U.S. Army Corps of Engineers

New England District
Concord, Massachusetts

Work Plan for Aquatic Invertebrate and Fish Sampling 1.5-Mile Reach Removal Action

Contract No. DACW33-00-D-0006
Task Order No. 0005

Environmental Remediation Contract
General Electric (GE)/Housatonic River Project
Pittsfield, Massachusetts

DCN: GE-062207 ADOT

June 2007

01M-0007

WESTON SOLUTIONS
Restoring Resource Efficiency

Work Plan For

Aquatic Invertebrate and Fish Sampling

Housatonic River 1.5-Mile Reach, Pittsfield, MA

1.0 Objectives

The purpose of the aquatic invertebrate sampling is to obtain information on polychlorinated biphenyl (PCB) concentrations and the composition of the aquatic invertebrates communities that have re-established themselves in the 1.5-Mile Reach of the Housatonic River since the completion of remediation activities. This information can be compared to the pre-remediation data collected in 2000. The purpose of the fish sampling is to characterize the fish species present and relative abundance following the completion of the remediation activities in the 1.5-Mile Reach.

2.0 Benthic Macroinvertebrate Collection

The activities described in this plan will be conducted in accordance with Weston's project-wide and area-specific planning documents. These planning documents include the following:

- Project Field Sampling Plan;
- Project Quality Assurance Project Plan and Addendum (QAPP) Appendix C;
- Project Health and Safety Plan (HASP); and
- Site-Specific Health and Safety Plan.

The following description of sampling procedures will serve as a Work Plan Addendum to the above mentioned Weston documents.

Aquatic macroinvertebrate samples will be collected from areas previously sampled in 2000 from the 1.5-Mile Reach of the Housatonic River near Pittsfield, Massachusetts. Samples will be collected from the following three transects: T070, T134, and T170. The sampling transects will be staked out by a licensed survey crew prior to commencement of sampling. See Figure 1 for the three sampling transects. If there is not enough sample material present at the sampling location, the sampling locations may be moved within reasonable distance (to be determined in the field) to increase the opportunity for collection of organisms. At each of the three sampling transects, macroinvertebrate samples will be collected for community composition as well as PCB concentrations.

Community Composition Samples: At each sample transect, 12 samples will be collected using a 9-inch by 18-inch rectangular kick-net with a 900-micron net. The net will be placed on the bed substrate and the substrate will be "kicked" for approximately two minutes during each sample collection. The 12 sample locations for each transect will be equally spaced (approximately 5 to 10 feet apart) and will transverse the channel width in an upstream zigzag pattern. A one-meter square grid will be employed upstream of the net to define the sampling area at each sample location. Three Woodlot staff will conduct macroinvertebrate sampling: one staff member will deploy and hold the kick-net in place, another will deploy the one-meter sampling area grid, and the third staff member will "kick" the bed substrate for two minutes. Upon completion of the two minute sampling, the net will be removed from the water column, drained of free water, and carefully inspected to determine the presence of aquatic macroinvertebrates. All samples will be individually packaged and preserved (in the field) in small glass jars, and then will be shipped to Lotic, Inc. (Lotic) for taxonomic identification.

Sample collection steps will be repeated in an upstream direction until adequate samples are obtained. Habitat characteristics, including water depth, stream characteristics (e.g., pool, run, and riffle), and substrate type, will be recorded on the field sampling data sheet (Appendix A).

Lotic is required to achieve a 60-day turn-around-time for reporting sample results for taxonomic analysis.

PCB Samples: At each transect, up to 10 grams (but no less than 1 gram) of the total macroinvertebrate material will be collected to characterize tissue PCB concentrations. In addition, one quality assurance (QA) sample will be collected. The location of the QA sample will be determined in the field based on sample material availability. The amount of material necessary for the QA sample will be 3 times that of one sample, which is 30-grams. If this is not feasible, the laboratory will perform a lab spiked blank and spiked blank duplicate. These samples will be collected using a kick-net by walking along the transect, just upstream of areas sampled for taxonomy. The predominant taxa used for the PCB tissue analysis will be determined in the field at each transect during the collection of the macroinvertebrate community characterization samples. All instrumentation and sampling gear will be decontaminated prior to sample collection with a de-ionized water rinse, and all Woodlot and Weston staff handling invert samples and collection jars will wear sterile gloves. Samples will be placed in pre-cleaned four-ounce glass jars with river water during collection and placed on wet ice for return to the processing area. At the processing area, samples will be drained, weighed, and preserved by freezing at approximately 0° F. Samples will then be shipped frozen to Geochemical &

Environmental Research Group (GERG) at the Collage of Geosciences Texas A&M University. The samples will be analyzed for PCB arocolrs, congeners, and homologs, and % Lipids.

GERG laboratory is required to achieve a 30-day turn-around-time for reporting sample results, and the detection limit for the individual analytes is less than 0.10 ng/g on a wet weight basis. Weston will conduct data management and data validation of sample analyses in accordance with the procedures outlined in Section 14 of the project QAPP. All analyses will meet the Data Verification, Evaluation, and Validation Requirements as outlined in Section 14 of the project QAPP.

2.1 Field Equipment and Materials

The following equipment will be utilized as part of macroinvertebrate tissue sampling procedures:

- D-Frame or Square Aquatic Kick-net (900 microns);
- Waders (with hip-belt) or Hip Boots;
- Logbook and Data Sheets;
- Nitrile Gloves;
- Coolers (Supplied by Weston);
- Ice (Supplied by Weston);
- Polarized Sunglasses;
- De-ionized Water
- Pre-Cleaned 4-ounce glass jars;
- Electronic Balance;

- 95% Ethanol; and
- Small glass jars.

3.0 Fish Sampling

Woodlot staff will be trained in electrofishing equipment use and safety prior to project initiation. Approximately 15 representative, randomly selected sections (e.g., pool/riffle) of the 1.5-Mile Reach will be selected prior to the fish survey. River sections of the 1.5-Mile Reach will be fished for 30-minute periods using a Smith-Root Model 15-D backpack electrofisher to characterize fish species richness and relative abundance. Abundance will be classified as: (1) Abundant (large numbers recorded); (2) Common (many recorded); or (3) Uncommon (present, but few recorded). Woodlot staff will select a voltage level necessary to achieve 25 watts average power output through the water between electrodes. All settings will be adjusted up or down from an initial starting point to achieve levels necessary for non-lethal fish capture. Three Woodlot staff will conduct fish sampling: one staff member will operate the electroshocker, one will net fish, and the third will retrieve caught fish and transport them to a live-well on-shore for later identification. Staff netting fish will work behind the person shocking for safety reasons and to better capture stunned fish floating downstream. After a river section has been surveyed and fish collected, Woodlot will then process and identify fish to species or group (for some cyprinids), record data (Appendix B), take photos of representative fish and habitat type, and return fish to the river downstream of initial capture. All Woodlot staff working in the water will wear waders with hip belts, felt-soled boots, and insulated rubber gloves. Fish nets used will all be fiberglass-handled to reduce the potential for electric shock. Polarized glasses will be used to aid in fish collection. All instrumentation and sampling gear

will be decontaminated prior to sample collection with a deionized water rinse. Fish species common to the 1.5-Mile Reach are listed in Appendix C.

3.1 Field Equipment and Materials

The following equipment will be utilized as part of fish sampling procedures:

- Smith-Root Backpack Electrofishing Unit, Model 15-D;
- Gas/Oil for Electrofishing Unit Generator;
- Long-Handled Fiberglass Fish Nets;
- Elbow-Length Insulated Waterproof Gloves;
- Electronic Balance;
- Fish Measuring Board;
- Scientific Collection Permits;
- Logbook and Data Sheets;
- Clipboards;
- Rubber Knee- and Hip-Boots;
- Chest Waders (with hip-belt);
- Polarized Sunglasses; and
- Digital Camera.

4.0 Schedule

Sampling will be initiated on June 25, 2007, assuming a scientific collection permit is received from the Commonwealth of Massachusetts and flow in the river is amenable to sampling. The sampling is expected to be completed in approximately three work days. A draft report, with

validated data, will be submitted approximately 90 days after sampling is completed. A final report will follow.

5.0 Health and Safety

Prior to survey initiation, Woodlot will determine water flows and depth for the 1.5-Mile Reach of the Housatonic River based on the USGS National Water Information System. This information, in conjunction with the initial site visit, will allow Woodlot to assess any safety issues with the sampling plan.

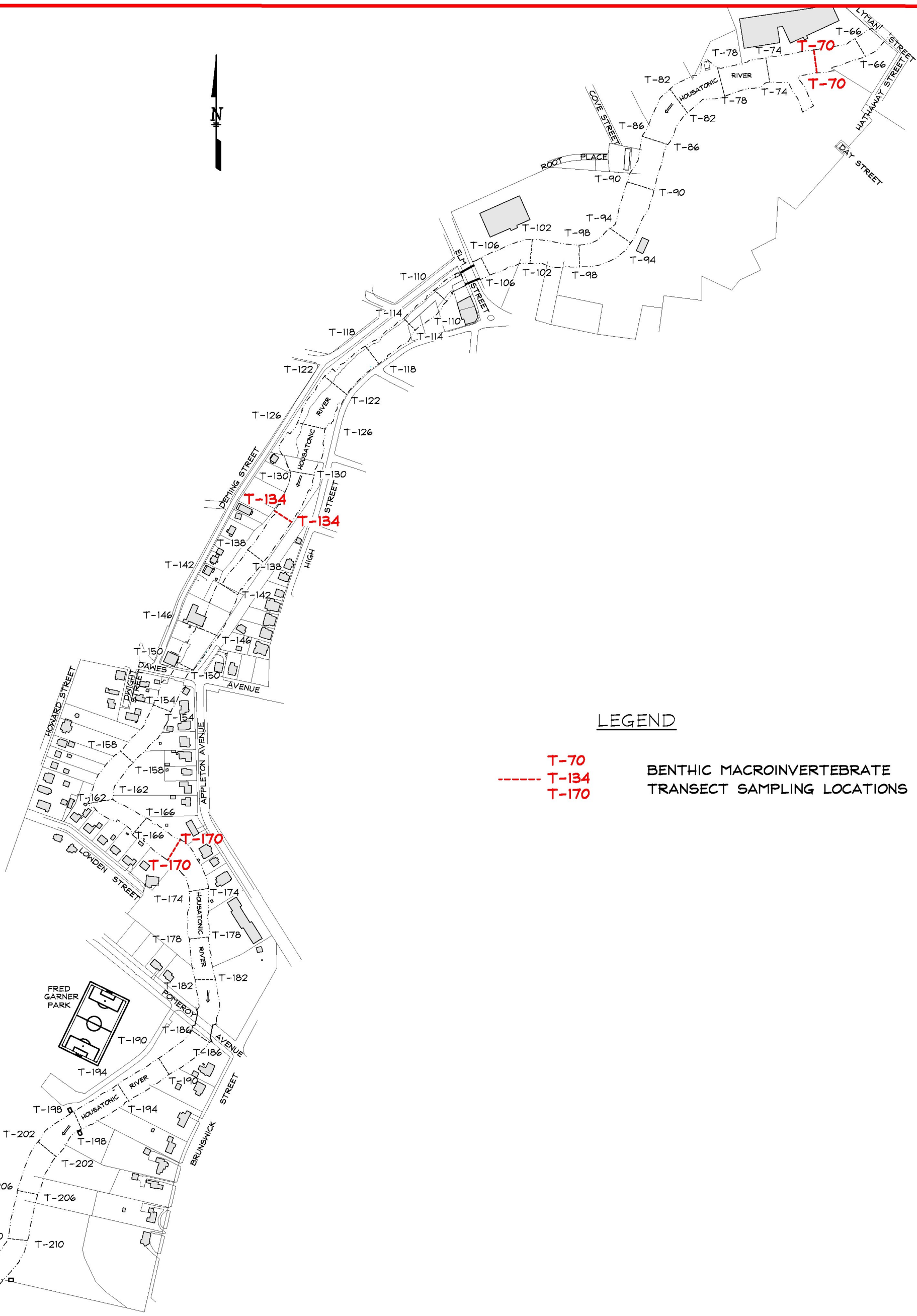
Attachments:

Figure 1 - Aquatic Invertebrate Sampling Locations

Appendix A – Housatonic 1.5 Mile Reach Macroinvertebrate Sampling Data Sheet

Appendix B - Housatonic 1.5 Mile Reach Fish Sampling Data Sheet

Appendix C - Fish species documented in the Housatonic River near Pittsfield, MA



LEGEND

T-70
------ T-134
T-170

BENTHIC MACROINVERTEBRATE TRANSECT SAMPLING LOCATIONS

WESTON SOLUTIONS, INC.

10 LYMAN STREET

PITTSFIELD, MA

REV.	DESCRIPTION	DR'N	CK'D.	DATE
A	ISSUED FOR COMMENT	JR		6-19-07

PROJECT DESCRIPTION: EAST BRANCH HOUSATONIC RIVER

DRAWING TITLE: BENTHIC MACROINVERTEBRATE SAMPLING LOCATIONS

0 400 800

DRAWN BY: JR
DATE DRAWN: 6-19-07
SCALE: 1"=400'
APV'D BY:

CAD CODE: TRANSECTSSK3.DWG

DRAWING NUMBER: SRV-758-SK3
REV.: A

50 Depot Street
Dalton, MA 01226
(413) 684-0925
www.hillengineers.com

Hill engineers architects planners

Appendix A.
Housatonic 1.5-Mile Reach Macroinvertebrate Sampling Data Sheet

General Information

Site : _____ Project: _____

Location:_____ Sample Collection Start Date:_____

Staff: _____ Sample Collection End Date:_____

Sample Collection Start Time:_____ Sample Collection End Time:_____

Weather Observations

Start of Sampling

Sun/Clear:_____ Overcast/Rain:_____

Wind Direction:_____ Ambient Temp.:____

End of Sampling

Sun/Clear:_____ Overcast/Rain: _____

Wind Direction:_____ Ambient Temp.: ____

Water Quality

Conductivity:_____ pH:_____ Dissolved O2:_____ Temperature:_____

Sample Information

Matrix: _____ Sample ID: _____

Sampling Method:_____ Sample Date:_____

Sample Mass (grams): _____ Sample Time:_____

Reference Photo IDs:_____ Species Reference Sample Collected: yes/no

Collocated Samples:_____

Habitat Description/Comments/Site Sketch

(i.e., flow rate, substrate, water depth, in-stream structure)

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Appendix B.
Housatonic 1.5-Mile Reach Fish Sampling Data Sheet

General Information

Project: _____ Date:_____ Start Time:_____ End Time:_____

Site : _____ Staff:_____

Location:_____ Equipment Used: _____

Weather Observations

Sun/Clear:_____ Overcast/Rain:_____ Wind Direction:_____ Ambient Temp.:_____(°C / °F)

Water Quality (*Record units)

Temp.:_____(°C / °F) Notes:

Fish Information

Photo IDs:_____ Process Time:_____

Species	Total Number	Notes

Site Notes:

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APPENDIX C: Fish Species Documented in the Housatonic River Near Pittsfield, MA.

Species	Common name	Estimated Relative Abundance in EE/CA Reach *	Habitat	Preferred Temp Range	Preferred pH Range	Spawning Habitat	Comments
Micropterus salmoides	Bass, Largemouth	C	Benthopelagic; Prefers quiet, clear water and over-grown banks.	50 - 89° F	7.0 - 7.5	Mud, sand or leaf litter, or among roots of aquatic plants.	Highly-prized gamefish, but not as prized as smallmouth bass.
Ambloplites rupestris	Bass, Rock	C	Demersal; vegetated and brushy stream margins and pools of creeks and small to medium rivers; most commonly found in clear, silt-free rocky streams.	50 - 84°F	7.0	Gravely shoreline areas.	Can seriously compete with smallmouth bass for food.
Micropterus dolomieui	Bass, Smallmouth	U	Demersal; clear and gravel-bottom runs and flowing pools of rivers.	50 - 86°F	-	Gravel or rubble bottom with nearby cover (boulder or log), in 2-12' of water.	Highly-prized gamefish.
Lepomis macrochirus	Bluegill Sunfish	C	Benthopelagic; lakes, ponds, reservoirs and sluggish streams; preferably lives in deep weed beds.	39 - 89°F	7.0 - 7.5	Gravely substrate in shallow water.	Can be a highly-valued gamefish, but tends to overpopulate waters where it is found.
Ameiurus nebulosus	Bullhead, Brown	U	Demersal, brackish pools and sluggish runs over soft substrates in creeks and small to large rivers.	39 - 86°F	-	Sandy bottom; in water <2 ft. deep; near or under shelter (log, rock, overhanging bank)	Can tolerate high carbon dioxide and low oxygen concentrations; resistant to domestic and industrial pollution.
Pomoxis nigromaculatus	Crappie, Black	U	Benthopelagic; backwaters and quiet pools, usually clean water with vegetation and sand or mud substrate.	-	-	Sand or mud bottom in 3-8' of water, often among rooted vegetation.	Can be a highly-valued gamefish.
Rhinichthys atratulus	Dace, Blacknose	U	Demersal; rocky runs and pools of headwaters, creeks and small rivers.	54 - 68°F	-	Riffles of streams, nest of pebbles.	Often an important forage fish for trout.
Rhinichthys cataractae	Dace, Longnose	C	Demersal; rubble and gravel riffles (sometimes runs and pools) of fast creeks and small to medium rivers.	39 - 61°F	7.0	Riffles over rock or gravely bottom.	Often an important forage fish for trout.
Semotilus corporalis	Fallfish	C	Demersal; gravel- and rubble-bottomed pools and runs of small to medium rivers.	-	-	Quiet stretches of stream, communal nest of pebbles and stone.	Important source of food for predatory gamefsh. A common bait fish.
Pimephales notatus	Minnow, Bluntnose	U	Demersal; almost anywhere in its range but most common in clear rocky streams.	-	-	Small depressions beneath flat rocks.	
Perca flavescens	Perch, Yellow	A	Benthopelagic; lakes, ponds, pools of creeks, and rivers in clear water near vegetation.	up to 84°F	-	Shallow backwaters when water temp reaches mid-40°'s F; in submerged veg. or branches of fallen trees.	Important forage fish and game fish, but can become overpopulated and stunted.
Esox niger	Pickerel, Chain	U	Demersal; vegetated lakes, swamps, and backwaters and quiet pools of creeks and small to medium rivers.	50 - 68°F	-	Marshy backwaters in aquatic vegetation.	Adults are voracious predators of fish, frogs, and often ducklings.
Esox lucius	Pike, Northern	U	Demersal; clear vegetated lakes, quiet pools and backwaters of creeks and small to large rivers.	50 - 82°F	-	Marshy areas with vegetation in water usually less than 17.8 cm; water temp of 50°F.	Can be a prized sportfish.
Lepomis gibbosus	Pumpkinseed Sunfish	U	Benthopelagic; quiet and vegetated lakes, ponds, and pools of creeks and small rivers.	39 - 72°F	7.0 - 7.5	Sand or gravel in very shallow waters (1-3 ft.) near the shore.	Can cause problems associated with overpopulation, harming other more economically-important fisheries.
Luxilus cornutus	Shiner, Common	C	Demersal; rocky pools near riffles in clear, cool creeks and small to medium rivers.	-	-	Running water and clean gravel bottom when temp is >60°F.	Important forage and bait fish.
Notemigonus crysoleucas	Shiner, Golden	C	Demersal; sluggish streams or lakes with thick aquatic growth and mud bottoms.	up to 87°F	-	Sactters adhesive eggs over submerged aquatic vegetation in quiet water.	Valuable as a forage fish for game species.
Notropis hudsonius	Shiner, Spottail	C	Demersal; sandy and rocky pools and runs of small to large rivers.	-	-	Submerged aquatic vegetation in quiet water.	Valuable as a forage fish for game species; a common bait fish.
Catostomus commersoni	Sucker, White	C	Demersal; very adaptable to all temperatures, substrates, flow rates, and vegetative conditions. Bottom dweller, but typically avoids deep water.	39 - 87°F	-	Gravelly areas of shallow, swift-flowing streams.	Valuable as a forage fish for game species and as bait.
Salvelinus fontinalis	Trout, Brook	U	Wide range of habitats, including sift mountain streams, sluggish meadow brooks, rivers, lakes. Inhabits mud, gravel, or bedrock bottom substrates, heavy weed to open water. Requires supply of year-round supply of cold (<68 F), oxygenated water, but can tolerate higher temps for short periods.	41 - 72°F	-	Gravel-bottomed, spring-fed tributaries.	A favored game fish, normally stocked.
Salmo trutta	Trout, Brown	U	Typically found in deep, quite pools or slow-moving, usually warmer lower sections of stream, but also does well in fast-flowing streams.	up to 75°F	-	Gravely-bottom riffles of spring-fed tributaries.	Brown trout are adaptable and can live under less favorable conditions than brook trout. Can be difficult for anglers to catch.
Salmo gairdneri	Trout, Rainbow	U	Swift riffles to deep pools of streams, as well as lakes. Thrives best in cold water, with swift riffles but can tolerate relatively high temperatures (up to 85 F).	50 - 75°F	-	Swift riffle area with gravel bottoms.	Thrives best in cold water, but can tolerate relatively high temperatures (up to 85 F). Some native populations are anadromous.

* Abundance:
A = Abundant: large numbers recorded
C = Common: many recorded
U = Uncommon: present, but only few recorded

Sources
- FishBase99 (www.fishbase.org)
- Freshwater Fishes of New Hampshire, J.F. Scarola, 1973, NH Fish and Game Dept.
- Fish characterization surveys by R.F. Weston, USEPA, USFWS, and Woodlot Alternatives, Inc., Sept. and Oct., 1998

Note: Blank cells in the table indicate that no data were readily available.