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and

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Ludington Biological Station
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and

Department of Fisheries and Oceans
Sea Lamprey Control Centre
1219 Queen Street East
Sault Ste. Marie, Ontario P6A 2E5
Canada

TECHNICAL OPERATING PROCEDURE

PROCEDURE TITLE:

Biological Surveys and Collections

APPLICABILITY:

Protocol applies to biological surveys and collections conducted in conjunction with lampricide applications.

PRINCIPLE:

Biological surveys and collections are conducted in conjunction with lampricide treatments. The typical goal of a biological survey is to document nontarget mortality *or* to assess lampricide treatment effectiveness. Both surveys may be completed during one trip to a site by field personnel. The amount of effort available to deliver this protocol is at the discretion of the lead agency and, if delivered by a treatment crew, the treatment supervisor.

EQUIPMENT REQUIRED:

Data forms	Hand lens	Samples bottles
Random number generation method	Calculator	Dip nets and Scap nets
Clip board and pens	Flagging tape	Polarized sunglasses
Timer/clock	First aid kit	
Hand tally's/counters	Tape measure	<u>Optional</u>
Labels and permanent markers	Paper towels	Camera
Pencils for labels to be placed in formalin	Measuring board	Necropsy kit
Personal flotation device as required by stream	Maps and/or GPS	Scale
Formalin & disposable formaldehyde resistant gloves	Buckets	Fish ID book(s)
Waders/boots	Ziploc Bags	

POTENTIAL INTERFERENCES:

Poor visibility due to environmental conditions such as water depth, turbidity, rain, chop, current, etc.

SAFETY:

Wear minimum safety equipment (waders/hip boots, polarized sunglasses).
Personal flotation device should be worn when warranted by unsafe water depth or current.
If formaldehyde is used, see MSDS and Formaldehyde Safety Plan or Task Hazard Analyses (*CT011 Diluting Formaldehyde 37% (to 10% Formalin Solution)* and *LA014 Formaldehyde 37% - Handling and Disposal*) for required PPE and safety precautions.

DISPOSAL:

Collected Organisms: Disposal of dead fish (<100) or other organisms (amphibians, mollusks, other invertebrates) that are not a species of interest can be done by burying fish in a pit away from human or animal activity after permission granted from property owner. Otherwise, fish can be disposed in a landfill after they have been double bagged.

Species of interest: The SLCP may coordinate with partners to collect tissue samples or whole organism specimens for species of interest to a jurisdiction (e.g. lake sturgeon, mudpuppies, or stonecat). Appropriate methods are used for sample and specimen handling and preservation as supplied by the partners. Refer to section H part 4 of this protocol for lake sturgeon collected in Michigan.

Formaldehyde (Formalin): If formaldehyde is used, it should be neutralized and properly disposed.

REAGENTS:

Formaldehyde 37.2% (Formalin)

DEFINITIONS:

Active surveying: Time spent looking for aquatic nontarget mortality at a survey site. Time does not include travel to the site, preparation of survey equipment, accessing the stream, identifying specimens or any other tasks performed at the survey site. Time spent in the stream but not surveying (e.g. while crossing the stream or overcoming an obstacle) is not included in the active surveying time.

Biological Collection: A procedure whereby field personnel survey a stream before, during or after a lampricide treatment with the goal of locating and collecting organisms for research or similar purposes.

Chemical treatment survey: A non-standardized survey of sea lamprey or nontarget mortality conducted as an observation of treatment effectiveness.

Nontarget survey: A standardized survey conducted to generate a record of nontarget mortality or lack thereof within the defined extent of the survey. All lamprey genera are excluded.

Reach: Biological reaches have been established for all streams historically infested with sea lampreys. Reach definitions were originally established as portions of streams that contained similar densities of larval sea lampreys and could be considered an independent section of the stream for the purpose of lampricide application. Contiguous sections of larger streams have often been divided into more than one reach.

Standard effort: The amount of active surveying required to document nontarget mortality at a survey site.

Survey: A process whereby field personnel inspect a portion of a lampricide treated stream and document

observed mortality. A survey may consist of one site or multiple sites.

PROCEDURES:

If substantial nontarget mortality is observed by field personnel during a survey, consult Appendix W: Flow Chart for Response to Fish Mortality Concurrent with Lampricide Treatment. Reporting procedures are included in AOP:007.x

I. Nontarget Surveys

When the goal of a survey is to generate a record of non-target mortality or lack thereof, a standardized survey is conducted. The standardized survey consists of a defined amount of active surveying, or standard effort, at each survey site. Observations are recorded at each survey site.

A. Extent of Survey

1. The treatment supervisor or risk management team leader will define the extent of the nontarget survey. The extent typically consists of all treated reaches within the stream, but will depend on water chemistry, lampricide concentration information, other environmental factors or availability of personnel. A survey designed to identify other causes for nontarget mortality is conducted as per TOP:026.x.

B. Site Selection

1. For each biological reach within the extent of the survey, a minimum of one random site is selected for conducting a nontarget survey. Negative tributaries (<400m treated length) within the reach that are flushed for volume or to prevent escapement will be included in the random selection process. The random site selection process is:
 - a. All appropriate larval assessment sites in the survey extent are numbered sequentially. Sites should have relatively easy access. Sites that have been historically problematic with respect to stream conditions or access may be eliminated from consideration due to time constraints and safety to field personnel.
 - b. A random number generator or table of random digits is used to generate a sufficient list of random survey site numbers and identify one random site per reach within the survey extent using one of the methods described in Attachment 2 or a similarly robust method.
 - c. Note that the site is random on the data sheet.
2. Additional and alternate non-random sites may be selected at the discretion of the treatment supervisor. Nontarget surveys are sometimes conducted at non-random sites because field personnel are at an appropriate survey site for a different purpose (e.g. to pick up a water sampler) but sufficient time is available to conduct a standardized survey at the site. Note that the site is recorded as non-random on the data sheet.
 - a. If a non-random site is within the extent of a nontarget survey consisting of random sites, the results are incorporated into the random site nontarget survey as an additional site.
 - b. If a random site survey is not conducted for the stream reach, then the results of a non-random site nontarget survey can generally be

considered representative of the reach within which the survey site is located. Notable exceptions might be survey sites at application points or sites within a reach where the stream system is highly dendritic.

D. Survey Site Types

1. Survey sites located at *primary application points* on the main stream or a tributary (including volume flushes)
 - a. Complete standard effort below application point starting where the lampricide and water were mixed across the stream. Record on the data sheet that the survey was conducted below an application point.
2. Survey sites located at *boost application points* on the main stream or a tributary
 - a. Complete half of the standard effort below application point starting where the lampricide and water were mixed across the stream. Record on the data sheet that the survey was conducted below an application point, and
 - b. Complete half of the standard effort above application point. Use a new data sheet. Record that the survey was not conducted below an application point.
 - c. Note that the site is a boost site in the comments section of both data sheets (DFO).
3. Survey sites located *elsewhere*
 - a. Complete standard effort above point of access. Record on the data sheet that the survey was not conducted below an application point, or
 - b. Complete standard effort below point of access. Record on the data sheet that the survey was not conducted below an application point, or
 - c. Complete half of the standard effort above and below the point of access. Record on the data sheet that the survey was not conducted below an application point.

E. Survey Timing

1. Surveys are to be completed as soon as possible but within 24 hours after the lampricide concentration drops below MLC at the survey site.

F. Standard Effort

1. The standard effort allocated at each survey site is 0.5 person hours (30 minutes) of active surveying. This is a required minimum time for nontarget surveys. Additional active survey time is typically not justified but may be increased in certain instances by 0.1 person hour (6 minute) increments.
2. Active surveying is looking in the water while wading in, boating over or walking along the edge of the stream with a scap net and a bucket in order to collect nontarget mortalities for identification after the active surveying period. Personnel also observe and take note of live fish as to number and condition as well as species (if possible without causing undue stress – do not scap or otherwise disrupt fish, especially sick fish). Record observations on the data sheet.

3. Active surveying time and an estimate of the length of stream surveyed are recorded on the data sheet.
4. Native and sea lampreys are not included in active surveying.
5. Additional survey types or biological collections (see section II, III) for sea lamprey mortality or other purposes conducted at nontarget sites should be noted and recorded on a separate data sheet. Time devoted to other survey types is independent of standard effort.

G. Personnel Requirements

1. Personnel must have training and competence in fish identification and/or in using fish keys or dead fish should be brought back to supervisors or a fish identification expert for identification.
2. A two-person crew is preferable to deliver this procedure when they are working away from the rest of the crew in remote locations.

H. Specimen Identification and Preservation

1. Fish are identified to species with the aid of fish identification keys.
2. Non-fish species are identified to Order at a minimum.
3. Specimens are preserved for laboratory identification when they cannot be appropriately identified.
4. In cooperation with the Lake Sturgeon Rehabilitation Program, sea lamprey field personnel will preserve any lake sturgeon specimens collected in state of Michigan waters when time and resources permit.
 - a. Record total length and weight of each fish, and the date and location of collection.
 - b. Temporary storage: Place specimens and specimen information in appropriately sized plastic bags (one specimen per bag). Place bags on ice in an insulated cooler.
 - c. Long term storage: Store bagged specimens (as above) in a freezer.
 - d. Treatment supervisors coordinate with Michigan Department of Natural Resources (DNR) staff to:
 - 1) transfer specimens to DNR biologists or enforcement staff onsite during or immediately after a lampricide treatment, or
 - 2) transfer specimens to DNR biologists or enforcement staff after returning to the field station.
5. For any other organism(s) of interest, consult with the treatment supervisor or representatives of relevant jurisdiction or group for procedures.

I. Data Recording

1. Data is recorded on Non-Target Assessment Survey Form (DFO) or a Treatment Collection Form (USFWS) contained in Appendix K of this manual. Completion of the Mudpuppy Catch Table (Appendix K) is optional and may be used at supervisory discretion to document additional details regarding mudpuppy (*Necturus maculosus*) catch in conjunction with DFO and USFWS forms.
2. Survey results including the extent of the survey and species observed should be

recorded in the treatment summary.

3. USFWS data is maintained electronically by survey site in the USFWS SLCP Information System.
4. If a nontarget survey is not able to be completed for a treated stream, a justification is given in the treatment summary.

II. Chemical Treatment Surveys

A typical goal of a chemical treatment survey is to document treatment effectiveness at a site by documenting lamprey mortality. Field personnel document sea lamprey or nontarget mortality observed while conducting other treatment related activities on the stream. The amount of survey effort for chemical treatment surveys is not standardized. Chemical treatment surveys are often timed when the lampricide block is at the site whereas nontarget surveys always occur after the lampricide concentration drops below MLC at the site. **Treatment supervisors direct field personnel not to collect fish at nontarget survey sites during chemical treatment surveys or during other treatment related activities so as not to impact the results of nontarget surveys.**

A. Extent of Survey

1. The treatment supervisor defines areas where chemical treatment surveys could provide relevant information about the treatment. Informational needs or requirements for supplemental applications define the extent, the number and location of survey sites and the effort. Personnel performing primary or supplemental applications of lampricides are often well positioned to conduct chemical treatment surveys.

B. Site Selection

1. Site selection is targeted to areas of interest, usually with the goal of verifying that an effective lampricide block was achieved at the site or to assess areas of historical significance (e.g. sites where nontarget mortality was documented previously). Examples include:
 - a. upstream of a boost application point;
 - b. downstream of a primary or boost application point;
 - c. sites below the junction of tributaries;
 - d. pooling areas immediately downstream of application points.
2. When chemical treatment surveys are conducted in conjunction with supplemental applications, sites are below the application points. Examples include:
 - a. main river below main application point;
 - b. tributaries treated for infestation;
 - c. back eddies, oxbows, embayments;
 - d. surveys in other types of pooling areas immediately downstream of application points.

C. Survey Timing, Effort, Personnel, Specimen Identification and Preservation

1. Timing, effort, specimen identification and preservation are not standardized and are at the discretion of the treatment supervisor or application personnel as

directed by the treatment supervisor.

2. Personnel have training and competence in lamprey identification.

D. Data Recording

1. Data is recorded on a Treatment Collection Form (USFWS) or Secondary Application Forms (DFO) contained in Appendix K of this manual. Completion of the Mudpuppy Catch Table (Appendix K) is optional and may be used at supervisory discretion to document additional details regarding mudpuppy (*Necturus maculosus*) catch in conjunction with DFO and USFWS forms.
2. USFWS data is maintained electronically by survey site in the USFWS SLCP Information System

III. Biological Collections

- A. Sea lamprey control agents occasionally collect specimens of aquatic organisms (usually lamprey) for researchers and other program partners. The requirements of these collections are highly specialized and may or may not be standardized. Biological collections can occur in conjunction with a nontarget or chemical treatment survey but should not impact the amount of standard effort devoted to a nontarget survey. Biological collections of sea lamprey to be used in standard toxicity tests should only occur prior to treatment.

REFERENCES:

This procedure has been reviewed and approved by the undersigned representatives of the U.S. Fish and Wildlife Service and Fisheries and Oceans Canada.

REVIEWED/APPROVED _____ DATE _____
Field Supervisor (U.S.)

REVIEWED/APPROVED _____ DATE _____
Program Manager (Canada)

TOP 029.21

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Revision No.	Date	Person(s) Responsible	Description
29.2	2/15/2023	Chris Eilers, Chris Gagnon, Christina Carter	Minor wording changes
29.21	1/30/2026	Lo Freitas	Addition of mudpuppy catch table