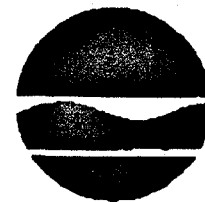


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New York State Department of Environmental Conservation
Division of Fish, Wildlife and Marine Resources
Hale Creek Field Station
102 Steele Avenue Extension
Gloversville, New York 12078
518-773-7318 FAX 518-773-7319



John Cahill
Commissioner

March 18, 1999

John Schaffer
TAMS Consultants Inc.
300 Broadacres Drive
Bloomfield, New Jersey 07003

Dear Sir:

In response to our recent telephone conversation regarding NYS DEC research on mink in the Hudson River Valley, I have enclosed a conceptual work plan for current and future work. As with most work plans, changes can be expected as work progresses. We have made two additions not indicated in the work plan: 1) the assessment of dietary sources using stable isotope techniques and 2) the determination of relatedness of mink relative to their geographic distribution using DNA techniques. The first addition will allow the evaluation of assumptions regarding dietary sources used in modeling effects of contaminants on mink and the second addition will allow the evaluation of population "sinks" associated with areas of high contaminant availability. We are also considering the addition of the analysis of several health-related parameters to the list of analyses (now including mercury, cadmium, and lead) slated in the work plan.

To date, we have collected approximately 130 mink (150 expected at the conclusion of the trapping season) and approximately a dozen each for otter and muskrat from the upper Hudson River drainage. We anticipate an additional collection next year to complete quotas for otter and muskrat as indicated in the work plan and to fill any "holes" in the geographic distribution of collected mink. We anticipate completing necropsies of all animals within the next few months and having analytical results prior to the next trapping season. We have substantial funding for activities planned through March, 2000; however, funding is not secure for a number of future research activities. Your client is apparently interested in securing data that can be used in a credible risk assessment for mink in the Hudson Valley. I would suggest that you indicate to your client that support of our current and future research activities may be beneficial to their interests.

If you have additional questions regarding our work, please contact me.

Sincerely,

David T. Mayack, Ph.D.
Conservation Biologist

Enclosure

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Schedule 1 - Scope of Services

Organochlorine and Metal Contaminant Levels in Hudson River Mammals

Goal

To provide the New York State and federal natural resource trustees with the information necessary to demonstrate contaminant-caused injury to selected mammals within the Hudson River ecosystem. Specifically, the information garnered by this investigation will be used to support a natural resource damages claim for contamination of the Hudson River.

Objectives

This monitoring effort is the first component of a comprehensive study of three distinct aspects of injury to Hudson River mammals. The program will be accomplished by a single research organization which integrates the components into a phased but comprehensive investigation:

1. Measure the levels and nature of contamination in mink, muskrat, and otter from within the Hudson River watershed.
2. Measure the population size and distribution of selected mammals throughout the Hudson River ecosystem.
3. Compare mammalian reproductive success in the Upper Hudson River with that in the Lower Hudson River.

A primary objective is to evaluate the extent of PCB contamination in mink, otter, and muskrat populations downstream of a major point source at Fort Edward, New York. Mink, otter, and muskrat carcasses will be obtained from cooperating trappers and analyzed for organochlorine contaminants including congener-specific levels of PCBs in liver and adipose tissues. Contaminant levels in populations upstream of Fort Edward will be compared to levels in populations downstream. Relationships in contaminant burden with downstream distance from the contaminant source will be explored; upstream levels will serve as a "baseline" for evaluating trends. This study will establish the downstream limit of potential contaminant impact on mammal populations in the Hudson River ecosystem.

A second objective is to determine if the abundance of mink can be related to the distribution of PCB contamination within the Hudson River drainage. Relative abundance of mink should be lower in drainages that flow into a reach of the Hudson River that is highly contaminated with PCBs as compared to drainages that flow to a reach free of point-source releases of PCBs. Relative abundance should be lower in an area of a drainage immediately adjacent to the contaminated reach of the river as compared to a more remote area. The abundance of mink will be determined using several indexing techniques for drainages that flow to reaches of the Hudson River immediately upstream and downstream of a major input of PCBs (Fort Edward, New York). A survey of mink presence/absence using scent stations equipped with track boards will serve as a field index to mink abundance. A retrospective interview of trappers will provide information that may serve as an indirect index to mink abundance. Data will be mapped using the Geographic Information System (GIS) as well as examined statistically for relationships between relative abundance and the

distribution of contaminants within the study area.

HREMP Objective

- LR-EP-8 Manage the physical and chemical properties of the estuary's water column and sediments (substrate) to ensure optimal production of the estuary's living resources.
- LR-EP-9 Reduce chemical contaminant levels to concentrations that will not impair the successful survival, reproduction and growth of sensitive species nor impair secondary consumers of fish, shellfish and wildlife.

HEP Objective

- Goal H-2 Restore and maintain an ecosystem which supports an optimum diversity of living resources on a sustained basis.

Background

The loading of PCBs in the Hudson river downstream of Fort Edward, New York, is the highest of any major river system in the United States. Analysis of a small number of mink (*Mustela vison*) and otter (*Lutra canadensis*) collected from the Hudson River region of New York State suggest that high levels of PCB contamination are present in populations of these mustelids in the Hudson River drainage (Foley et al 1988). Levels of PCBs in mink were greater than levels known to cause reproductive failure in ranched mink (Foley et al 1988). This degree of contamination suggests that reproductive impairment and a consequent decrease in abundance may be present in wild populations of mink in the Hudson Valley region. Although PCB levels in mustelids collected from the Hudson River region were the highest of any collected from 8 areas of New York State, the number of animals collected within the Hudson River drainage was too small to define the extent of high-level contamination within the drainage. Additional information on the extent of high-level PCB contamination in semi-aquatic mammal populations (mink, otter, and muskrats (*Ondatra zibethicus*)) downstream of major point-sources of contaminants is needed to define the impact of PCB contamination in the Hudson River ecosystem.

Approach

This study will be accomplished by a research associate under the auspices of the Cooperative Wildlife Research Unit at Cornell University. NYSDEC will supervise much of the day-to-day tasks associated with this job. Contaminant analysis will be accomplished by a private laboratory.

Required Outputs

I. Assessment of Contaminant Burdens

A. *Collection of specimens*

Carcasses will be obtained from cooperating trappers within NYSDEC Regions 5, 3, and 4. Approximately 200 trappers make sets within the Hudson River drainage. NYS DEC has on record the names, addresses and telephone numbers of 125 trappers (Regions 5, 4, and 3) that indicated they would be willing to participate in future research on mink, otter, and muskrats. Additional trappers not contacted by NYSDEC may also agree to participate in providing carcasses, if located and asked. County and state trapping organizations, fur sales, fur buyers, and pelt sealing data may serve as additional sources of trappers. Trappers will be contacted prior to the trapping season to determine if they anticipate trapping in the Hudson River drainage and to make arrangements for collection of carcasses. Cooperating trappers will be provided with a toll-free number to report the availability of carcasses. Trappers should be instructed to call as soon as possible after taking animals to make arrangements for pick up of carcasses by staff. Date and location of take should be recorded by trappers. Arrangements should be made to minimize the period of time carcasses are in the field. Precautions for animals infected with rabies will be necessary for personnel collecting carcasses. Carcasses will be stored in polyethylene bags at -20 C prior to dissection. Storage will be at a facility that has proper precautions for handling animals potentially infected with rabies.

Sixty mink and 30 muskrat carcasses will be collected from drainages flowing into the Hudson River from North River to New Baltimore. Similarly, 30 otter carcasses will be collected from drainages flowing into the Hudson River from North River to the Rockland-Westchester County line. Thirty mink, 15 otter, and 15 muskrat carcasses will be collected from drainages entering the Hudson River upstream of a major point-source of PCB contamination at Fort Edward; numbers of mink, otter, and muskrat identical to those collected upstream will be collected from drainages entering the river downstream of Fort Edward. All carcasses from mink and muskrat taken within 5 miles of the Hudson River will be collected; however, preference for chemical analysis will be given to animals taken within 1.5 miles of the river. For otter, all carcasses taken within 15 miles of the Hudson River will be collected, however, preference for chemical analysis will be given animals taken within 5 miles of the River.

B. *Dissection and sample preparation*

A standard necropsy will be performed on all animals including measurements for calculating a health index. Jaws of mink and otter will be removed for subsequent age analysis. Reproductive tracts will be removed and preserved. All adipose tissue will be removed, incorporated into a composite sample, weighed, and homogenized. Similarly, the liver will be removed, weighed, homogenized. Tissues will be stored in glass bottles at -20 C prior to chemical analysis. All dissections will be done with proper precautions for handling animals potentially infected with rabies.

C. *Chemical analysis*

Adipose and liver tissues from each animal will be analyzed for organochlorine compounds including

specific PCB congeners, lipid content, and percent moisture. Congeners selected for analysis will be representative of PCB congeners known to be prominent in the Hudson River ecosystem. Preference will be given to PCB congeners known to have a significant toxicological effect on mammals. Standard operating procedures (NYS DEC) regarding quality assurance and quality control for congener-specific PCB analysis will be followed.

D. Data analysis

Contaminant levels in populations upstream of Fort Edward will be compared statistically to levels in populations downstream. Trends in contaminant levels with distance will be explored statistically. Contaminant levels will be evaluated relative to potential toxicological effects. The downstream limit of elevated contaminant levels in mink, otter, and muskrat populations should be identified. A computer print out and two diskettes (3.5 in) of data for each sample year on appropriate software will be provided to NYSDEC along with any standard data summaries.

F. Reporting

For the funding period March 1, 1998 to March 31, 2000, brief status reports are due the end of each quarter, summarizing progress and any problems or unusual findings to date. A final report will be drafted on or before 31 January 2000. An approved final report will be due by 31 March 2000. Details of information to be contained in the annual progress and final reports will be discussed with the Department prior to preparation. A similar reporting schedule will be required for April 1, 2000 to March 31, 2002, contingent upon availability of funding.

II. Assessment of Mink Abundance

A. Study Area and Site Evaluation

Two sections of the drainage located along reaches of the Hudson River from North River to Fort Edward and from Fort Edward to Troy will be compared. Twenty stream-road-intersection sites upstream and 20 sites downstream of Fort Edward will be selected for placement of track boards.

Ten stream-road intersections located within 1.5 miles of the Hudson River and an additional 10 stream-road intersections located 1.5 to 5 miles from the river will be selected as study sites within each study section. Habitat quality of potential sites will be evaluated using a Habitat Suitability Index for mink (USFWS). Using GIS information, sites will be rated according to their proximity to large wetlands that may serve as summer habitat for mink. Sites will be selected according to their potential to provide adequate habitat for mink. Trapper information and information from past NYS DEC surveys for mink sign will also be incorporated into the selection process for sites.

B. Track-Board Survey

Boards are constructed of 0.6 m square pieces of hardboard (3 mm thick) that are sooted with an acetylene torch. Boards are enclosed in a weather resistant structure constructed of 30.5 cm (I.D.) corrugated polyethylene culvert. Longitudinal sections (0.6 m) are cut from 6.1 m stock sections

of culvert. Each section is cut longitudinally into halves. A base made of 3 mm hardboard is attached to the tubing using several furring strips. Track boards are cut such that they slide easily into the station and are attached to the base using fabricated wire hooks held under tension with rubber bands. Soot from ranch mink to which commercial mink lure has been added is placed in the center of the sooted board. White plaster or plaster colored to match the ground may be used as a substitute for soot as a track recording medium to reduce avoidance of track-board stations. Culverts should be labeled with "NYS DEC" and a phone number for inquiries.

Four track-board stations will be deployed at each stream-road-intersection site. Track-board stations should be located on the bank within 1.5 m of the stream in areas that are potential runs for mink but are not likely to be flooded during high stream stage. Typically, two stations will be located on opposite banks upstream of the bridge and two on opposite banks downstream of the bridge. Location should be far enough away from bridge to avoid conflict with typical trapper sets but close enough to take advantage of the "funneling" aspect of the bridge on mink activity (roughly 100 yards from bridge). Track-board enclosures should be rinsed in stream water to remove human scent and handled with gloves thereafter. As much as possible, culvert enclosures should be camouflaged with natural vegetation to reduce visibility to the public.

Track-board stations will be installed during August. Surveys will be conducted at each station once a week from the beginning of September to the end of April. This should permit the detection of mink at stations during dispersal and breeding activities. Boards will be inspected for mink sign. Mink sign will be recorded as "present" or "absent"; other sign should be identified, if possible, and noted. Condition of the station will be noted. Survey for sign within several meters of the station will be conducted when snow conditions permit. If possible, track boards with sign should be removed and preserved for further laboratory analysis and archival storage. Track boards will be maintained to provide appropriate substrate for the record of sign.

C. *Trapper Survey*

According to NYS DEC estimate through the NYS DEC trapper survey, approximately 60 trappers set for mink in the Hudson River watershed from North River to Troy. NYS DEC has on record the names, phone numbers, and addresses of 33 trappers (Region 5) that have long-term trapping experience for mink and expressed interest in participating in a survey on mink trapping experience. Additional trappers not contacted by NYS DEC may also agree to participate, if located and asked.

The proposed survey (draft survey developed by NYS DEC) requires the trapper to locate set sites that he has actually used or considered using on topographic maps and categorize sites regarding take, set site quality, habitat quality, and accessibility of sites through an interview process. This process will require an initial contact and a general identification of trap lines. Identification of trap lines may require a small scale map be sent to the trapper and returned with trap lines indicated. Topographic maps appropriate for identification of set locations for the indicated trap lines will be used in the interview process. Topographic maps will be sent to the trapper before the interview date. The trapper will be asked to identify all set locations that he has actually used or considered using for trapping mink. An interview date and place will be arranged at the convenience of the trapper for a one-on-one interview. During the interview, the trapper will be asked to indicate those sites

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that fall into a specific category presented by the interviewer. Approximately 6 categories will be posed to the trapper for inclusion of sites. The interview should take from 1 to 2 hours to complete.

D. Data Analysis

Track-board and trapper survey data will be mapped using GIS. Geographically identifiable patterns that suggest variation in presence/absence of mink according to track-board survey results will be identified. Geographic variation in the presence/absence of mink will be explored statistically relative to the distribution of contaminants within the study area. Variation in take of mink by trappers will be examined geographically. Geographically identifiable patterns in mink take will be explored statistically relative to contaminant distribution. Geographic areas that are not set by trappers due to poor quality habitat, limited access, or lack of sites for sets will be identified from trapper survey information and mapped. Results of the analysis of mink abundance relative to contaminant distribution as determined from track-board survey will be compared to results obtained through the analysis of data from the trapper survey.

E. Reporting

For the funding period March 1, 1998 to March 31, 2000, brief status reports are due the end of each quarter, summarizing progress and any problems or unusual findings to date. A final report will be drafted on or before 31 January 2000. An approved final report will be due by 31 March 2000. Details of information to be contained in the annual progress and final reports will be discussed with the Department prior to preparation. A similar reporting schedule will be required for April 1, 2000 to March 31, 2002, contingent upon availability of funding.

Schedule - March 1, 1998 to March 31, 1998

Literature review

1 March 1998 to 31 March 1998

Evaluation of contract laboratories

1 March 1998 to 31 March 1998

Schedule - April 1, 1998 to March 31, 1999

Evaluation of contract laboratories

1 April 1998 to 31 July 1998

Trapper contacts

1 August 1998 to 31 October 1998

Specimen collection (mink and muskrat)

1 November 1998 to 31 March 1999

Dissection and sample preparation

to 31 March 1999

Schedule - April 1, 1999 to March 31, 2000

Dissection and sample preparation

to 30 April 1999

Chemical analysis

1 May 1999 to 31 October 1999

Trapper survey

1 May 1999 to 31 October 1999

Data analysis and report preparation

1 November 1999 to 31 January 2000

Final, approved report

by 31 March 2000

Schedule - April 1, 2000 to March 31, 2001

Site evaluation and selection

1 April 2000 to 31 May 2000

Construction of track boards

1 June 2000 to 31 July 2000

Deployment of track boards

1 August 2000 to 31 August 2000

Monitor sites

1 September 2000 to 31 March 2001

Specimen collection (otter)

1 November 2000 to 31 March 2001

Schedule - April 1, 2001 to March 31, 2002**Monitor sites****to 30 April 2001****Dissection and sample preparation****to 30 April 2001****Chemical analysis****1 June 2001 to 30 September 2001****GIS mapping****1 May 2001 to 31 July 2001****Analysis of track board and trapper surveys****1 August 2001 to 30 September 2001****Data analysis and report preparation****1 October 2001 to 30 January 2002****Final, approved report****by 31 March 2002****323140**

Project Managers

David T. Mayack, Ph.D., NYS DEC Hale Creek Field Station, Gloversville, New York 12078

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SJS/ER&R/NRD/CASES/HUDSON/MONITOR/MAMMALS.Sc4