
25'
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes
Mountain
Substation
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
Mill
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN
STATE FOREST
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
4699
4698
4697
4696
4695
4693

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kwiwacky

Address: ~~Woodlot Alternatives, Inc.~~
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: Northern Harrier (Circus cyaneus)

Date and Time of observation: 18 Oct 99 1000

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Pittsfield Sewage Treatment Plant located East of Holmes Road

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? Plumage, flight pattern, habitat

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Female type, age unknown

5. Evidence (if any) of breeding activity at this site: None

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: —

7. Description of habitat at this site: GRASSY MEADOW ADJACENT TO SEWAGE IMPOUNDMENTS AND [redacted] FLOODPLAIN FOREST

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: TOWN OF PITTSFIELD

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):

____ Amateur naturalist. Years of experience: ____
____ Conservation Commission member
____ Biology/science teacher
X Environmental Consultant
X Degree in Biology: A Bachelor's ____ Master's ____ Ph. D.
X Other. Please specify: ORNITHOLOGIST 6 YRS.

12. Briefly explain your previous field experience with this species:

AVID BIRDER, OBSERVED MANY TIMES IN FIELD

13. List names and qualifications of other observers (if any):

CHRIS WERNER - BIOLOGIST WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 3NOV99

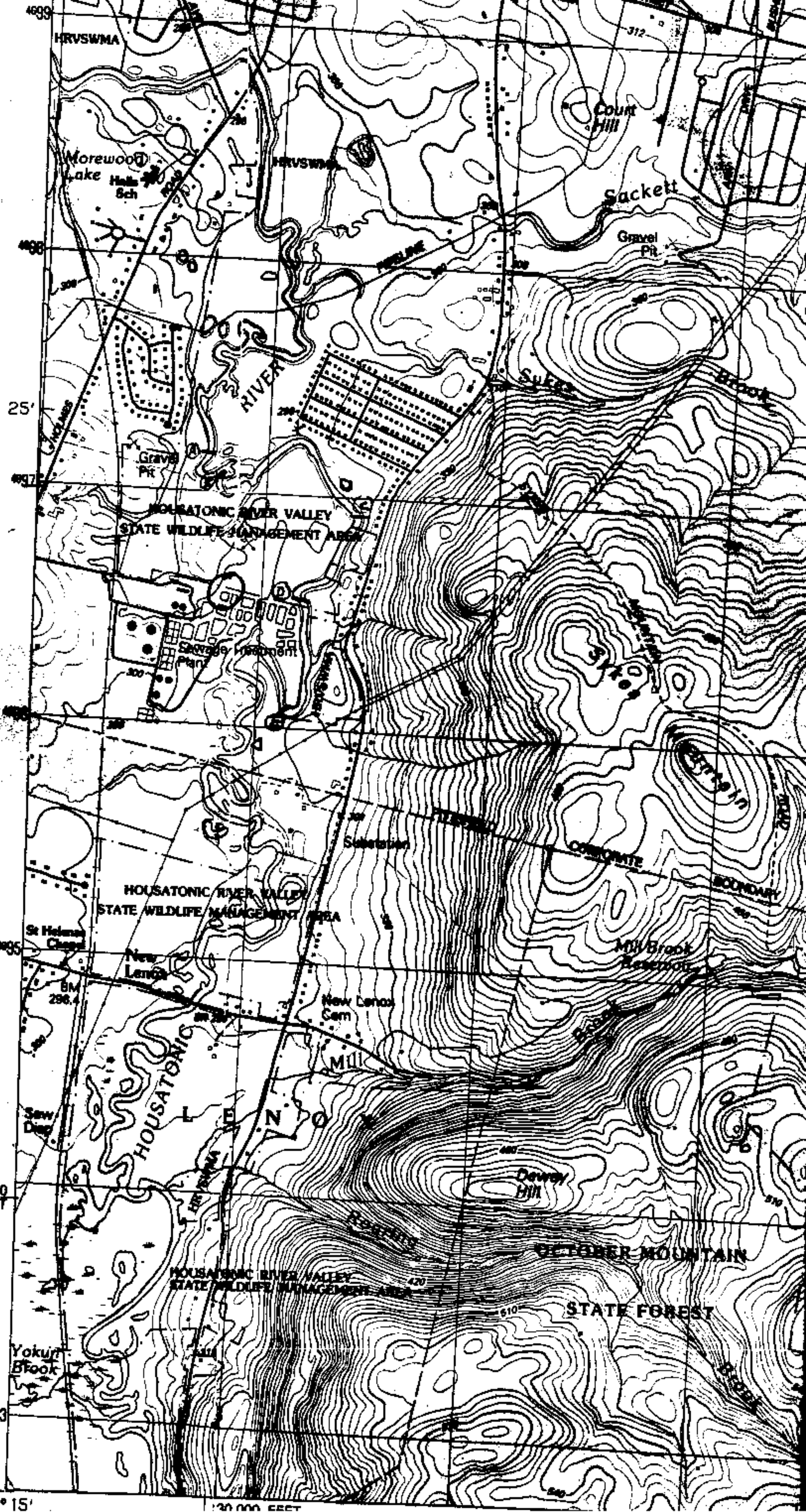
Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

* - Cobble / sand bottom,
Backwater fishing

□ = Sand bottom,
Shallow
Backpack fishing

Δ = Deep ...
good area ...
... ft



Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KNAWACKY

Address: WOODLOT ALTERNATIVES
122 MAIN ST., NO. 3 TOPSHAM, ME 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: NORTHERN HARRIER (CIRCUS CYANEUS)

Date and Time of observation: 4 OCT 99 0900

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD EAST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot:
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
LOCATED EAST OF HOLMES ROAD, NORTH OF SEWAGE TREATMENT PLANT

2. Number of individuals observed: 2

3. Was a positive ID possible? YES Based on what field marks?
PLUMAGE, FLIGHT PATTERN, HABITAT

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: BOTH WERE FEMALE TYPE, AGE UNKNOWN

5. Evidence (if any) of breeding activity at this site: N/A

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: MOWED GRASSY FIELD ADJACENT TO A CAT-TAIL MARSH AND THE HOUSATONIC RIVER

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: STATE OF MASS.

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   X Other. Please specify: ORNITHOLOGIST FOR 6 YRS.

12. Briefly explain your previous field experience with this species: AVID BIRDER, OBSERVED SPECIES NUMEROUS TIMES

13. List names and qualifications of other observers (if any): ARTHUR HAINES - BOTANIST/NATURALIST - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 3 NOV 99

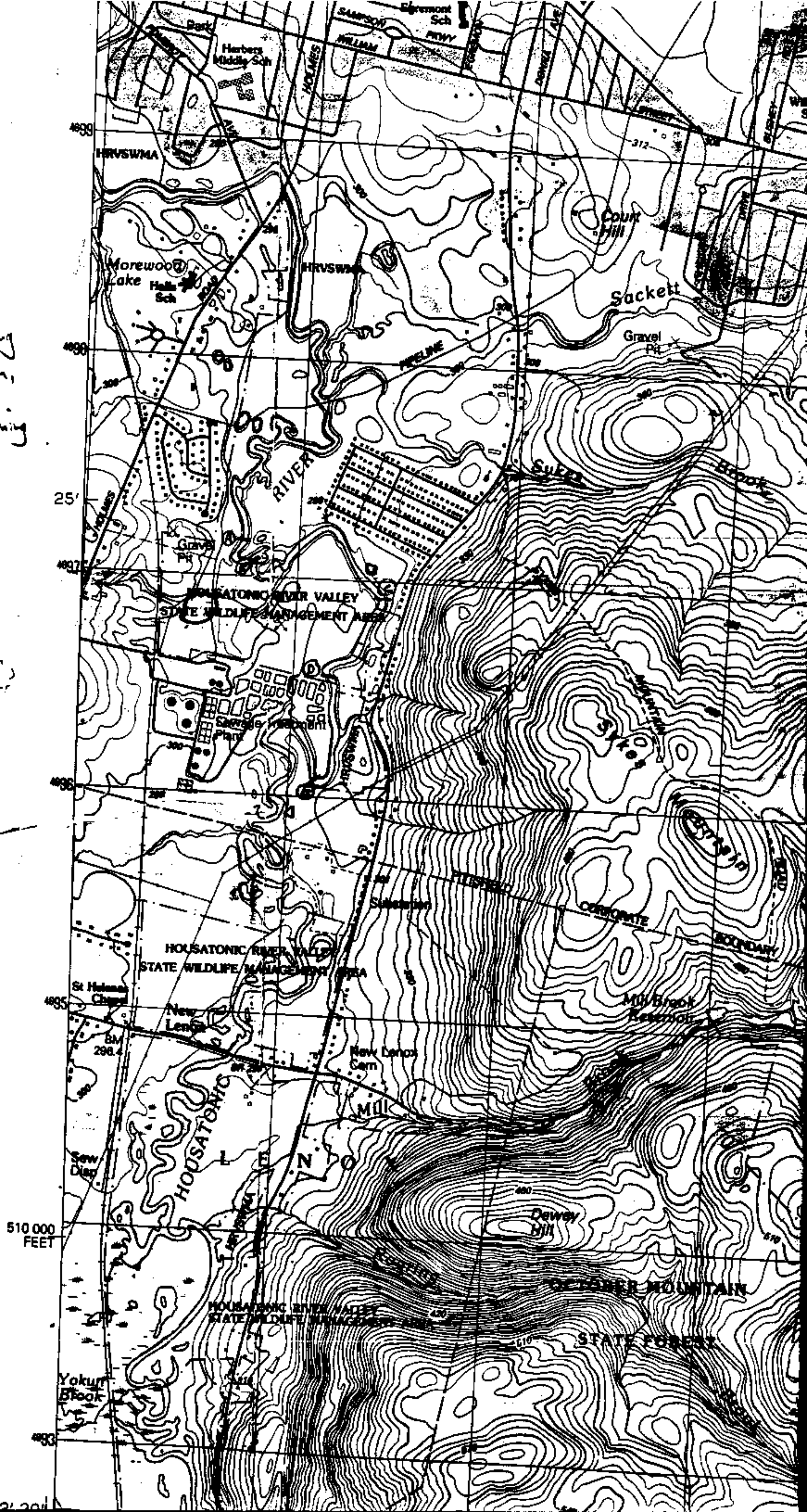
Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

* - Cobble / sand bottom
Backpack fishing

□ = Sand bottom, Shallow
Backpack fishing

Δ = Deep stretch, good area for
[illegible] net


Park
Herbert Middle Sch
HOLMES
HRVSWMA
Morewood Lake
Court Hill
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes
Brook
25'
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Substation
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helena Chapel
New Lenox
BM 298.4
New Lenox Cem
Mill Brook Reservoir
Mill
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN
STATE FOREST
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
NORTHERN HARRIER (CIRCUS CYANEUS)

Date and Time of observation:
5MAY 2000 1030

1. Location where species was observed:

a) Town: Washington County BERKSHIRE USGS Map: EAST LEE

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FROM NEW LENOX RD. IN PITTSFIELD TRAVEL SOUTH ALONG THE WOODLAND ROAD (DIRT ROAD ALONG WEST SIDE OF OCT. MTN. STATE FOREST), TAKE LEFT ON OCTOBER MOUNTAIN ROAD. STAY RIGHT AT ALL FORKS, MAKE RIGHT AT ONLY 4-WAY INTERSECTION.

2. Number of individuals observed: 2

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE (BROWN PLUMAGE, WHITE UPPERTAIL COVERTS), FLIGHT PATTERN (DIHEDRAL), HABITAT

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE - SECOND YEAR OR OLDER, SEX - UNKNOWN.

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: THE LAKE CONTAINS OPEN WATER, EMERGENT MARSH, AND SHRUB SWAMP HABITAT SURROUNDED BY UPLAND FOREST. ELEVATION ca. 1700 FEET.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: OCTOBER MOUNTAIN STATE FOREST - STATE OF MASSACHUSETTS

10. Additional observations/comments: BOTH BIRDS HUNTING OVER SHORELINES OF WASHINGTON MOUNTAIN LAKE AND ALONG ADJACENT MARSH

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- X Other. Please specify: AVIAN BIOLOGIST FOR 6 YEARS

12. Briefly explain your previous field experience with this species: AVIAN FIELD BIOLOGIST, HAWK MIGRATION COUNTER, AVID BIRDER

13. List names and qualifications of other observers (if any): CHRIS WERNER - BIOLOGIST, WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

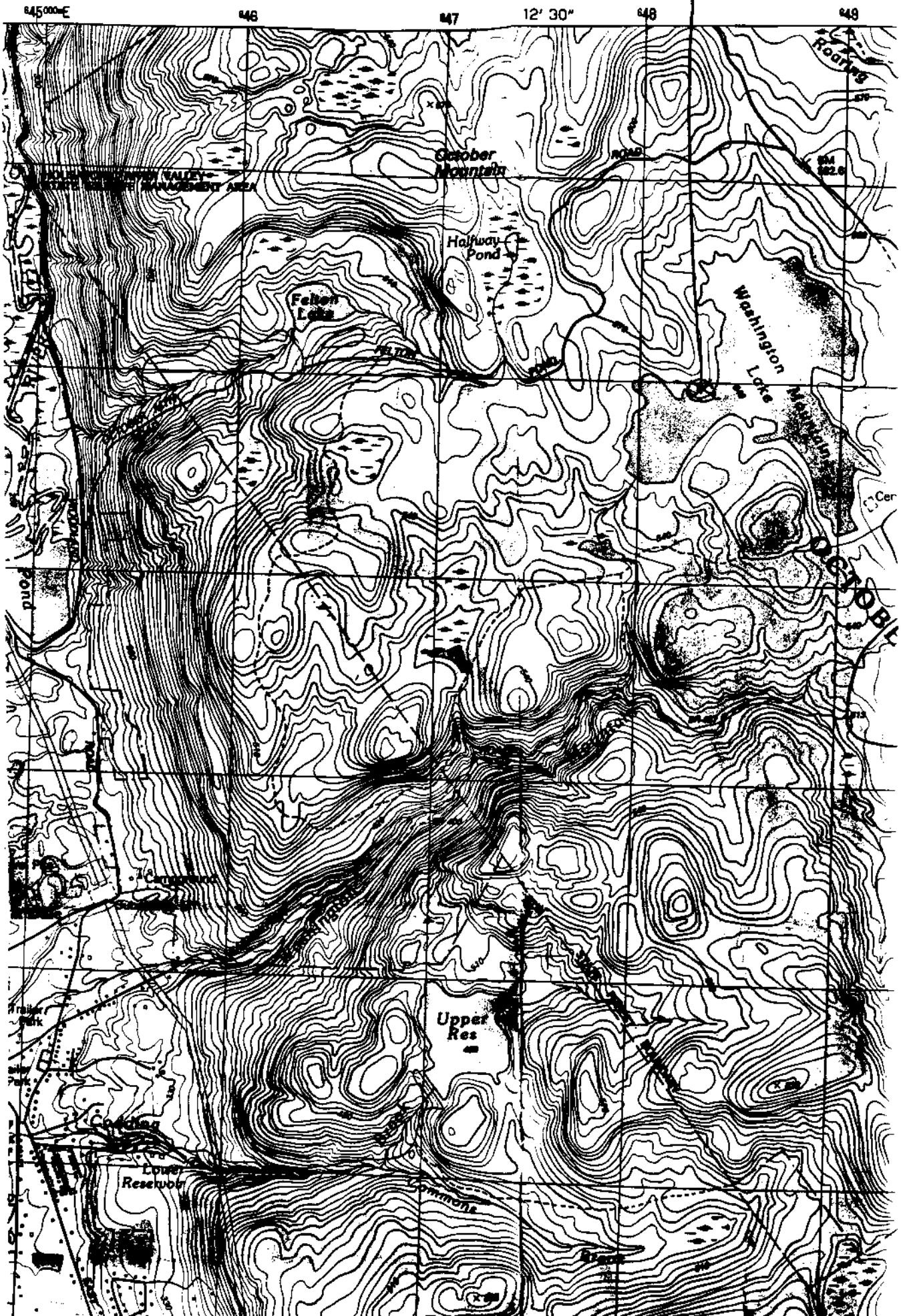
Signature _____ Date: 6MAY00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

NORTHERN HARRIER

MASSACHUSETTS



Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
NORTHERN PARULA (PARULA AMERICANA)

Date and Time of observation:
12 MAY 99 AM

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: PITTSFIELD EAST

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FROM THE NEW LENOX ROAD BRIDGE, FOLLOW A DIRT ROAD NORTH ALONG THE WEST SIDE OF THE HOUSATONIC RIVER.

2. Number of individuals observed: ONE

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, VOCALIZATION

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT MALE

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: TRANSITIONAL FLOODPLAIN FOREST ADJACENT TO THE HOUSATONIC RIVER

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: BIRD OBSERVED VOCALIZING AND FORAGING

11. Qualifications of observer (check all that apply):
   _____ Amateur naturalist. Years of experience: _____
   _____ Conservation Commission member
   _____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's _____ Master's _____ Ph. D.
   _____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: BIRD BANDER AT MANOMET CENTER FOR CONSERVATION SCIENCES, AVID BIRDER

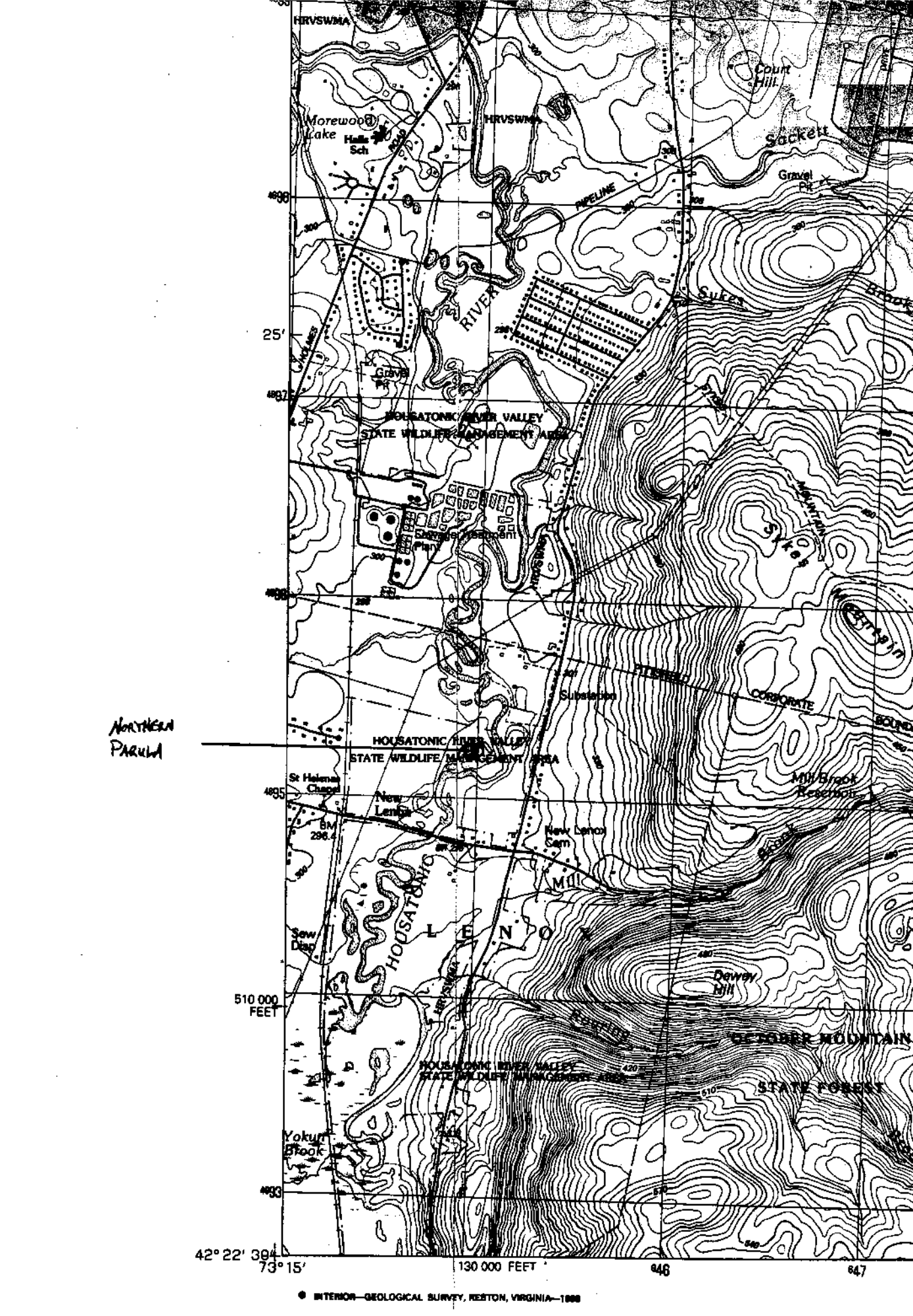
13. List names and qualifications of other observers (if any): CHRIS WERNER - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 20MAR01

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



● INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1966

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KNOWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:

NORTHERN PARULA (PARULA AMERICANA)

Date and Time of observation:

10 MAY 99, 11 MAY 99 AM

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD WEST

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: TRAVEL ON POMEROY AVE TO BRUNSWICK AVE. TRAVEL SOUTH TO END OF STREET. OBSERVATIONS FROM HABITAT SOUTH OF GRADED TRAIL

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, VOCALIZATIONS

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT MALE OBSERVED ON BOTH DATES

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: TRANSITIONAL FLOODPLAIN FOREST ADJACENT TO HOUSATONIC RIVER

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: BIRDS OBSERVED VOCALIZING AND FORAGING

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: BIRD BANDER AT MANOMET CENTER FOR CONSERVATION SCIENCES, AVID BIRDER

13. List names and qualifications of other observers (if any): CHRIS WERNER - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 20 MAR 01

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


PITTSFIELD
Hillcrest Hospital
West Side Community Sch
St Josephs High Sch
Crosby Jr High Sch
Hosp
Park
Museum
Clapp Park
Memorial
Branch
PITTSFIELD MUNICIPAL AIRPORT
Airport 2
Beacon
Wampenum
MOUNTAIN
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Pittsfield Country Club
Morewood Lake
Bousquet Ski Area
Gravel Pit
Trailer Pk
The Cobble
4702
27′ 30″
4701
4700
4699
4698
25′
4697
4696
NORTHERN PARULA
HOLMES RD

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KAKWACKY

Address: WOODLOT ALTERNATIVES
122 MAIN ST., No 3, TOPSHAM, ME 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
RIFFLE SNAKETAIL (OPHIOGOMPUS CAROLUS)

Date and Time of observation:
3 JUNE 1999 AM

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD EAST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: APPROXIMATELY 500m DOWNSTREAM FROM THE CONFLUENCE OF EAST AND WEST BRANCH OF HOUSATONIC RIVER.

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? _____

EXUVIA IDENTIFICATION WAS COMPLETED BY JEREMIAH TRIMBLE + BLAIR NIKULA HARWICH PORT, MA 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: EXUVIA

5. Evidence (if any) of breeding activity at this site: YES

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: STEEP BANK ALONG HOUSATONIC RIVER ADJACENT TO FLOODPLAIN FOREST. RIVER IS NARROW WITH RIFFLES AND RUNS, AND A SHALLOW, COBBLE BOTTOM

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. NO OTHER SPECIES COLLECTED AT THIS LOCATION ON THIS DATE

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any): KURT KNAUSKY - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 6/14/00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

RIFFLE SNAKETAIL


27' 30"
County Jail
Substa
BM 303.2
EAST
Silver Lake
Housatonic
Radio Tower
BM 300.2
St Lukes Hospital
Branch
Goodrich Pond
Deming Park
BRATTLE BROOK PAR
ELM
PITTSFIELD
Fire Sta
DAWES
MARION AVE
SAMPSON
WILLIAM
Herberg Middle Sch
HOLMES
Egremont Sch
PKWY
ABOVEGROUND
BIRCHGROVE
MAPLEGROVE
STREET
4700
4699
4698
HRVSWMA
Court Hill
Morewood Lake
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes
Brook
25'
20 KM TO INTERSTATE 90
LENOX 12 KM

Natural Heritage &
Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KAKWACKY

Address: WOODLOT ALTERNATIVES
122 MAIN ST., No. 3, TOPSHAM, ME 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
RIFFLE SNAKETAIL (OPHIOGOMPHUS CAROLUS)

Date and Time of observation:
20 SEPTEMBER 1999 AM

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD WEST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: CONFLUENCE OF EAST AND WEST BRANCH OF HOUSATONIC RIVER TO 200 m DOWNSTREAM

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? _____

EXUVIA IDENTIFICATION WAS COMPLETED BY JEREMIAH TRIMBLE AND BLAIR NIKULA
HADLEY MA, MA 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: EXUVIA

5. Evidence (if any) of breeding activity at this site: YES

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: STEEP BANK ALONG HOUSATONIC RIVER ADJACENT TO FLOODPLAIN FOREST. RIVER IS NARROW WITH RIFFLES AND RUNS, AND A SHALLOW, COBBLE BOTTOM.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. NO OTHER SPECIES COLLECTED AT THIS LOCATION ON THIS DATE

11. Qualifications of observer (check all that apply):
    - ____ Amateur naturalist. Years of experience: ____
    - ____ Conservation Commission member
    - ____ Biology/science teacher
    - X Environmental Consultant
    - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
    - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

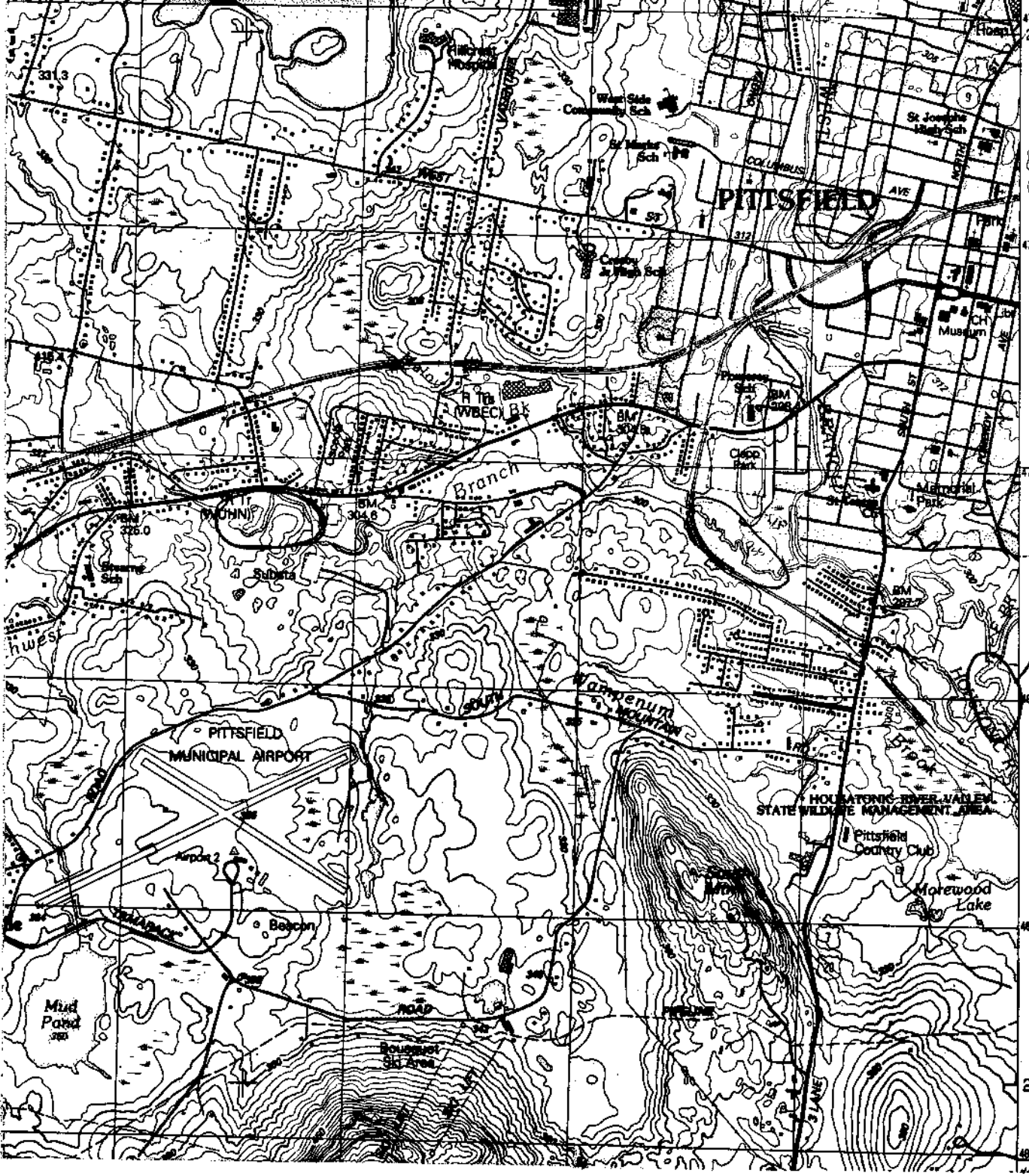
13. List names and qualifications of other observers (if any): KURT KARWACKY - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 7 MAR 00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


PITTSFIELD
PITTSFIELD MUNICIPAL AIRPORT
Hillcrest Hospital
West Side Community Sch
St Joseph Mem Sch
St Mary Sch
Central Mass Sch
CH Museum
Phelps Sch
Clapp Park
Memorial Park
Branch
Subiaco
Greene Sch
Tamarack Mountain
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Pittsfield Country Club
Morewood Lake
Beacon
Mud Pond
Bousquet Ski Area
Pipeline
Airport 2
4702
4701
4700
4699
4698
4697
27' 30"
25'
RIFFLE SNAKETAIL
20 SEPT 99

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: JOHN LORTIE

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
SHARP-SHINNED HAWK (ACCIPITER STRIATUS)

Date and Time of observation:
AM 22AUG00

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: EAST LEE, MASS.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FROM HOLMES ROAD, TRAVEL EAST ON NEW LENOX ROAD TO THE DEERFIELD CANOE LAUNCH, WHICH IS ON THE SOUTH SIDE OF ROAD. BIRD OBSERVED SOARING FROM CANOE LAUNCH PARKING LOT.

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? FLIGHT PATTERN, TAIL SHAPE (SQUARE), SIZE

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE - UNKNOWN, SEX - UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: BIOLOGISTS WITH WOODLOT ALTERNATIVES HAVE OBSERVED THIS SPECIES IN THIS VICINITY IN 1997, 2000.

7. Description of habitat at this site: RIVER HABITATS INCLUDE EMERGENT MARSH, SCRUB SHRUB HABITAT, WET MEADOWS, FLOODPLAIN AND UPLAND FOREST.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: STATE OF MASSACHUSETTS - HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: BIRD OBSERVED SOARING FROM THE DEENER CANOE LAUNCH

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - ✓ Environmental Consultant
   - ____ Degree in Biology: ____ Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: > 20 yrs experience

12. Briefly explain your previous field experience with this species: ____

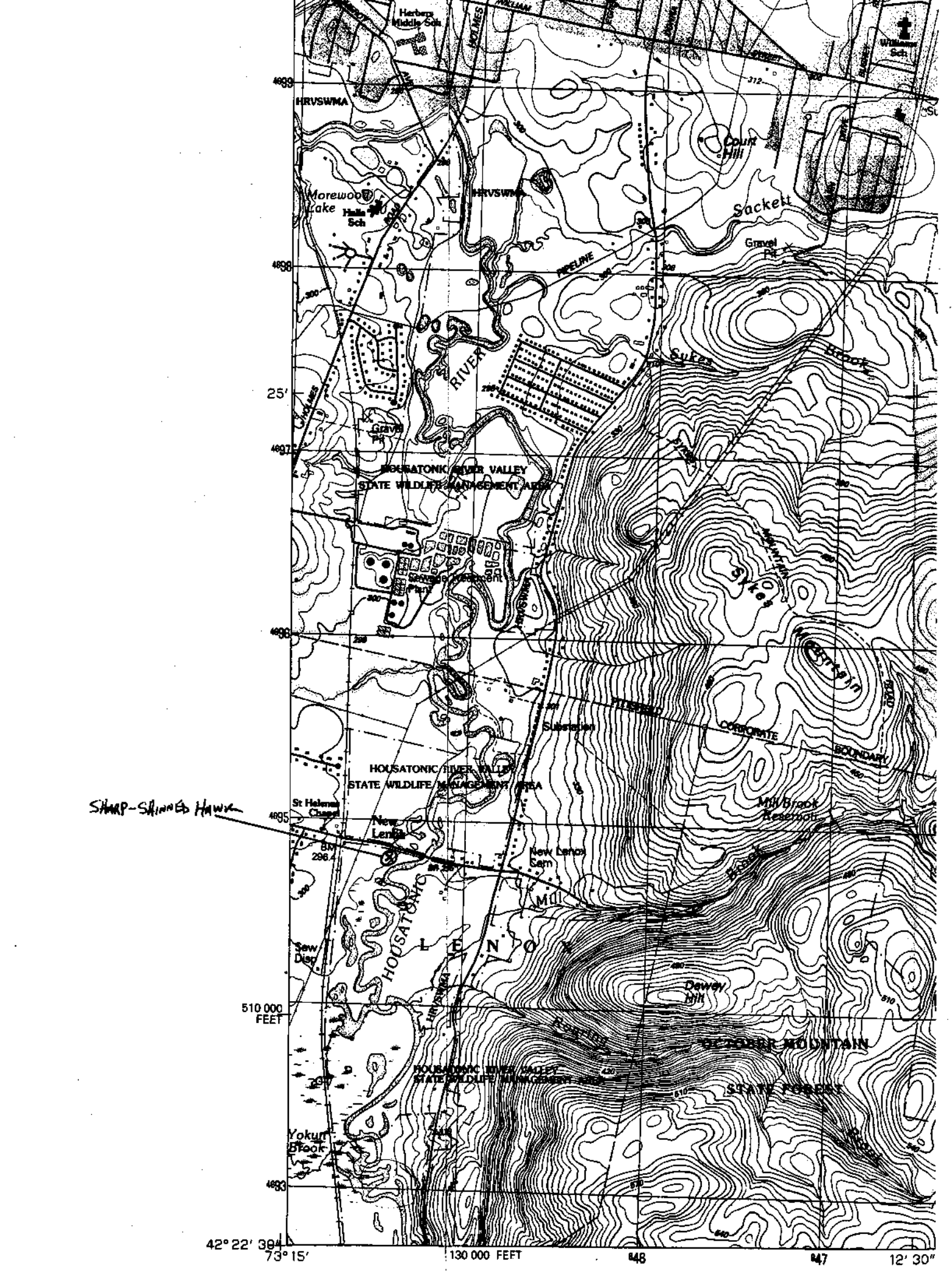
13. List names and qualifications of other observers (if any): ____

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature JC R Date: 11/4/00

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


Herberg Middle Sch
HRVSWMA
Morewood Lake
Hills Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes Brook
25'
Gravel Pit
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Substation
Mountain
Sykes
Mt Prospect
PIPELINE
CORPORATE BOUNDARY
Substation
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
SHARP-SHINNED HAWK
St Helena Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
Mill Brook
Sew Disp
HOUSATONIC
L E N O X
HRVSWMA
Dewey Mtn
510 000 FEET
Rattle
OCTOBER MOUNTAIN STATE FOREST
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Yokum Brook
42° 22' 30"
73° 15'
130 000 FEET
12' 30"

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: 207-846-6764 (H) 207-729-1199 (W)

Species observed: Sharp-shinned Hawk

Date and Time of observation: 9.1.98

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: Pittsfield East

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Seen at the Decker Canoe Launch ~~at~~ on the Housatonic River. Launch is on New Lenox Rd. in Lenox, near the New Lenox Rd. Bridge.

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? Close view of definitive field marks (long, squared tail, etc.).

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Not recorded

5. Evidence (if any) of breeding activity at this site: No, appeared to be foraging in shrub habitats.

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: SCRUB-SHRUB WETLANDS & SUCCESSIONAL SHRUBLANDS W/ SCATTERED TREES LOCATED ADJACENT TO OPEN FLOODPLAIN OF RIVER.

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: MASS. FISH & WILDLIFE

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):

___ Amateur naturalist. Years of experience: ___
___ Conservation Commission member
___ Biology/science teacher
X Environmental Consultant
X Degree in Biology: X Bachelor's ___ Master's ___ Ph. D.
___ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: HAVE CONDUCTED RAPTOR SURVEYS THROUGHOUT THE NORTHEAST

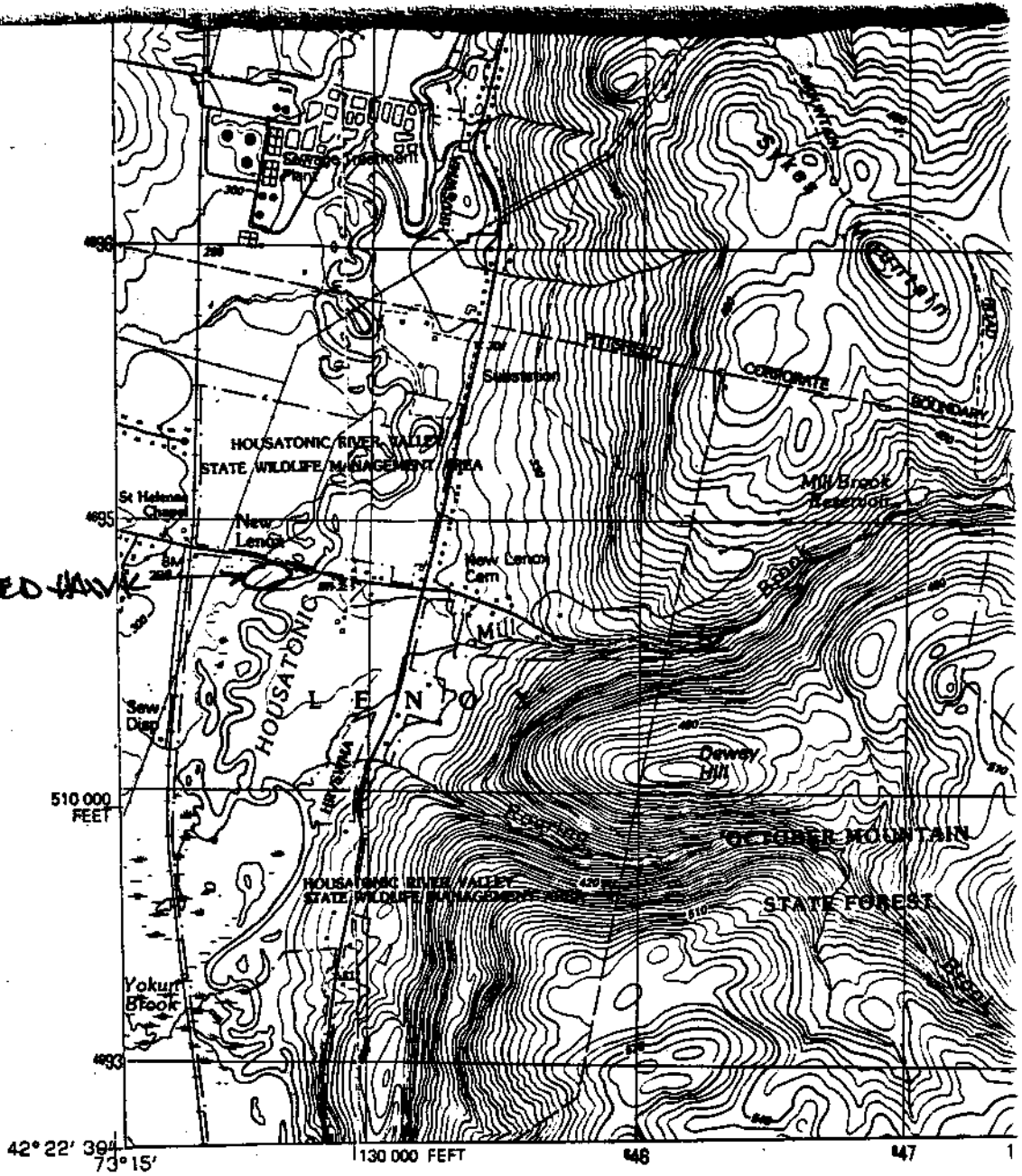
13. List names and qualifications of other observers (if any): _____

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 9.1.98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



9.1.98
SHARP-SHINNED HAWK

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy

Species observed: Sharp-shinned Hawk

Address: ~~Woodlot Alternatives, Inc.~~
122 Main Street
~~Topsham, Maine 04086~~

Date and Time of observation: 9.15.98 & 12.22.98

Phone: 207.846.6764 (H) 207.729.1199 (W)

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield East

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Park @ Holmes Rd. Bridge in Pittsfield. Follow access road (yellow pipe gate) south along River. Observations occurred in streamside trees ±1000' south of Holmes Rd. & forested floodplain ±3500' south of Holmes Rd.

2. Number of individuals observed: 1 on 9.15.98, 1 on 12.22.98

3. Was a positive ID possible? Yes Based on what field marks? typical field marks (long, squared tail, etc.)

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Not recorded

5. Evidence (if any) of breeding activity at this site: No, migrating or wintering birds (but possibly year-round residents)

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: —

7. Description of habitat at this site: STREAMSIDE TREES DEE ACER NEGUNDO. FORESTED FLOODPLAIN DOMINATED BY ACER SACCHARINUM.

8. Observed or potential threats to the species or its habitat at this site: —

9. Landowner's name and address, if known: MASS. FISH & WILDLIFE (HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA).

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: ____

12. Briefly explain your previous field experience with this species: HAVE CONDUCTED RAPTOR SURVEYS THROUGHOUT NORTHEAST

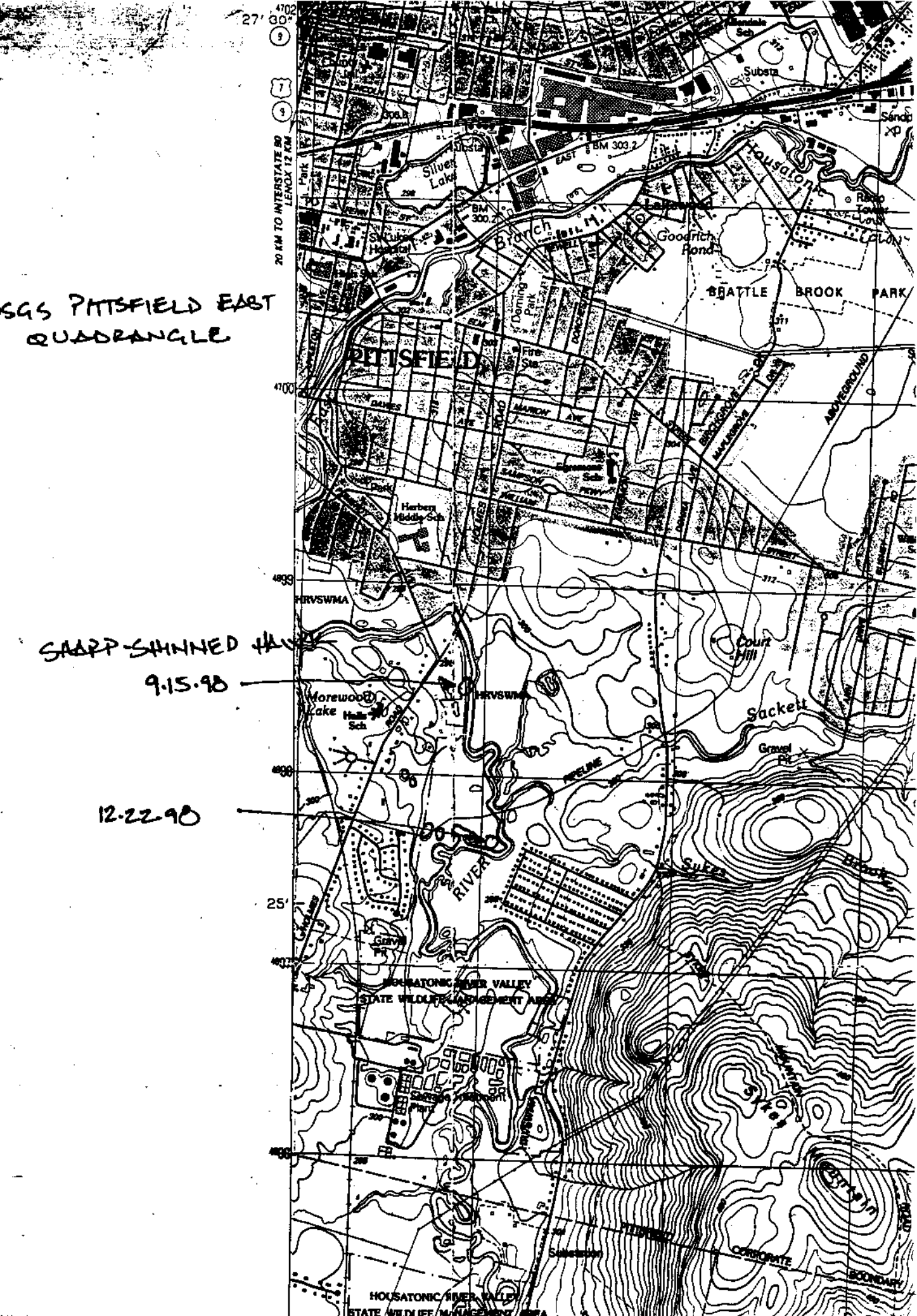
13. List names and qualifications of other observers (if any): ____

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 9/15-98 12/22/98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


USGS PITTSFIELD EAST QUADRANGLE
SHARP-SHINNED HAWK
9.15.98
12.22.98
PITTSFIELD
Silver Lake
Goodrich Pond
BRATTLE BROOK PARK
Housatonic River
Morewood Lake
Court Hill
Sackett
Gravel Pit
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
20 KM TO INTERSTATE 90 LENOX 12 KM
HRVSWMA

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Karol Worden

Address: Woodlot Alternatives
Topsham, ME

Phone: 207 729-1199 (H) _____ (W)

Species observed: Sharp-shinned Hawk (Accipiter striatus)

Date and Time of observation: 8 July 99 / 16:10

1. Location where species was observed:

a) Town: Hinsdale County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Route 8 South from Pittsfield, east on Summit Hill Road, north on Upper Valley Road for approximately 1/4 mile turn east and follow along railroad tracks for approximately 1 mile north

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? Body size and shape, coloring, call

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Unknown

5. Evidence (if any) of breeding activity at this site: Unknown

(OVER)

6. Have you observed this species at this site in previous years? No

If yes, please give details: _____

7. Description of habitat at this site: Deciduous stand on west side of railroad tracks

8. Observed or potential threats to the species or its habitat at this site: None

9. Landowner's name and address, if known: Unknown

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - ____ Environmental Consultant
   - ____ Degree in Biology: ____ Bachelor's ✓ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: Observed in field and captive settings

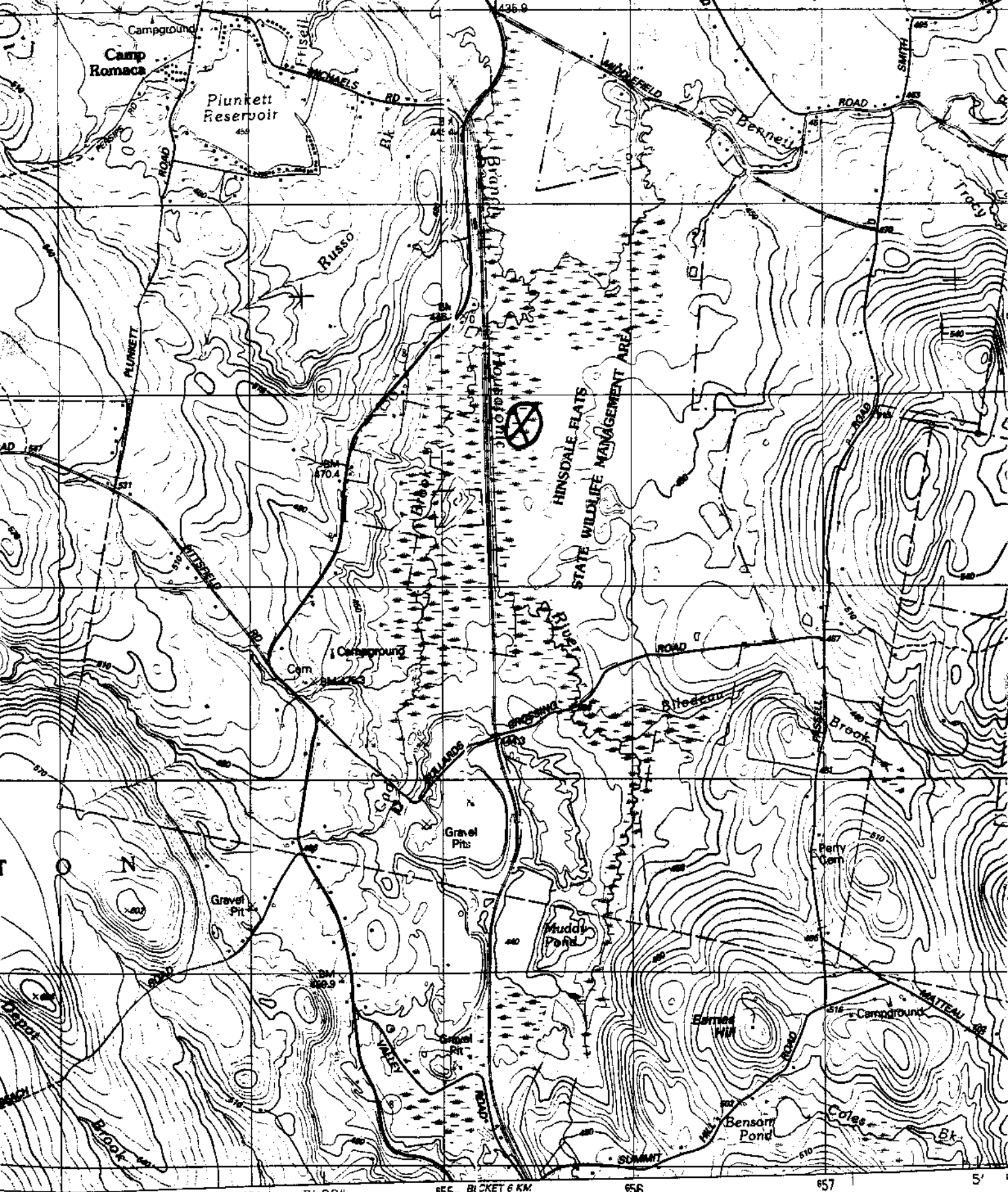
13. List names and qualifications of other observers (if any): Doug Stewart, Arthur Haines - Woodlot Alternatives

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Karol A. Worden Date: 7-14-97

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro. MA 01581
508-792-7270 ext. 200



SCALE 1:25 000

1 CENTIMETER ON THE MAP REPRESENTS 250 METERS ON THE GROUND

CONTOUR INTERVAL 6 METERS

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Karol Worden

Address: Woodlot Alternatives
Topsham ME

Phone: 207 729-1199 (H) _____ (W)

Species observed: Sharp-shinned Hawk (Accipiter striatus)

Date and Time of observation: 13 July 1999 / 1305

1. Location where species was observed:

a) Town: Hinsdale County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Route 8 South from Pittsfield, east on Summit Hill Road, north on Upper Valley Road for approximately 1/4 mile turn east and follow along railroad tracks for approximately 1 mile north

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? Barring on tail, body size and shape

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Unknown

5. Evidence (if any) of breeding activity at this site: Unknown

(OVER)

6. Have you observed this species at this site in previous years? No

If yes, please give details: Not seen on previous years, but seen at same site preceeding week

7. Description of habitat at this site: Emergent / scrub shrub along E. Branch Housatonic River

8. Observed or potential threats to the species or its habitat at this site: None

9. Landowner's name and address, if known: UnKnown

10. Additional observations/comments: Also seen at same site moments before Broad winged hawk

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   ✓ Environmental Consultant
   ✓ Degree in Biology: ____ Bachelor's ✓ Master's ____ Ph. D.
   ____ Other. Please specify: ____

12. Briefly explain your previous field experience with this species: Observed in field and captive settings

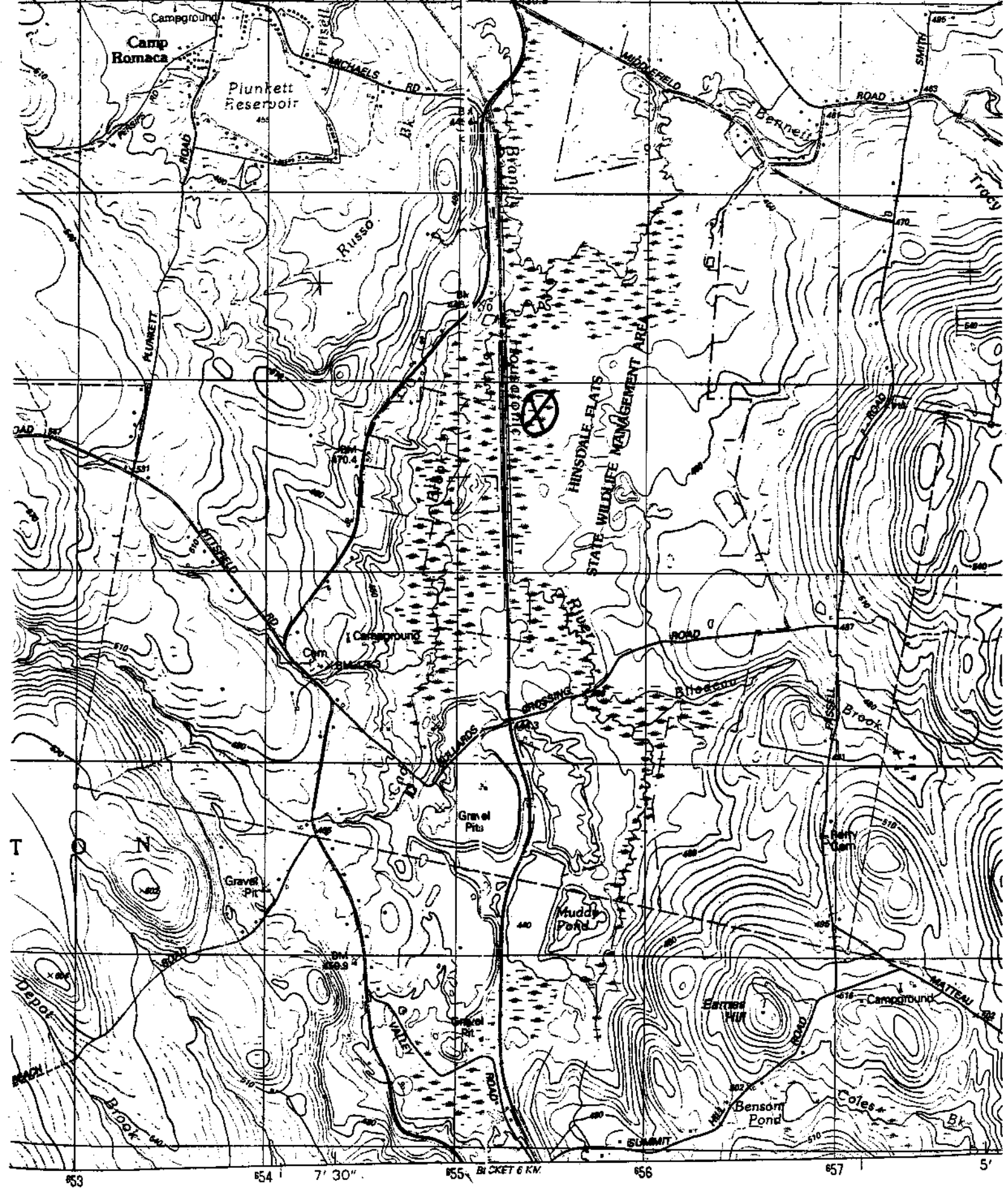
13. List names and qualifications of other observers (if any): Chris Werner - Woodlot Alternatives

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Carol A. Worden Date: 7-14-99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



SCALE 1:25 000

1 CENTIMETER ON THE MAP REPRESENTS 250 METERS ON THE GROUND

CONTOUR INTERVAL 6 METERS

500 0 1000 2000

1000 0 2000 4000 6000

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: ~~Woodlot Alternatives, Inc.~~
~~122 Main Street~~
~~Topsham, Maine 04086~~

Phone: _____ (H) 207-729-1199 (W)

Species observed: SHARP-SHINNED HAWK (ACCIPITER STRIATUS)

Date and Time of observation: 7 OCT 99 1100

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD EAST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: CANOE MEADOWS – MASS. AUDUBON LOCATED EAST OF HOLMES ROAD

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? BIRD WAS SOARING – FLIGHT PATTERN, HEAD PROJECTION, TAIL SHAPE, WING BEAT FREQUENCY, BODY SIZE

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: AGE & SEX UNKNOWN

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. ... species at this site in previous years? No

If yes, please give details: _____

7. Description of habitat at this site: A MIX OF GRASS FIELD, CAT-TAIL MARSH, FLOODPLAIN FOREST, AND SCRUB-SHRUB.

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner s name and address, if known: MASS. AUDUBON SOCIETY

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - X Other. Please specify: ORNITHOLOGIST 6 YEARS

12. Briefly explain your previous field experience with this species:

AVID BIRDER, OBSERVED MANY TIMES IN FIELD & AT HAWK WATCHES

13. List names and qualifications of other observers (if any):

ARTHUR HAINES - BOTANIST/NATURALIST - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 3 NOV 99

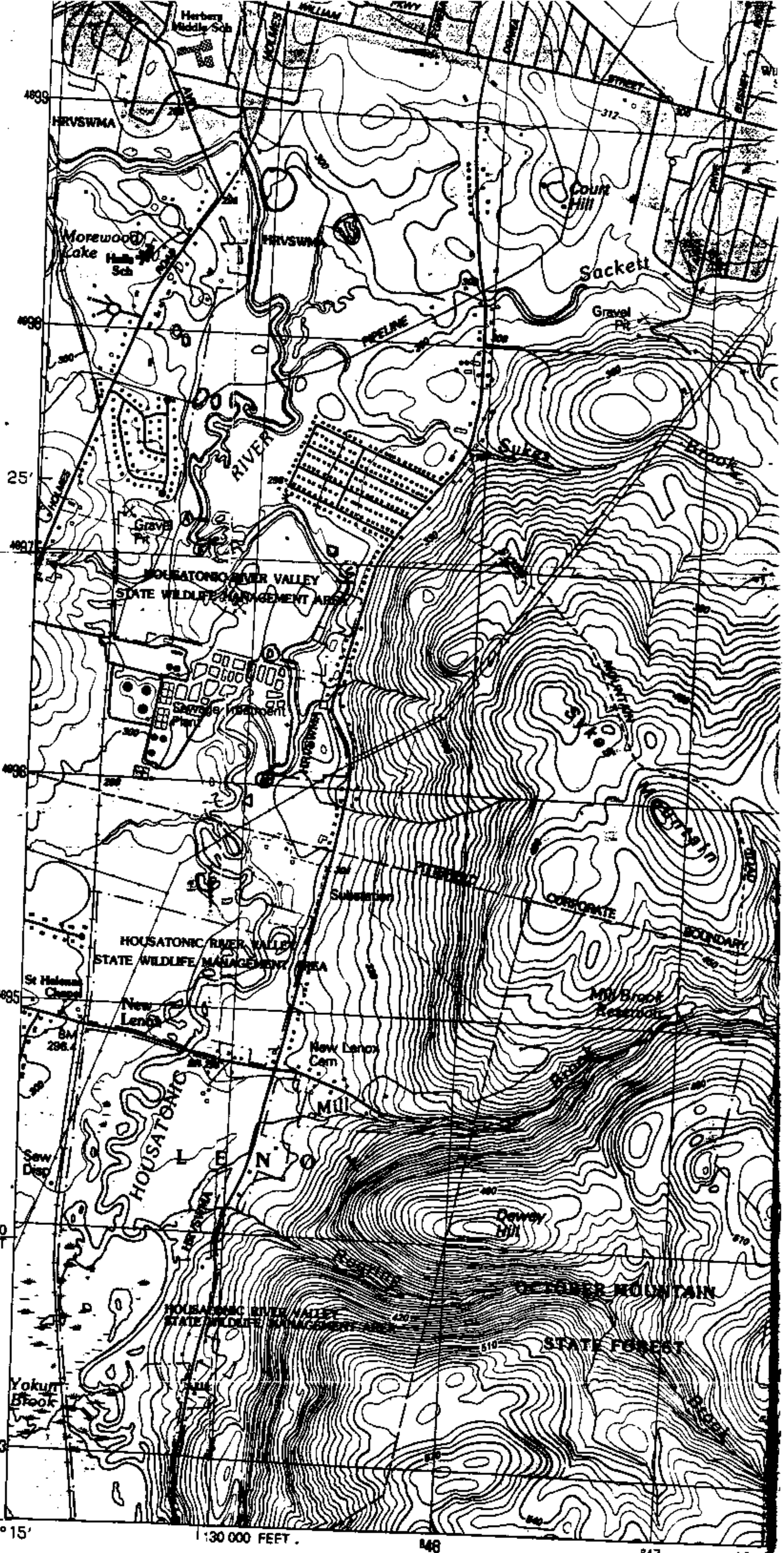
Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

* - Cobble / sand bottom
Backpack fishing

□ = Sand bottom, Shallow
Backpack fishing

Δ = Deep stretch
good area for
C... et



Herberg Middle Sch
HRVSWMA
Morewood Lake
Halls Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes Brook
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Substation
CORPORATE BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
BM 298.4
Mill Brook Reservoir
New Lenox Cem
Mill
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
OCTOBER MOUNTAIN
STATE FOREST
Yokun Brook
510 000 FEET
42°22′30″
73°15′
130 000 FEET

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kwiatkowski

Address: ~~Woodlot Alternatives, Inc.~~
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: Sharp-shinned Hawk (Accipiter striatus)

Date and Time of observation: 6 Oct 99 1400

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Housatonic River Valley State Wildlife Management Area located east of Holmes Rd, north of Sewage Treatment Plant

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? Bird was soaring – flight pattern, head projection, tail shape, wing beat frequency, body size

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: age unknown, sex unknown

5. Evidence (if any) of breeding activity at this site: None

(OVER)

6. Have you observed this species at this site in previous years? NONE

If yes, please give details: _____

7. Description of habitat at this site: FORESTED FLOODPLAIN ADJACENT TO GRAVEL PIT AND THE HOUSATONIC RIVER

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: STATE OF MASS.

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - X Environmental Consultant
   - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   - X Other. Please specify: ORNITHOLOGIST FOR 6 YRS.

12. Briefly explain your previous field experience with this species:

AVID BIRDER, OBSERVED NUMEROUS TIMES DURING HAWK WATCHES

13. List names and qualifications of other observers (if any):

ARTHUR HAINES - BOTANIST/NATURALIST - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 3 NOV 99

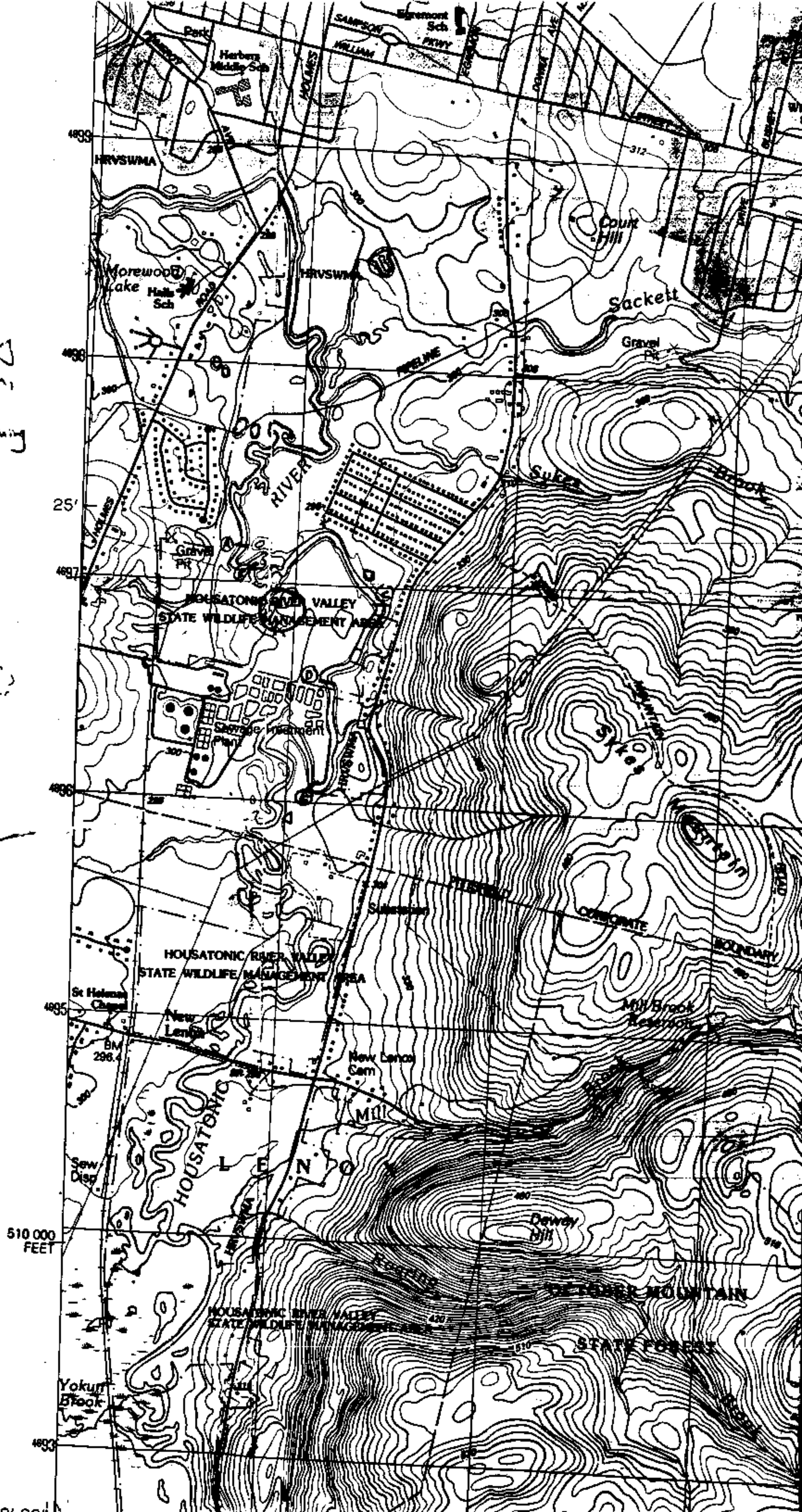
Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

* - Cobble / sand bottom
Backpack fishing

□ = Sand bottom,
Shallow
Backpack fishing

Δ = Deep stretch,
good area for
[illegible]



Park
Herberg Middle Sch
Egremont Sch
HRVSWMA
Morewood Lake
Hale Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
RIVER
Sukes
Brook
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
OCTOBER MOUNTAIN
STATE FOREST
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
25'
510 000 FEET
4697
4696
4695
4693

Natural Heritage &
Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: JOHN LORTIE

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
SHARP-SHINNED HAWK (ACCIPITER STRIATUS)

Date and Time of observation:
1 MAR 2001 12PM

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD EAST, MASS.

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: FOLLOW HOLMES ROAD SOUTH FROM THE CITY OF PITTSFIELD TO POMEROY AVE. TRAVEL NORTH ON POMEROY AVE. TO BRIDGE CROSSING HOUSATONIC RIVER. BIRD WAS OBSERVED SOUTH OF POMEROY AVENUE NEAR BRIDGE.

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? PLUMAGE, FLIGHT PATTERN, VOCALIZATION

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: FULL ADULT PLUMAGE

5. Evidence (if any) of breeding activity at this site: NONE

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: BIOLOGISTS FROM WOODLOT ALTERNATIVES OBSERVED THIS SPECIES IN 2000 IN ADJACENT CANOE MEADOWS (MASS. AUDUBON SANCTUARY)

7. Description of habitat at this site: TRANSITIONAL FLOODPLAIN FOREST WITH ADJACENT HIGH-TERRACE FOREST AND CULTURAL GRASSLAND COMMUNITIES

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: BIRD OBSERVED CALLING AND CHASING A SECOND UNKNOWN BIRD. SHARP-SHINNED HAWK THEN PERCHED IN A NEARBY TREE AND CONTINUED VOCALIZING.

11. Qualifications of observer (check all that apply):
    - ____ Amateur naturalist. Years of experience: ____
    - ____ Conservation Commission member
    - ____ Biology/science teacher
    - X Environmental Consultant
    - X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
    - ____ Other. Please specify: ____

12. Briefly explain your previous field experience with this species: WILDLIFE BIOLOGIST WITH 20+ YEARS OF FIELD EXPERIENCE

13. List names and qualifications of other observers (if any): NONE

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 3/16/01

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


SHARP-SHINNED HAWK
N
Scale in Feet
2000 0 2000 4000 6000
Housatonic River Project
Pittsfield, Massachusetts
Pittsfield-East QUAD

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: CHRISTINA WERNER

Address: ~~Woodlot Alternatives, Inc.~~
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-721-1199 (W)

Species observed:
SMALL-FOOTED MYOTIS

Date and Time of observation:
24 AUG 1999 20:00

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD, EAST

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: LOCATION IS APPROX. 500 m UPSTREAM OF THE POMEROY AVE BRIDGE ON THE HOUSATONIC RIVER IN PITTSFIELD, MA.

2. Number of individuals observed: ONE

3. Was a positive ID possible? NO Based on what field marks? POSSIBLE

OBSERVATION BASED ON RECORDINGS OF ECHOLOCATION CALLS. SMALL-FOOTED MYOTIS CALLS SIMILAR TO LITTLE BROWN BAT ; DIFFICULT TO DISTINGUISH, HOWEVER PARAMETERS SUGGEST SMALL-FOOTED MYOTIS.

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: UNKNOWN

5. Evidence (if any) of breeding activity at this site: NO

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: MEDIUM-GRADIENT STREAM SURROUNDED BY TRANSITIONAL FLOODPLAIN FOREST DOMINATED BY ACER SACCHARINUM, ACER NEGUNDO, POPULUS DELTOIDES, & ULMUS AMERICANA.

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):

____ Amateur naturalist. Years of experience: ____
____ Conservation Commission member
____ Biology/science teacher
✓ Environmental Consultant
✓ Degree in Biology: ✓ Bachelor's ____ Master's ____ Ph. D.
____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: _____

CONDUCTED BAT SURVEY USING ECHOLOCATION TECHNOLOGY

13. List names and qualifications of other observers (if any): _____

NONE

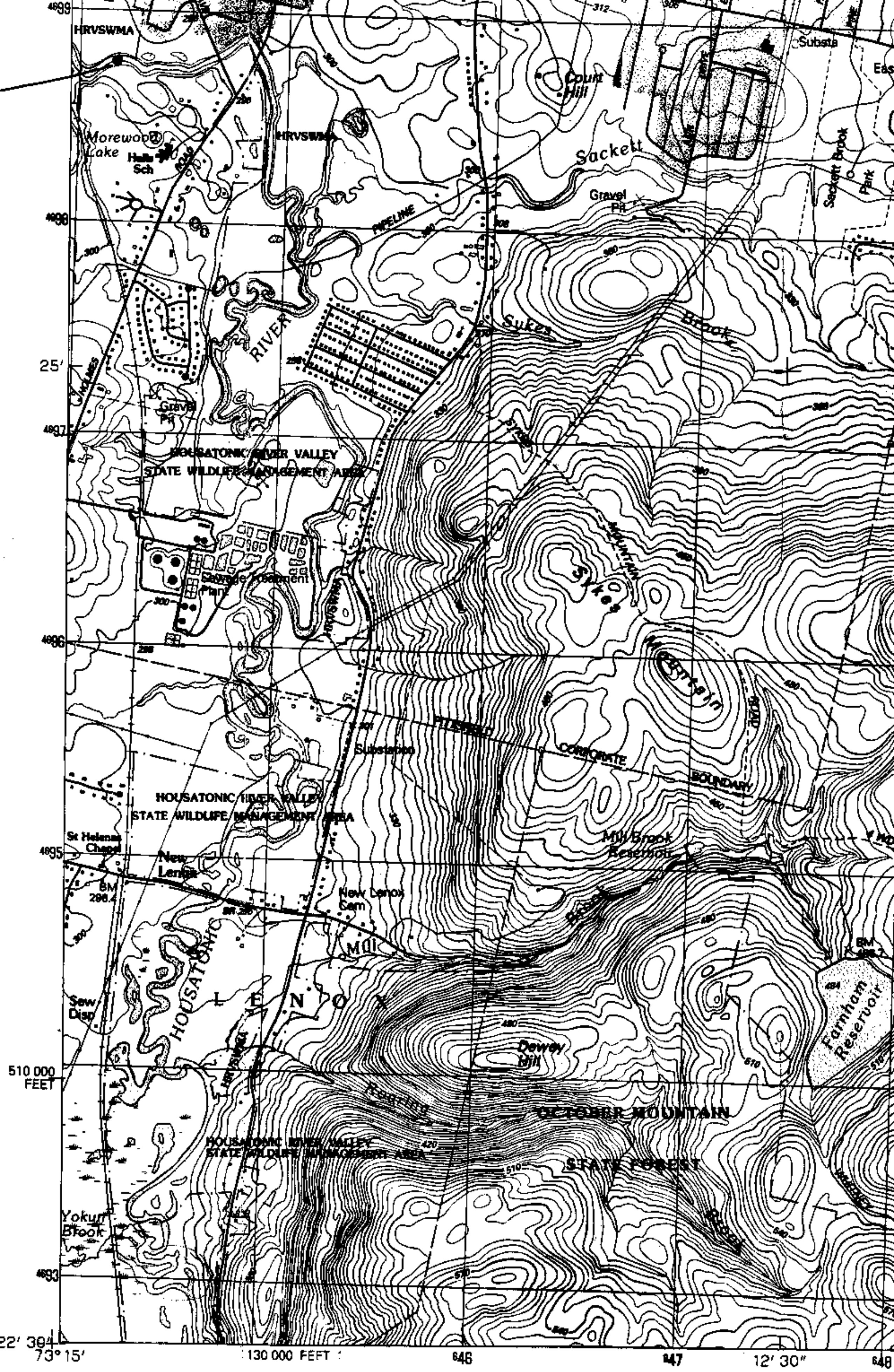
14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 21 MARCH 2001

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

POSSIBLE SMALL-FOOTED MYOTIS



HRVSWMA
Morewood Lake
Halls Sch
Court Hill
Substa
Sackett
Sackett Brook
Park
Gravel Pit
PIPELINE
RIVER
Sykes Brook
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes Mountain
CORPORATE BOUNDARY
Substation
St Helenas Chapel
New Lenox
New Lenox Cem
BM 298.4
Mill Brook Reservoir
Mill
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
Farnham Reservoir
Roaring
OCTOBER MOUNTAIN
STATE FOREST
Yokun Brook
25′
510 000 FEET
42° 22′ 30″
73° 15′
130 000 FEET
12′ 30″
KILOMETERS 1

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1988

Natural Heritage & Endangered Species Program
MA Division of Fisheries & Wildlife
Route 135, Westborough, MA 01581
(508) 792-7270 x 200

RARE ANIMAL OBSERVATION FORM

1. OBSERVER INFORMATION
a) Observer's Name, Address, Phone:
John Lortie 122 Main Street 207-729-1199
Topsham, ME 04086

b) Date and Time of Observation:
6/30-7/1/1999 - 12:00 AM during rainstorm

c) Species Observed:
Spring Salamander Gyrinophilus porphyriticus

2. LOCATIONAL INFORMATION
Please describe where this rare species observation was made.

a) Town: Lenox, Roaring Brook
County: Berkshire
USGS Topo:

b) Please attach a photo copy of the appropriate section of a USGS topo map (or similar map if a topo map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain in writing how to get to this spot:
Take New Lenox Rd to Woodland Rd and head south towards woods Road. Stop at intersection with Roaring Brook. The spring salamander was spotted on road crossing.

3. POPULATION INFORMATION
Please describe what you observed.

a) Number of animals observed: 1

b) Age and sex of animals observed: adult, did not sex

c) Evidence (if any) of breeding activity at this site: N/A

d) Have you observed this species at this site in previous years? N, but I believe its a known site for the species
If yes, please give details:

SITE INFORMATION
a) Description of habitat at this site:
Hardwood forest, beech and sugar maple, and perennial stream with a base flow of a few cfs, but which swells greatly during storm events. Stream gradient is 2-4% and has pools and riffles.

b) Observed or potential threats to the species or its habitat at this site: None observed other than getting run over when they cross the road

c) Landowner's name and address, if known:
State of MA - October Mtn. State Forest

SPECIES IDENTIFICATION
a) Was a positive ID possible? Yes
Based on what field marks? size, color,

b) Were photographs or slides taken? No it was pouring buckets
If yes, please submit a clear photograph or slide of the animal.

c) Qualifications of observer (check all that apply):
___Amateur naturalist - Years of experience ____
___Conservation Commission member
___Biology/science teacher
✓Environmental Consultant
✓Degree in Biology - Bachelor's ✓ Master's___ Ph.D.___
✓Other - Please specify Performed herp surveys for >10 years for MARAP project in Maine.

d) Briefly explain your previous field experience with this species: I have captured spring salamanders in several locations in western Maine and have handled these individuals

e) List names and qualifications of other observers (if any):

N/A

ADDITIONAL COMMENTS (if any):

CERTIFICATION:

I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature: [signature]

Date: 2/24/00

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy & Doug Smith

Species observed: SQUAWFOOT — Name & Existing Photo w/ with Bob

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Date and Time of observation: 11.4.98

Phone: 207.846.6764 (H) 207.729.1199 (W)

1. Location where species was observed:

a) Town: GREAT BARRINGTON County BERKSHIRE USGS Map: GREAT BARRINGTON

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: TAKE BROOKSIDE RD (BRUSH HILL RD) EAST FROM RTE 7, SOUTH OF FAIRGROUNDS. GO ACCROSS BRIDGE & TAKE FIRST RIGHT ONTO E. SHEFFIELD RD. SITE IS ± 0.9 MILE DOWN THIS ROAD, WHERE HOUSATONIC RIVER COMES UP ALONG RD.

2. Number of individuals observed: 8 SETS OF SHELLS

3. Was a positive ID possible? YES Based on what field marks? THICK SHELL, BLUE-WHITE NACRE, NO LAT. TEETH, MINOR SWELLING @ PSEUDOCARDINAL TOOTH LOC.

Were photographs taken? NO (SOME SPECIMENS RETAINED BY DOUG SMITH).
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: —

5. Evidence (if any) of breeding activity at this site:

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: CONTACT DOUG SMITH - (UMASS AMHERST) FOR INFORMATION.

7. Description of habitat at this site: PACKED GRAVEL SUBSTRATE. MODERATE TO FAST RUN HABITAT. 8" TO ±4' DEEP.

8. Observed or potential threats to the species or its habitat at this site: —

9. Landowner's name and address, if known: —

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):

___ Amateur naturalist. Years of experience: ___
___ Conservation Commission member
X Biology/science teacher SMITH
X Environmental Consultant ROY
___ Degree in Biology: X Bachelor's ___ Master's X Ph. D.
___ Other. Please specify: ___

12. Briefly explain your previous field experience with this species: HAVE CONDUCTED FRESHWATER MUSSEL SURVEYS THROUGHOUT NORTHEAST.

13. List names and qualifications of other observers (if any): AQUATIC INVERT PROFESSOR, EXTENSIVE EXPERIENCE STUDYING MUSSELS.

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 11/4/98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy; Doug Smith

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: 207.846.6764 (H) 207.729.1199 (W)

Species observed: Triangle Floater

Date and Time of observation: 11.4.98

1. Location where species was observed:

a) Town: Great Barrington County Berkshire USGS Map: Great Barrington

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Take Brookside Rd (Brush Hill Road) east from Rte 7, south of the fairgrounds. Go across bridge & take first right (E. Sheffield Rd). Site is ±0.9 miles down this rd., where Housatonic River comes up along rd.

2. Number of individuals observed: ± 15 sets of shells

3. Was a positive ID possible? Yes Based on what field marks? Lge pseudocardinal, lack of lateral teeth

Were photographs taken? No (specimens were retained by Doug Smith, UMass Amherst)
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Not known

5. Evidence (if any) of breeding activity at this site: –

(OVER)

6. Have you observed this species at this site in previous years? YES

If yes, please give details: CONTACT DOUG SMITH FOR INFORMATION

7. Description of habitat at this site: PACKED GRAVEL HABITAT IN MOD. TO FAST FLOWS (FAST RUN HABITAT) DEPTHS 8" TO ± 4' DEEP.

8. Observed or potential threats to the species and its habitat at this site:

9. Landowner's name and address, if known:

10. Additional observations/comments:

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - X Biology/science teacher - D. SMITH
   - X Environmental Consultant - F. ROY
   - X Degree in Biology: X Bachelor's ____ Master's X Ph. D.
   - ____ Other. Please specify:

12. Briefly explain your previous field experience with this species: CONDUCTED MUSSEL SURVEYS THROUGHOUT NE.

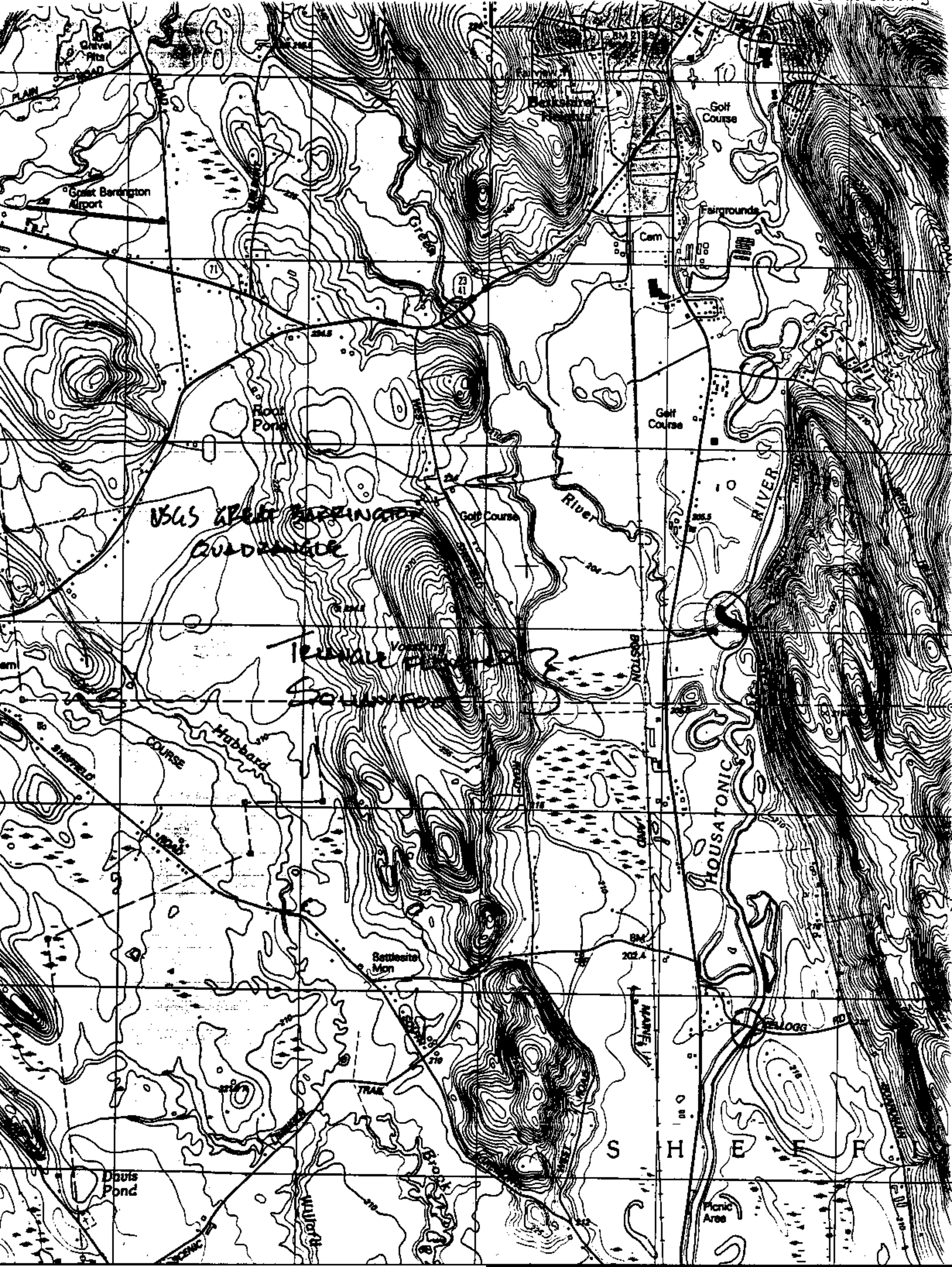
13. List names and qualifications of other observers (if any): AQUATIC INVERT PROFESSOR, EXTENSIVE EXPERIENCE STUDYING MUSSELS

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 11/4/90

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



Gravel Pits
PLAIN
ROAD
Great Barrington Airport
Golf Course
Fairgrounds
Cem
Root Pond
Golf Course
River
Golf Course
RIVER
USGS GREAT BARRINGTON QUADRANGLE
BOSTON
HOUSATONIC
Hubbard
COURSE
SHEFFIELD
ROAD
Battlesite Mon
BM
202.4
KELLOGG RD
TRAIL
Brook
Davis Pond
Picnic Area
S H E F F I

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy/Doug Smith

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: 207-846-6764 (H) 207.729.1199 (W)

Species observed: Triangle Flower

Date and Time of observation: 9.16.98

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield East

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Population occurs in the Housatonic River 100' to 500' downstream of Holmes Rd. Bridge.

2. Number of individuals observed: 8

3. Was a positive ID possible? Yes Based on what field marks? Definitive shell characteristics

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: 1 indiv. was an adult, gravid ♀. Others were unknown. 45 mm long.

5. Evidence (if any) of breeding activity at this site: 1 gravid ♀

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: FINE, SHIFTING SANDS IN WEST ½ OF CHANNEL; PACKED, SILT-COVERED GRAVEL IN EAST ½ WHERE MUSSELS WERE FOUND

8. Observed or potential threats to the species and its habitat at this site: _____

9. Landowner's name and address, if known: _____

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   X Biology/science teacher – D. Smith
   X Environmental Consultant – R. Roy
   ____ Degree in Biology: X Bachelor's ____ Master's X Ph. D.
   ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: Both observers are experienced in mussel surveys & I.D.

13. List names and qualifications of other observers (if any): _____

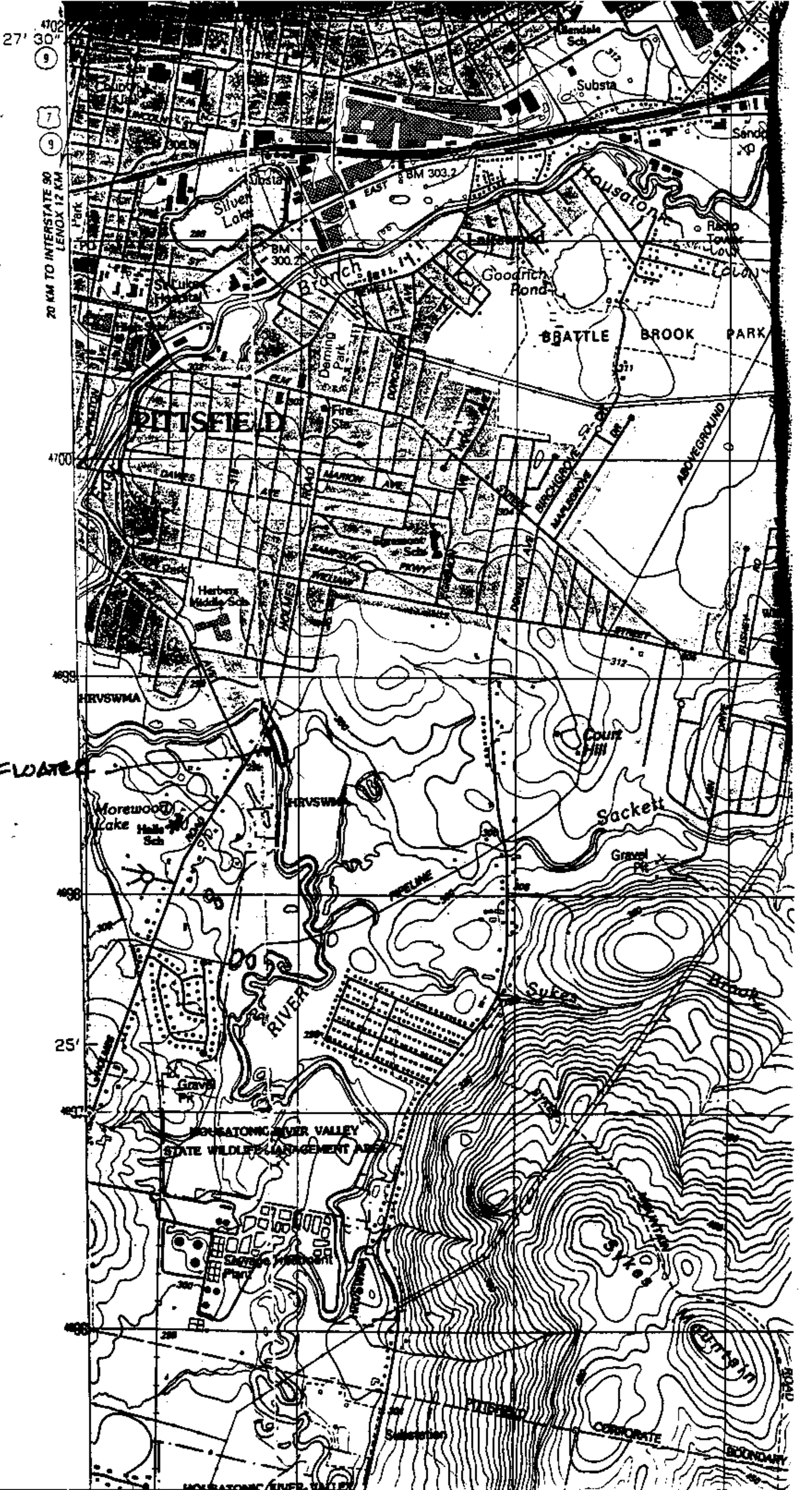
14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 9.16.98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

USGS PITTSFIELD EAST QUADRANGLE



27' 30"
4702
20 KM TO INTERSTATE 90
LENOX 12 KM
Substa
Silver Lake
BM 303.2
BM 300.2
Housatonic
Goodrich Pond
BRATTLE BROOK PARK
PITTSFIELD
Deming Park
Fire Sta
4700
Herberg Middle Sch
ABOVEGROUND
BIRCHGROVE
MAPLEGROVE
HRVSWMA
Morewood Lake
Holmes Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
Sykes
Brook
RIVER
25'
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes
PITTSFIELD
CORPORATE
BOUNDARY

TRIANGLE FLOATED

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy

Address: Woodlot Alternatives, Inc.
122 Main St. No. 3
Topsham, ME 04086

Phone: 207-846-6764 (H) 207-729-1199 (W)

Species observed: Wood Turtle

Date and Time of observation: 5.7.98; ~ 8-10 AM

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield West

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Site can be reached by entering Housatonic River Valley State Wildlife Management Area at gate at the end of Underhill Place (in Pittsfield). From gate, walk up access road ~~for~~ east for approximately 300 yds. Once ~~the~~ access road enters field, turn left (north) and drop down steep 80' hillside to wetland.

2. Number of individuals observed: 2

3. Was a positive ID possible? YES Based on what field marks? carapace, color, e

Were photographs taken? only of female.
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: one female found at 8am, was photograp
one male found at ~ 10 am, no camera available @ time

5. Evidence (if any) of breeding activity at this site: None observed
other than presence of ♂ & ♀ w/in 30' of eachother

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BOTH INDIVS. WERE FOUND AMONG YOUNG PELTANDRIS ARUNDINACEA GROWTH ADJACENT TO A BACKWATER CHANNEL OF THE HOUSATONIC RIVER.

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: MASS. FISH & WILDLIFE

10. Additional observations/comments: _____

11. Qualifications of observer (check all that apply):

___ Amateur naturalist. Years of experience: ___
___ Conservation Commission member
___ Biology/science teacher
X Environmental Consultant
X Degree in Biology: X Bachelor's ___ Master's ___ Ph. D.
___ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: HAVE FOUND SEVERAL NEW POPULATIONS IN MAINE.

13. List names and qualifications of other observers (if any): _____

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Robert D. R[illegible] Date: 5.7.98

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra:
MA Divsion of Fisheries and Wildlife
Route 135
Westboro. MA 01581
508-792-7270 ext. 200

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Robert D. Roy

Address: Woodlot Alternatives, Inc.
122 Main St. No. 3
Topsham, ME 04086

Phone: 207-846-6764 (H) 207-729-1199 (W)

Species observed: Wood Turtle

Date and Time of observation: 6-18-98 ; ± 11 AM

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield West

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Turtle was found dead on Crofut St. in Pittsfield (off of Rte 7/20). Was hit by vehicle. Individual was a female, as eggs were visible in the body.

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? In hand

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Female, adult

5. Evidence (if any) of breeding activity at this site: Individual was carrying eggs before being hit by a vehicle.

(OVER)

6. Have you observed this species at this site in previous years? ± 1 MONTH PRIOR

If yes, please give details: SEE ATTACHED SHEET

7. Description of habitat at this site: ROAD ABOVE FLOODPLAIN OF HOUSATONIC RIVER (WEST BRANCH)

8. Observed or potential threats to the species or its habitat at this site: —

9. Landowner's name and address, if known: —

10. Additional observations/comments: —

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify:

12. Briefly explain your previous field experience with this species:

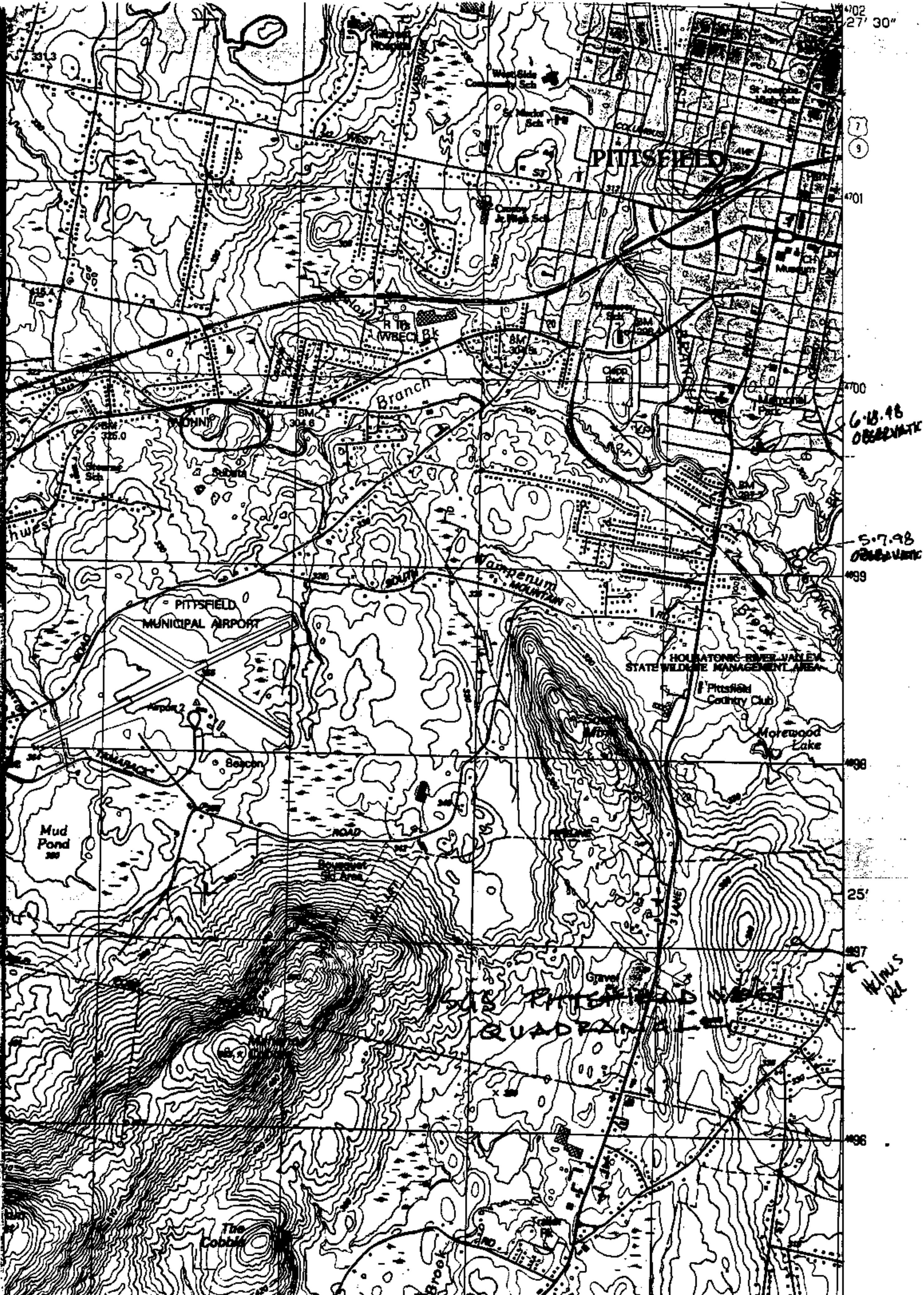
13. List names and qualifications of other observers (if any):

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature [signature] Date: 6-18-90

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


4702
27' 30"
West Side Community Sch
St Joseph High Sch
PITTSFIELD
4701
Country Jr High Sch
Museum
4700
Branch
Memorial Park
6.18.98 OBSERVATION
5.7.98 OBSERVATION
Wampenum
SOUTH
MOUNTAIN
4699
PITTSFIELD MUNICIPAL AIRPORT
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Pittsfield Country Club
Morewood Lake
Beacon
4698
Mud Pond
ROAD
Bousquet Ski Area
25'
4697
Gravel
Holmes Rd
PITTSFIELD WEST QUADRANGLE
4696
Trailer Pk
The Cobble
Brook

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Vicki Schoonard

Address: 122 Main St.
Topsham, ME 04086

Phone: _____ (H)(207) 729-1199 (W)

Species observed: Clemmys insculpta (wood turtle)

Date and Time of observation: June 3, 1999 (0900)

1. Location where species was observed: (Observed on June 3, 1999 at 0900)

a) Town: Lenox County Berkshire USGS Map: East Lee, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: New Lenox Rd to Canoe Meadows boat launch site - take grassy road (w/ gate) across from canoe launch area, follow road ≈ 150 meters north.

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? Length and thickness of tail, position of anal opening, carapace + skin coloration.

Were photographs taken? Yes
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Male - age unknown

5. Evidence (if any) of breeding activity at this site: Unknown

(OVER)

6. Have you observed this species at this site in previous years? Yes –

If yes, please give details: This species although not observed at this particular site, was observed farther upstream near West Branch of Housatonic River confluence.

7. Description of habitat at this site: Grassy road bordered on both sides by emergent wetlands and scrub/shrub habitat – Cornus sp., Salix sp., Carex sp., Peltandra virginica dominant.

8. Observed or potential threats to the species or its habitat at this site:

Unknown

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: Turtle was heading towards the emergent wetland.

11. Qualifications of observer (check all that apply):

____ Amateur naturalist. Years of experience: ____
____ Conservation Commission member
____ Biology/science teacher
✓ Environmental Consultant
✓ Degree in Biology: ✓ Bachelor's ____ Master's ____ Ph. D.
____ Other. Please specify:

12. Briefly explain your previous field experience with this species:

Both male + female wood turtles observed in study area in 1998.

13. List names and qualifications of other observers (if any): A. Haines – Botonist/Biologist – Woodlot Alternatives

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Vicki Schoonard Date: 6/8/99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

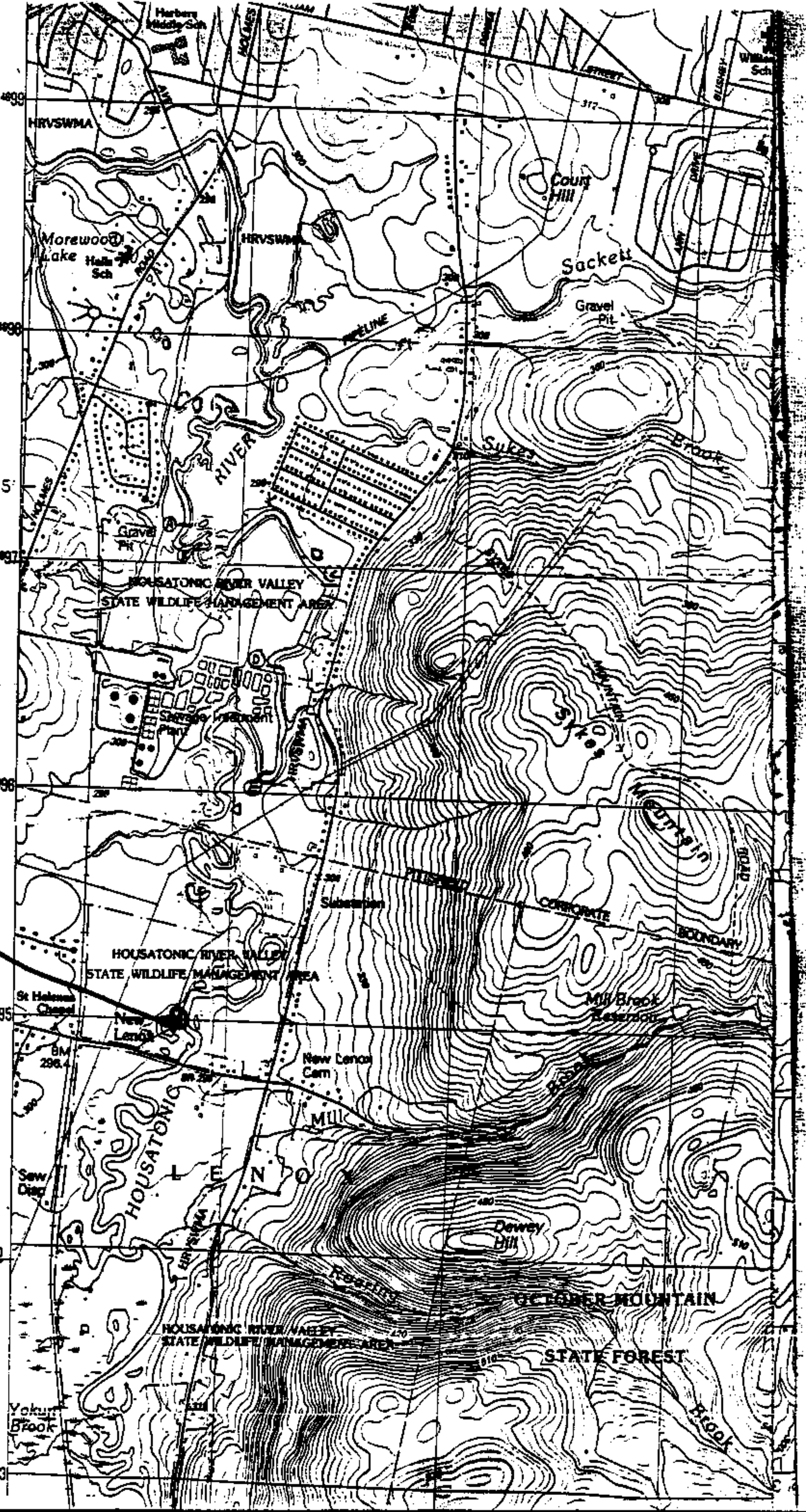
MA Natural Heritage and Endangered Species Progra
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

✱ - Cobble / sand bottom
Backpack fishing

□ = Sand bottom, Shallow
Backpack fishing

Δ = Deep stream,
good sites for

Wood Turtle



...ral Heritage &
Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KNOWACKY

Address: WOODLOT ALTERNATIVES
122 MAIN ST., No. 3 TOPSHAM ME 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
WOOD TURTLE (CLEMMYS INSCULPTA)

Date and Time of observation:
5 AUG 99 1400

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD EAST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: PITTSFIELD WASTEWATER TREATMENT PLANT - ENTRANCE IS OFF HOLMES ROAD, HEAD EAST TO MAIN BUILDING, CONTINUE NORTH PAST YELLOW LOCKED GATE AND MARSH ON [redacted] LEFT AND RIGHT CONTINUE ONTO HOUS. [redacted] RIVER VALLEY STATE WILDLIFE MNGMT. AREA

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? SHELL. AN EMPTY SHELL WAS THE ONLY REMAINS.

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: ADULT MALE. MALE BASED ON SHAPE OF PLASTRON

5. Evidence (if any) of breeding activity at this site: N/A

(OVER)

this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: FLOODPLAIN FOREST WITH 60'-80' ACER SACCHARINUM AND DENSE GROUND COVER OF MATTEUCCIA STRUTHIOPTERIS. SITE FOUND 30' FROM NASH. RIVER

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: STATE OF MASS.

10. Additional observations/comments: NONE

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   X Environmental Consultant
   X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: OBSERVED SPECIES IN FIELD ON PREVIOUS [redacted] OCCASIONS.

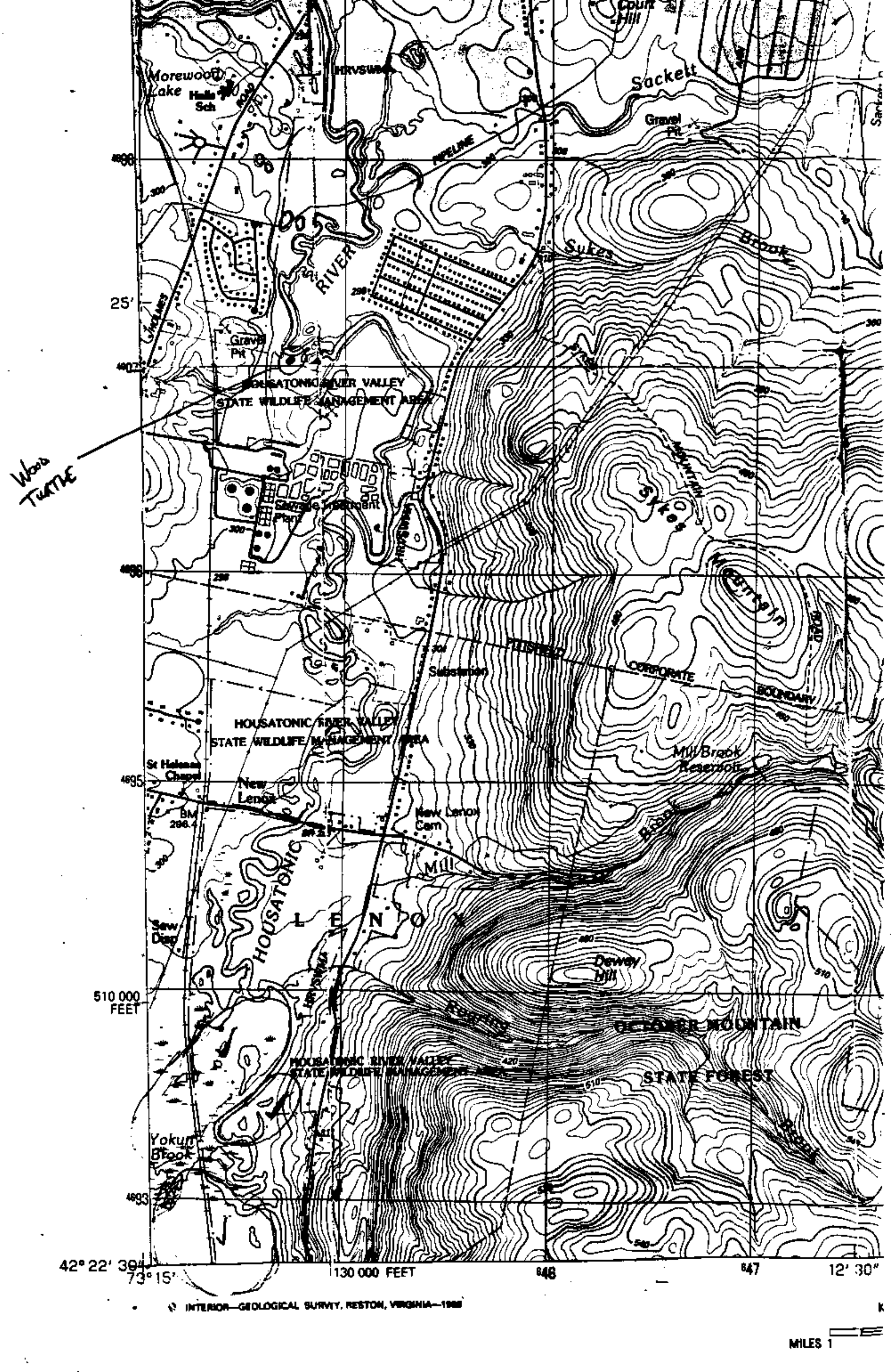
13. List names and qualifications of other observers (if any): ARTHUR HAINES - BOTANIST/BIOLOGIST - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 22 NOV 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


Morewood Lake
Sackett
Gravel Pit
PIPELINE
RIVER
Sukes Brook
25′
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Wood Turtle
Sewage Treatment Plant
Sykes Mountain
PITTSFIELD CORPORATE BOUNDARY
Substation
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Mill Brook Reservoir
St Helenas Chapel
New Lenox
New Lenox Cem
Mill Brook
BM 296.4
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN
STATE FOREST
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
42° 22′ 30″
73° 15′
130 000 FEET
12′ 30″
INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1988
MILES 1

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kreiwacky

Address: Woodlot Alternatives
122 Main St., No. 3 Topsham, ME 04086

Phone: _____ (H) 207-[redacted]1199 (W)

Species observed:
Wood Turtle (Clemmys insculpta)

Date and Time of observation:
9 Sept 99 0900

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield West, MA-NY

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: [redacted] From the confluence of the East and West branches of the Housatonic River, head 100m upstream on the West branch.

2. Number of individuals observed: 1 (one)

3. Was a positive ID possible? Yes Based on what field marks? Shape of carapice, [redacted] color, tail shape

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Adult male

5. Evidence (if any) of breeding activity at this site: N/A

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: MUDDY BANK

8. Observed or potential threats to the species or its habitat at this site:
N/A

9. Landowner's name and address, if known: ADJACENT TO FORD GARAGE PARK - TOWN OF PITTSFIELD

10. Additional observations/comments: GROWTH / ABNORMALITY ON RIGHT SIDE OF CARAPACE AND PLASTRON

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: MA Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species:
PREVIOUSLY OBSERVED IN FIELD [redacted] BY BOTH OBSERVERS

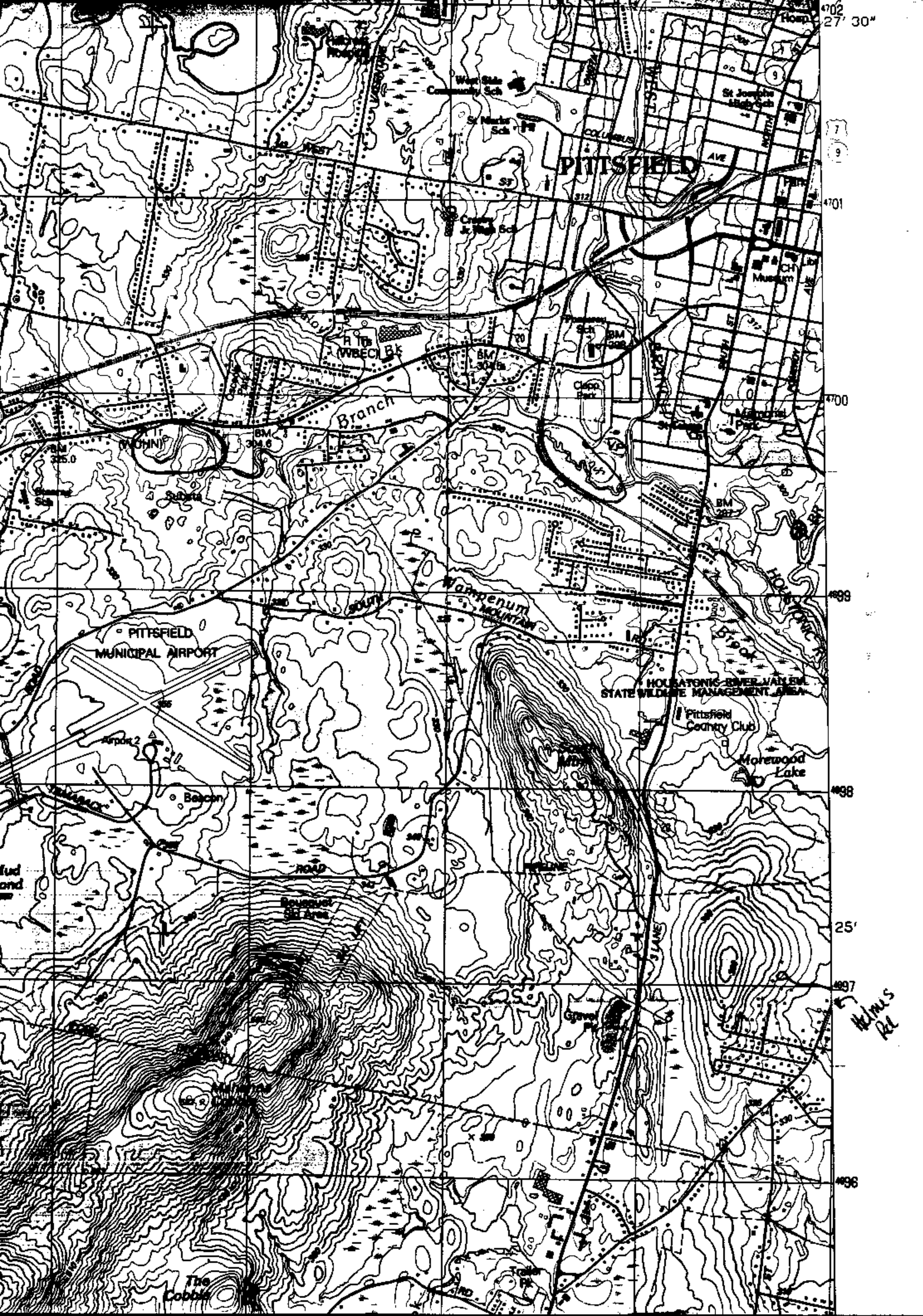
13. List names and qualifications of other observers (if any):
ARTHUR HAINES - BIOLOGIST/BOTANIST WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 15 SEPT 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



4702
27′ 30″
West Side Community Sch
St Marks Sch
St Josephs High Sch
COLUMBUS AVE
PITTSFIELD
4701
Museum
R Tts (WBEC)
Bk
BM 308
BM 300
Clapp Park
4700
Branch
(WUHN)
BM 325.0
BM 304.6
Substa
Memorial Park
BM 297
4699
Wampenum
SOUTH MOUNTAIN RD
PITTSFIELD MUNICIPAL AIRPORT
Airport 2
Beacon
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Pittsfield Country Club
Morewood Lake
4698
ROAD
PIPELINE
Bousquet Ski Area
25′
4697
Gravel Pit
Holmes Rd
4696
The Cobble
Trailer Pk

Natural Heritage & Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Vicki Schoonard

Address: 122 Main St.
Topsham, ME 04086

Phone: (207) (H) _____ (W)

Species observed:
Clemmys insculpta (Wood turtle)

Date and Time of observation:
June 3, 1999 (1500)

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: PITTSFIELD WEST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: From Fred Garner River Park, float approx. 1800-2000' downstream (sharp left bend in river with power lines overhead).

2. Number of individuals observed: 1

3. Was a positive ID possible? Yes Based on what field marks? Carapace, skin coloration.

Were photographs taken? yes
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Undetermined

5. Evidence (if any) of breeding activity at this site: Unknown

(OVER)

Commonwealth of Massachusetts
Division of Fisheries & Wildlife 100 Cambridge St. Boston, MA 02202 (617) 727-9194, -3151

6. Have you observed this species at this site in previous years? Yes.

If yes, please give details: Both male + female wood turtles were observed near confluence area of Housatonic River w/ West Branch in 1999.

7. Description of habitat at this site: Riparian with sandy, gradually sloping shore to scrub/shrub area

8. Observed or potential threats to the species or its habitat at this site: Unknown

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: Turtle was observed within herbaceous layer approx. 15' from river's edge heading towards forested habitat.

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- ✓ Environmental Consultant
- ✓ Degree in Biology: ✓ Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: ____

12. Briefly explain your previous field experience with this species: Both male + female wood turtles were observed in 1998.

13. List names and qualifications of other observers (if any): A. Haines - Botanist / Biologist - Woodlot Alternatives

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature Vicki Schonard Date: 6/8/99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra
MA Divsion of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

4702
27' 30"
Hosp
Hillcrest Hospital
West Side Community Sch
St Marks Sch
St Josephs High Sch
COLUMBUS
AVE
WEST
PITTSFIELD
4701
Crosby Jr High Sch
Museum
Pomeroy Sch
BM 298
R Trs (WBEC)
BM 304.8
Clapp Park
Memorial Park
4700
Branch
BM 325.0
BM 304.6
Substa
Stearns Sch
4699
Wampenum MOUNTAIN
SOUTH
PITTSFIELD MUNICIPAL AIRPORT
ROAD
Airport 2
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Pittsfield Country Club
Morewood Lake
4698
TAMARACK
Beacon
ROAD
Bousquet Ski Area
25'
LANE
4697
Gravel Pit
4696
Wood Turtle

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: ZEBRA CLUBTAIL (STYLURUS SCUDDERI)

Date and Time of observation: 6 JUL 99

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: [redacted] EAST LEE, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: DOWNSTREAM OF DEREK CANOE LAUNCH (OFF NEW LENOX ROAD) ON THE HOUSATONIC RIVER

2. Number of individuals observed: 1

3. Was a positive ID possible? YES Based on what field marks? _____

EXUVIA IDENTIFICATION COMPLETED BY JEREMIAH TRIMBLE AND BLAIR NIKULA HARWICHPORT, MA 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: EXUVIA

5. Evidence (if any) of breeding activity at this site: YES

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BANK OF HOUSATONIC RIVER ADJACENT TO FLOODPLAIN FOREST; OUT ON 'SPIT' OF LAND BORDERED BY SHALLOW, MUCK BOTTOM BACKWATER AND DEEP CHANNEL, SLOW MOVING HOUS. RIVER.

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES IDENTIFIED = BEAVERPOND BASKETTAIL, ARROW CLUBTAIL, COMMON BASKETTAIL, COMMON WHITEFACE, EASTERN PONDHAWK, DOT-TAILED WHITEFACE

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species:

GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any):

KAROL WORDEN, CHRIS WERNER - WOODLOT ALTERNATIVES

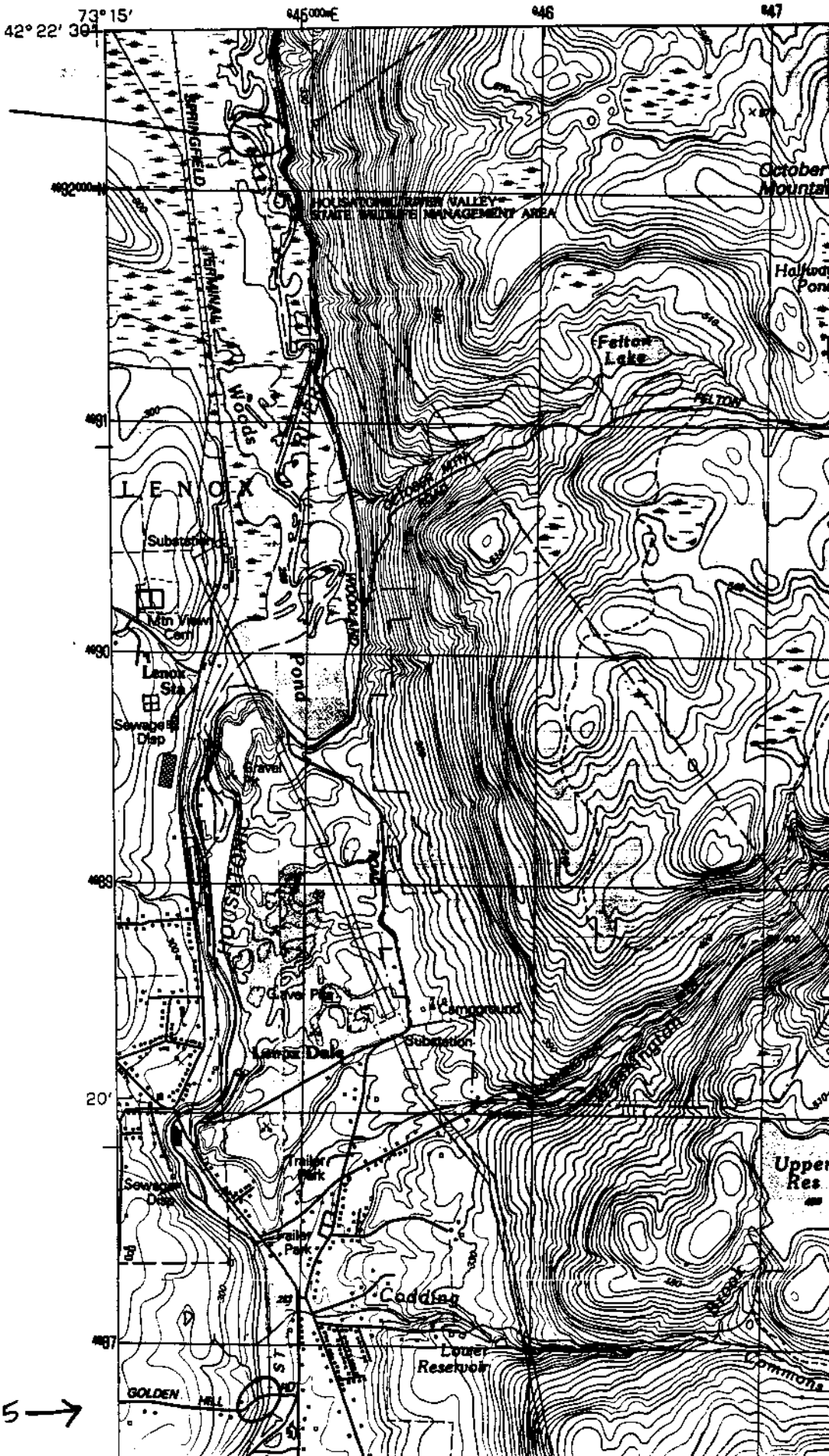
14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 2 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

EAST LEE, MASSACHUSETTS



Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kreiwacky

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed: Zebra Clubtail (Stylurus scudderi)

Date and Time of observation: 6 Jul 99, 27 Jul 99

1. Location where species was observed:

a) Town: Lenox County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Downstream of where New Lenox Road crosses the Housatonic River (~~Dorker~~ Canoe Launch)

2. Number of individuals observed: 6 Jul 99 - 11 inds., 27 Jul 99 - 12 inds.

3. Was a positive ID possible? Yes Based on what field marks? _____

Exuvia. Identification completed by Jeremiah Trimble and Blair Nikula Marlborough, MA 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Exuvia

5. Evidence (if any) of breeding activity at this site: Yes

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BANK OF THE HOUSATONIC RIVER WITH EMERGENT AND SCRUB-SHRUB VEGETATION, ADJACENT TO FLOODPLAIN FOREST; RIVER IS DEEP AND SLOW-MOVING, MUCK BOTTOM

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS; OTHER SPECIES IDENTIFIED INCLUDE: BROWN CLUBTAIL, LANCET CLUBTAIL, FAWN DARNER, DUSKY CLUBTAIL, ASHY CLUBTAIL

11. Qualifications of observer (check all that apply):
   - ____ Amateur naturalist. Years of experience: ____
   - ____ Conservation Commission member
   - ____ Biology/science teacher
   - a Environmental Consultant
   - a Degree in Biology: a Bachelor's ____ Master's ____ Ph. D.
   - ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any): KAROL WENDEN, CHRIS WERNER, JONATHAN MILNE, DOUG STEWART - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 2 DEC 99

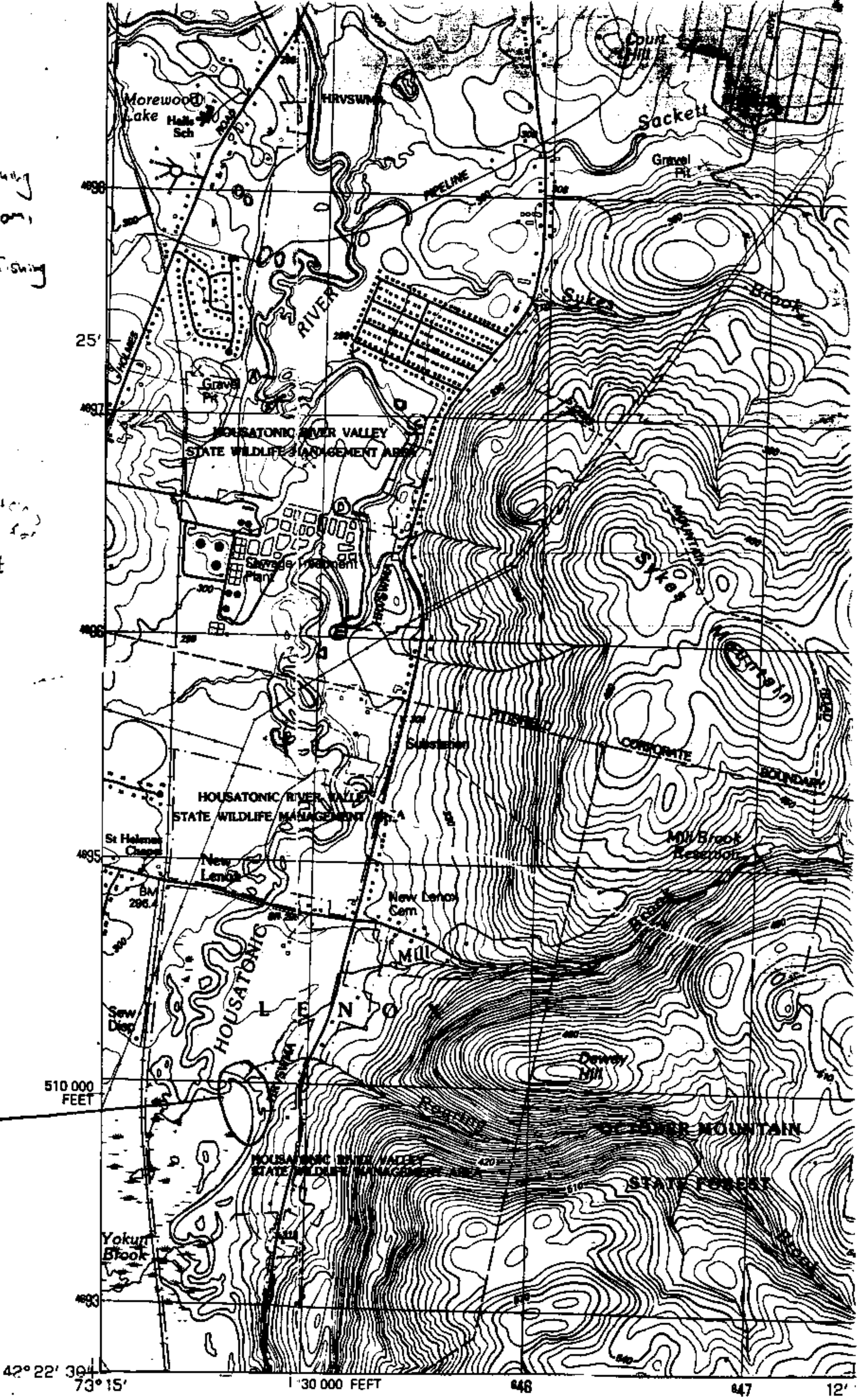
Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

* = Cobble/sand bottom
Backpack fishing

□ = Sand bottom, Shallow
Backpack fishing

Δ = Deep stretch, good area for Cast net



Court Hill
Morewood Lake
Hales Sch
HRVSWMA
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes Brook
25′
4698
4697
4696
4695
4693
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes Mountain
Substation
CORPORATE BOUNDARY
St Helenas Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
Mill
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
510 000 FEET
OCTOBER MOUNTAIN
STATE FOREST
Yokun Brook
42° 22′ 30″
73° 15′
30 000 FEET
646
647
12′

ZEBRA CLUBTAIL

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—19

MILES 1

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
ZEBRA CLUBTAIL (STYLURUS SCUDDERI)

Date and Time of observation:
6 JUL 99, 27 JUL 99, 17 AUG 99

1. Location where species was observed:

a) Town: LENOX County BERKSHIRE USGS Map: PITTSFIELD EAST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: UPSTREAM OF WHERE NEW LENOX ROAD CROSSES THE HOUSATONIC RIVER.

2. Number of individuals observed: 6 JUL 99 - 4 INDS., 27 JUL 99 - 4 INDS., 17 AUG 99 - 5 INDS.

3. Was a positive ID possible? YES Based on what field marks? _____

EXUVIA. IDENTIFICATION COMPLETED BY JEREMIAH TRIMBLE AND BLAIR NIKULA HARWICHPORT, MA 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: EXUVIA

5. Evidence (if any) of breeding activity at this site: YES

(OVER)

6. Have you observed this species at this site in previous years? No

If yes, please give details: _____

7. Description of habitat at this site: BANK OF HOUSATONIC RIVER WITH EMERGENT AND SCRUB-SHRUB VEGETATION, ADJACENT TO FLOODPLAIN FOREST; RIVER SLOW MOVING, DEEP, AND MUD BOTTOM

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES INCLUDE: ARROW CLUBTAIL, BLACK-SHOULDERED SPINYLEG, COMMON GREEN DARNER, FAWN DARNER

11. Qualifications of observer (check all that apply):
   ____ Amateur naturalist. Years of experience: ____
   ____ Conservation Commission member
   ____ Biology/science teacher
   a Environmental Consultant
   x Degree in Biology: x Bachelor's ____ Master's ____ Ph. D.
   ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

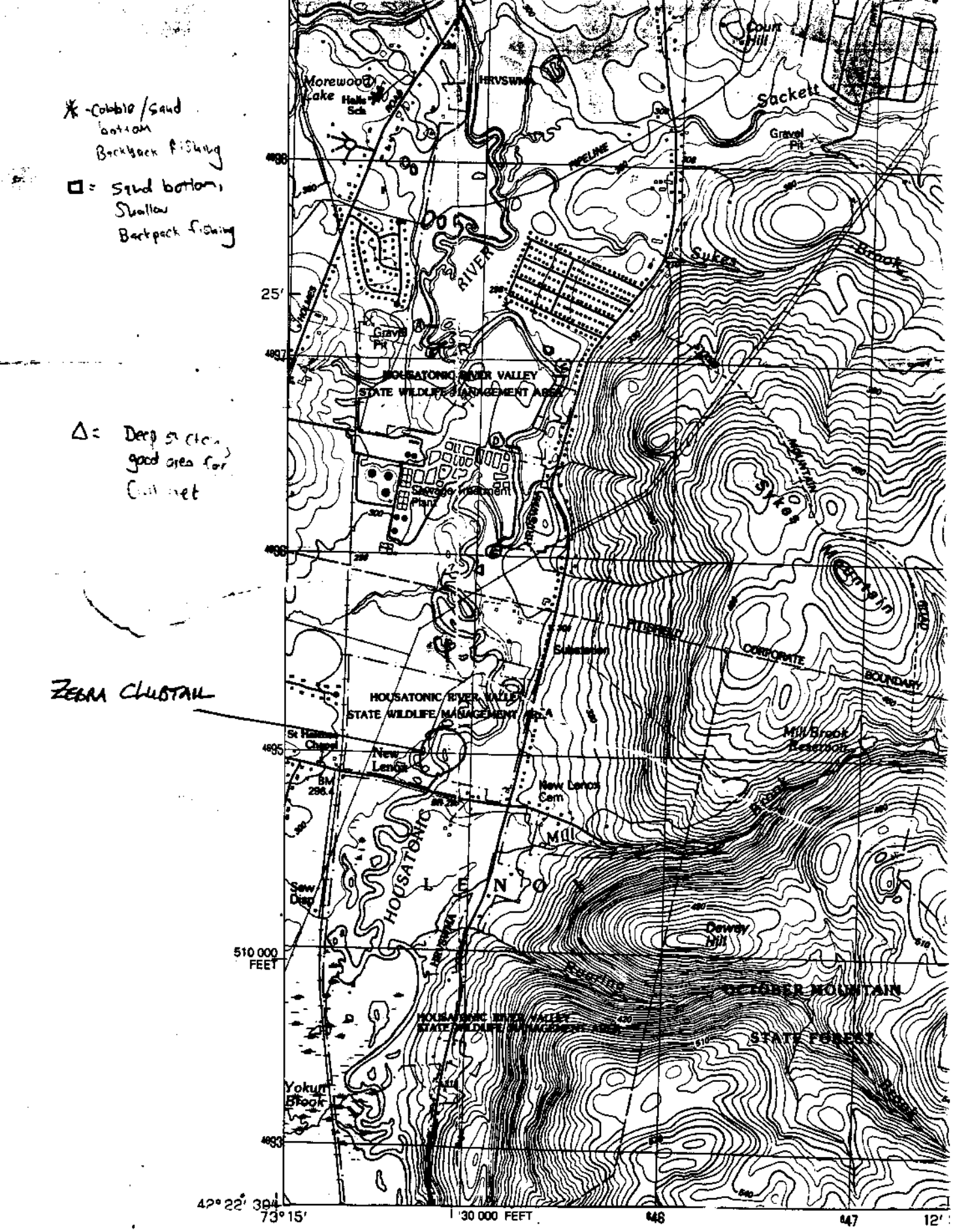
13. List names and qualifications of other observers (if any): RACHEL WARDEN, CHRIS WERNER, EUGENIE MOORE, JONATHAN MILNE-WOODLOT ALTS.

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 2 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200


* - Cobble / Sand bottom Backpack fishing
□ = Sand bottom, Shallow Backpack fishing
Δ = Deep stocked good area for Catfish
ZEBRA CLUBTAIL
Morewood Lake
Hale Sch
HRVSWMA
Court Hill
Sackett
Gravel Pit
PIPELINE
RIVER
Sykes Brook
Gravel Pit
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes Mountain
PITTSFIELD
CORPORATE BOUNDARY
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
St Ramses Chapel
New Lenox
BM 286.4
New Lenox Cem
Mill Brook Reservoir
Mill
Saw Dam
HOUSATONIC
L E N O X
Dewey Hill
PITTSFIELD
OCTOBER MOUNTAIN STATE FOREST
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Yokum Brook
510 000 FEET
42° 22' 30"
73° 15'
30 000 FEET
MILES 1

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KARWACKY

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
ZEBRA CLUBTAIL (STYLURUS SCUDDERI)

Date and Time of observation:
25 JUN 99, 19 JUL 99

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD WEST ~~TOWN~~, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: TRANSECT BEGAN JUST SOUTH OF THE CONFLUENCE OF EAST BRANCH AND WEST BRANCH OF HOUSATONIC RIVER.

2. Number of individuals observed: 25 JUN 99 (1 INDIVIDUAL), 19 JUL 99 (1 INDIVIDUAL)

3. Was a positive ID possible? YES Based on what field marks? _____

EXUVIA IDENTIFICATION COMPLETED BY JEREMIAH TRIMBLE & BLAIR NIKULA HARWICH PORT, MA 508-432-6348

Were photographs taken? N
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: EXUVIA

5. Evidence (if any) of breeding activity at this site: ~~NONE~~ YES

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BANK ALONG HOUSATONIC RIVER; ADJACENT TO FORESTED UPLAND; RIVER IS NARROW WITH RIFFLES AND RUNS, AND A MUD BOTTOM

8. Observed or potential threats to the species or its habitat at this site: NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES INCLUDE: FAWN DARNER, RUSTY SNAKETAIL.

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any): ARTHUR HAWES, CHRIS WERNER, KAROL WOLSEN - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 1 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

27' 30"
PITTSFIELD
Crosby Jr High Sch
West Side Community Sch
St Marks Sch
St Joseph High Sch
Museum
Clapp Park
Memorial Park
Branch
BM 325.0
BM 304.6
Wampenum
SOUTH MOUNTAIN RD
PITTSFIELD MUNICIPAL AIRPORT
Airport 2
Beacon
Mud Pond
HOUSATONIC RIVER VALLEY STATE WILDLIFE MANAGEMENT AREA
Pittsfield Country Club
Morewood Lake
Bousquet Ski Area
PIPELINE
ROAD
Gravel Pit
Trailer Pk
The Cobble
Brook
4701
4700
4699
4698
4697
4696
25'
Holmes Rd

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kirkwacky

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
Zebra Clubtail (Stylurus scudderi)

Date and Time of observation:
21 JUL 99, & 16 Aug 99

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Located downstream of the confluence of the East and West Branches of the Housatonic River.

2. Number of individuals observed: 21 JUL 99 (3 specimens) 16 Aug 99 (1 specimen)

3. Was a positive ID possible? Yes Based on what field marks? _____

Exuvia identification was completed by Jeremiah Trimble and Blair Nikula
Harwichport, MA 508-432-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Exuvia

5. Evidence (if any) of breeding activity at this site: Yes

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: STEEP BANK ALONG HOUSATONIC RIVER ADJACENT TO FLOODPLAIN FOREST; RIVER IS NARROW, SHALLOW, WITH RIFFLES AND RUNS, AND COBBLE BOTTOM

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES INCLUDE: FAWN DARNER, ARROW CLUBTAIL

11. Qualifications of observer (check all that apply):

____ Amateur naturalist. Years of experience: ____
____ Conservation Commission member
____ Biology/science teacher
X Environmental Consultant
X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species:

GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any):

JONATHAN MILNE, EUGENIE MOORE, RAHOL WONDOU, CHRIS WEGNER - WOODLOT ALTS.

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 1 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Progra
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

ZEBRA CLUBTAIL


20 KM TO INTERSTATE LENOX
Lake
BM 300.2
St Luke Hospital
Branch
Goodrich Pond
Deming Park
BRATTLE BROOK PARK
PITTSFIELD
Fire Sta
4700
DAVIES
MARION
AVE
ROAD
BIRCHGROVE
MAPLEGROVE
ABOVEGROUND
Egremont Sch
SAMPSON
WILLIAM
PKWY
Herberg Middle Sch
HOLMES
STREET
312
4699
HRVSWMA
Court Hill
Morewood Lake
HRVSWMA
Sackett
Gravel Pit
4698
PIPELINE
RIVER
Sykes
Brook
25'
Gravel Pit
4697
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
4696
Substation
CORPORATE
BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helena Chapel
4695
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
HOUSATONIC
L E N O X

* = Cobble / sand bottom
Backpack fishing

□ = Sand bottom, Shallow
Backpack fishing

Δ = Deep [illegible]
good area for
Clubtail

Natural Heritage
Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Kirwacky

Address: ~~Woodlot Alternatives, Inc.~~
122 Main Street
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
Zebra Clubtail (Stylurus Scudderi)

Date and Time of observation:
28 Jun 99, 26 Jul 99, 19 Aug 99

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Upstream of the Pittsfield Wastewater Treatment Facility outflow, East of Holmes Road

2. Number of individuals observed: 28 Jun 99 - 1 ind., 26 Jul 99 - 2 inds., 19 Aug 99 - 1 ind.

3. Was a positive ID possible? Yes Based on what field marks?

Exuvia identification completed by Jeremiah Trimble and Blair Nikula
Hawchport, MA 508-432-6348

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Exuvia

5. Evidence (if any) of breeding activity at this site: Yes

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BANK ALONG HOUSATONIC RIVER. ADJACENT TO FLOODPLAIN FOREST; RIVER IS QUICKWATER WITH COBBLE BOTTOM.

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS; OTHER SPECIES INCLUDED: NARROW CHESTAIL, DRAGONHUNTER, FAWN DARNER

11. Qualifications of observer (check all that apply):
- ____ Amateur naturalist. Years of experience: ____
- ____ Conservation Commission member
- ____ Biology/science teacher
- X Environmental Consultant
- X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
- ____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: _____

GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any): _____

EUGENIE MOORE, JONATHAN MILNE, ARTHUR HAINES, KAROL WARDEN, CHRIS WERNER - WOODLOT ALTS.

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 1 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

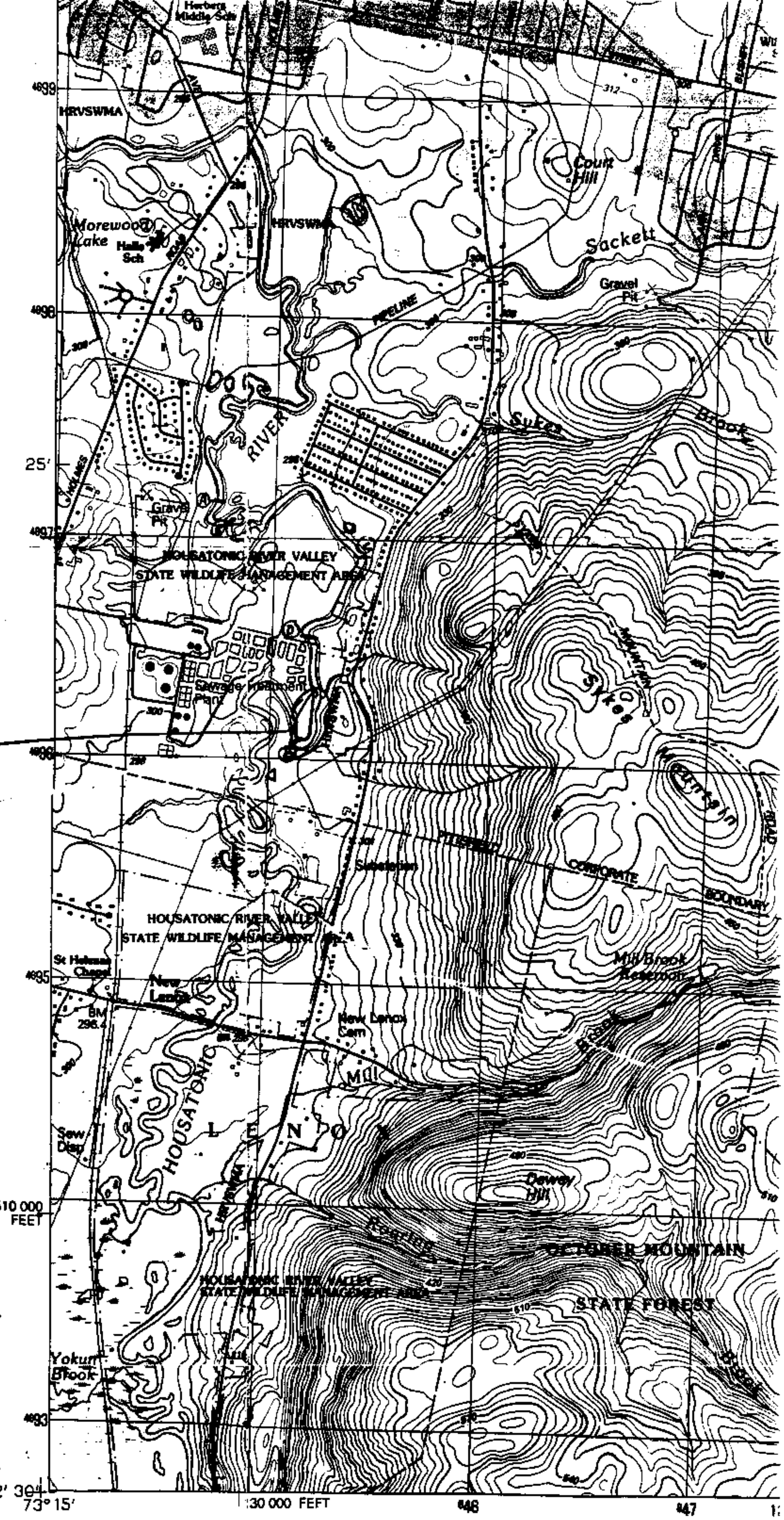
MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

* - Cobble / Sand bottom
Backpack fishing

□ = Sand bottom, Shallow
Backpack fishing

Δ = Deep ... good area for ...

ZEBRA CLUBTAIL



Herbert Middle Sch
HRVSWMA
Morewood Lake
Hallo Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
Sykes Brook
RIVER
Gravel Pit
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Sykes Mountain
Substation
CORPORATE BOUNDARY
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
St Helenas Chapel
New Lenox
BM 296.4
New Lenox Cem
Mill Brook Reservoir
Mill
HOUSATONIC
L E N O X
Sew Disp
Dewey Hill
Roaring
OCTOBER MOUNTAIN
STATE FOREST
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Yokun Brook
4699
4698
25′
4697
4696
4695
510 000 FEET
4693
42° 22′ 30″
73° 15′
130 000 FEET
646
647

Natural Heritage &

Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: KURT KAKWACKY

Address: Woodlot Alternatives, Inc.
~~122 Main Street~~
Topsham, Maine 04086

Phone: _____ (H) 207-729-1199 (W)

Species observed:
ZEBRA CLUBTAIL (STYLURUS SCUDDERI)

Date and Time of observation:
6 JUL 99, 21 JUL 99, 19 AUG 99 AM

1. Location where species was observed:

a) Town: PITTSFIELD County BERKSHIRE USGS Map: PITTSFIELD EAST, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: #. UPSTREAM OF PITTSFIELD WASTEWATER TREATMENT FACILITY, EAST OF HOLMES ROAD.

2. Number of individuals observed: 6 JUL 99 - 31 INDS., 21 JUL 99 - 22 INDS., 19 AUG 99 - 4 INDS.

3. Was a positive ID possible? YES Based on what field marks? _____

EXUVIA IDENTIFICATION COMPLETED BY JEREMIAH TRIMBLE AND BLAIR NIKULA HAMILTON, MA 508-468-6348

Were photographs taken? NO
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: EXUVIA

5. Evidence (if any) of breeding activity at this site: ~~ADULT~~ YES

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: BANK OF HOUSATONIC RIVER ADJACENT TO FLOODPLAIN FOREST; RIVER IS QUICKWATER WITH COBBLE BOTTOM.

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES INCLUDE: ARROW CLUBTAIL, ASHY CLUBTAIL, FAWN DARNER, RUSTY SNAKETAIL

11. Qualifications of observer (check all that apply):

____ Amateur naturalist. Years of experience: ____
____ Conservation Commission member
____ Biology/science teacher
X Environmental Consultant
X Degree in Biology: X Bachelor's ____ Master's ____ Ph. D.
____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species:

GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any):

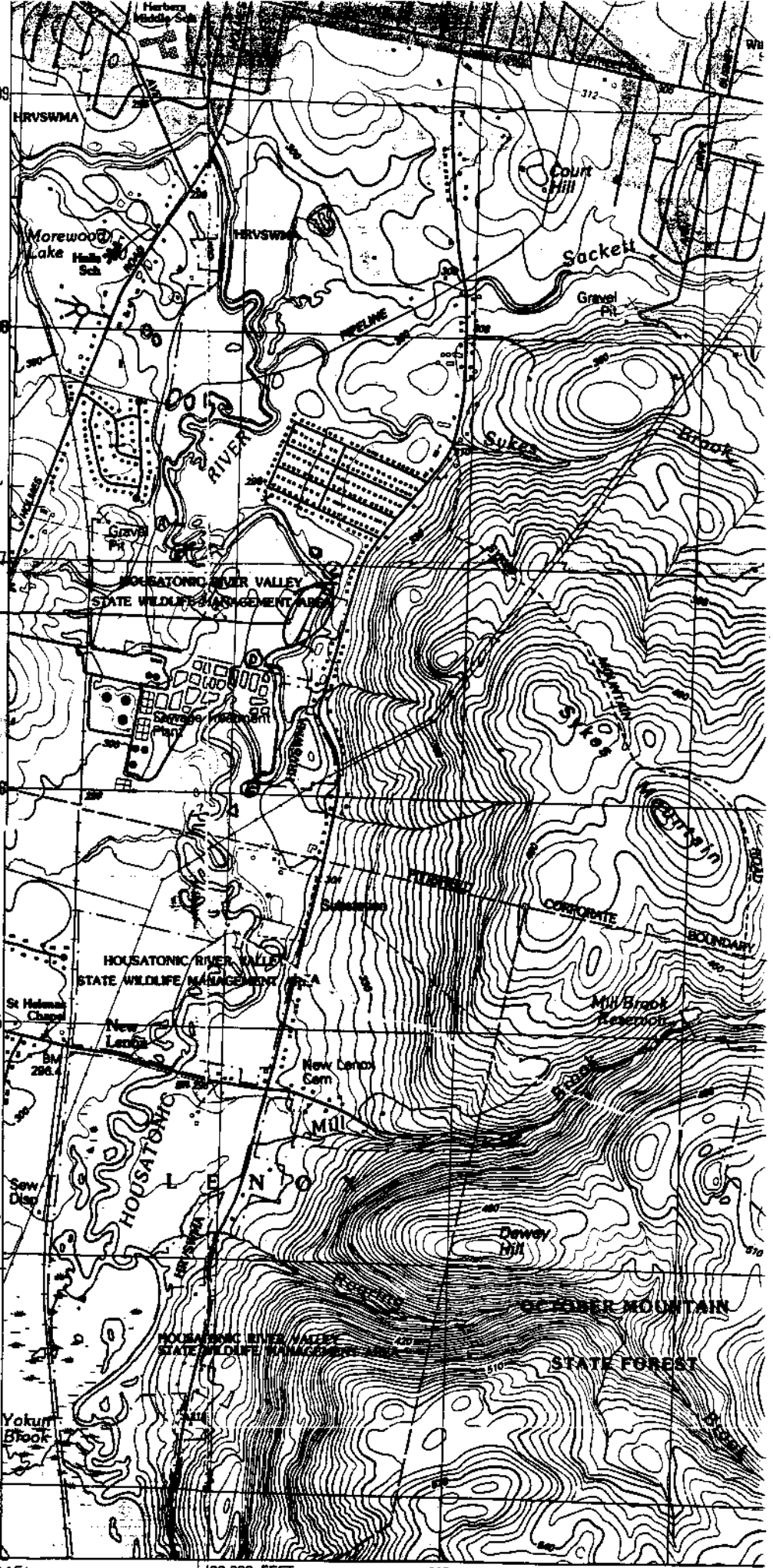
KAROL WARDEN, CHRIS WERNER, EUGENIE MOORE, JONATHAN MILNE - WOODLOT ACTS.

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 10899

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200



* - Cobble / Sand bottom Backpack fishing

□ : Sand bottom, Shallow Backpack fishing

ZEBRA CLUBTAIL

△ : Deep [illegible] good site for [illegible]

Natural Heritage &
Endangered Species Program

RARE ANIMAL OBSERVATION FORM

Observer's name: Kurt Karwacky

Address: Woodlot Alternatives, Inc.
122 Main Street
Topsham, Maine 04086

Phone: (H) 207-729-1199 (W)

Species observed:
Zebra Clubtail (Stylurus scudderi)

Date and Time of observation:
28 Jun 99, 21 Jul 99, 24 Aug 99, 17 Aug 99

1. Location where species was observed:

a) Town: Pittsfield County Berkshire USGS Map: Pittsfield East, MA

b) Please attach a photo copy of the appropriate section of a USGS topographic map (or similar map if a USGS map is unavailable). Please carefully mark the site in red where you observed this rare species.

c) Please explain how to get to this spot: Located just upstream of where Pomeroy Ave crosses the Housatonic River, downstream of the confluence of the East and West Branches of the Housatonic River.

2. Number of individuals observed: 28 Jun 99 – 11 inds., 21 Jul 99 – 67 inds., 24 Aug 99 – 2 inds. 17 Aug 99 – 5 inds.

3. Was a positive ID possible? Yes Based on what field marks?
Exuvia identification completed by Jeremiah Trimble and Blair Nikula Harwichport, MA 508-432-6348

Were photographs taken? No
If yes, please submit one clear photograph of the animal.

4. Age and sex of individuals: Exuvia

5. Evidence (if any) of breeding activity at this site: Yes

(OVER)

6. Have you observed this species at this site in previous years? NO

If yes, please give details: _____

7. Description of habitat at this site: STEEP BANK ALONG THE HOUSATONIC RIVER ADJACENT TO FORESTED UPLAND; RIVER IS SHALLOW, FAST-MOVING, WITH COBBLE BOTTOM

8. Observed or potential threats to the species or its habitat at this site:

NONE

9. Landowner's name and address, if known: UNKNOWN

10. Additional observations/comments: EXUVIA COLLECTED DURING DRAGONFLY EXUVIA SURVEYS. OTHER SPECIES INCLUDE: ARROW CLUBTAIL, ASHY CLUBTAIL, COMMON BASKETTAIL, FAWN DARNER

11. Qualifications of observer (check all that apply):

____ Amateur naturalist. Years of experience: ____
____ Conservation Commission member
____ Biology/science teacher
__7__ Environmental Consultant
__x__ Degree in Biology: x Bachelor's ____ Master's ____ Ph. D.
____ Other. Please specify: _____

12. Briefly explain your previous field experience with this species: _____

GENERAL KNOWLEDGE OF ODONATE IDENTIFICATION

13. List names and qualifications of other observers (if any): _____

JONATHAN MILNE, EUGENIE MOORE
KAROL WOLADGE, CHRIS WELLNER, ARTHUR HAWES - WOODLOT ALTERNATIVES

14. I hereby certify under pains and penalties of perjury that the information contained in this report is true and complete to the best of my knowledge.

Signature _____ Date: 1 DEC 99

Please submit field forms and all supporting documentation (map, photo, etc.) to:

MA Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
Route 135
Westboro, MA 01581
508-792-7270 ext. 200

ZEBRA CLUBTAIL

✱ -Cobble / sand bottom
Backpack fishing

□: Sand bottom,
Shallow
Backpack fishing

Δ: Deep stretch,
good area for
Cast net


20 KM TO INTERST
LENOX
PITTSFIELD
St Lukes Hospital
High Sch
Branch
Goodrich Pond
BRATTLE BROOK PARK
Radio Tower
Deming Park
Fire Sta
DAVIES
MARION AVE
Egremont Sch
SAMPSON
WILLIAM
Herberg Middle Sch
HRVSWMA
Morewood Lake
Holmes Sch
Court Hill
Sackett
Gravel Pit
PIPELINE
RIVER
Sukes Brook
HOUSATONIC RIVER VALLEY
STATE WILDLIFE MANAGEMENT AREA
Sewage Treatment Plant
Substation
CORPORATE
BOUNDARY
Mill Brook Reservoir
St Helena Chapel
New Lenox
New Lenox Cem
BM 296.4
HOUSATONIC