

**TOP:011.6B/US**

February 1, 2016

U.S. Fish and Wildlife Service  
Marquette Biological Station  
3090 Wright Street  
Marquette, Michigan 49855  
U.S.A.

and

U.S. Fish and Wildlife Service  
Ludington Biological Station  
229 South Jebavy Drive  
Ludington, Michigan 49431  
U.S.A.

and

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

## **TECHNICAL OPERATING PROCEDURE**

### **PROCEDURE TITLE:**

Procedures for Protecting Populations of State -Listed Endangered and Threatened Species During Lampricide Treatments.

### **APPLICABILITY:**

Protocol applies to treatment of waters with known populations of state-listed endangered and threatened species.

### **PRINCIPLE:**

To protect state-listed endangered and threatened species during applications of lampricides.

### **SAMPLE COLLECTION AND PRESERVATION:**

Not applicable

### **EQUIPMENT REQUIRED:**

Not applicable

### **POTENTIAL INTERFERENCES:**

Not applicable

### **SAFETY:**

Not applicable

**DISPOSAL:**

Not applicable

**REAGENTS:**

Not applicable

**PROCEDURES:**

**INTRODUCTION**

State-listed endangered and threatened species exist in and near streams of North America. The Sea Lamprey Control Program (SLCP) consults with state agencies in the eight states bordering the Great Lakes each year to identify streams that support populations of state-listed species where lampricide treatments are proposed.

Actions will be taken to minimize the effect of SLCP activities to state-listed endangered and threatened species (e.g. Lake Sturgeon – see Attachment 1). If a lampricide treatment is required in a stream in which a state-listed species is known to exist, the following will be initiated:

- I. Consultation will be initiated between the SLCP (Risk Management Team Leader and Larval Unit Supervisor) and the endangered species program of the state in which the scheduled treatment is located to discuss and to negotiate:
  - A. Selection of a treatment scenario that minimizes risk to the species.
  - B. Adoption of a treatment schedule for application at a time when the species is least vulnerable.
  - C. Application for an incidental take permit through the appropriate regulatory agency.
  - D. Election not to apply lampricides.
  - E. Conducting toxicity tests with lampricides (TFM and/or a combination of TFM and Bayluscide) on certain life stages of:
    1. a surrogate species if a suitable substitute exists and is available in sufficient numbers
    - or*
    2. the listed species if available in sufficient numbers from areas in which the species is not listed.
- II. The following protocols will be distributed annually to all field personnel involved in the treatment of streams:
  - A. *Protocol to Protect and Avoid Disturbance to Federal and State-Listed Endangered, Threatened, Candidate, Proposed, or Special Concern Species and Critical or Proposed Critical Habitats in or near Great Lakes Streams Scheduled for Lampricide Treatments in the United States*
  - B. *Protocol to Protect and Avoid Disturbance to Federal and State-Listed Endangered, Threatened, Candidate, Proposed, or Special Concern Species and Critical or Proposed Critical Habitats in or near Great Lakes Streams Scheduled for Granular Bayluscide Assessments in the United States*

**REFERENCES:**

State Endangered Species Acts.

---

This procedure has been reviewed and approved by the undersigned representative of the U.S. Fish and Wildlife Service.

REVIEWED/APPROVED Aaron P. Woldt      DATE 04/08/2016  
Field Supervisor (U.S.)

# TOP:011B – Attachment 1

(edited March 2015)

## History of Lake Sturgeon Specific Lampricide Treatment Protocol

The Great Lakes are the center of the historic range for lake sturgeon (*Acipenser fulvescens*). Populations of lake sturgeon across the basin have declined substantially since the late 1800s due to exploitation and degradation of habitat (Hayes and Caroffino, 2012). Lake sturgeon is listed as endangered in Illinois, Indiana, Ohio, and Pennsylvania, threatened in Michigan, New York, and Ontario, and as a species of special concern in Minnesota and Wisconsin. Lake sturgeon is not currently listed as an endangered, threatened, or candidate species by the Federal governments of Canada or the United States. A Lake Sturgeon Rehabilitation Program is conducted by the state of Michigan (Hayes and Caroffino, 2012) and the Little River Band of Ottawa Indians (LRBOI, 2008) in conjunction with the US Fish and Wildlife Service, Green Bay Fish and Wildlife Conservation Office.

Lampricide treatments have occurred in streams where lake sturgeon spawn throughout the 50 year history of sea lamprey control in the Great Lakes. On-site bioassays conducted in 1989, 1993 and 1994 on the Sturgeon River, (Baraga County, Michigan) raised concern about lake sturgeon mortality during lampricide treatments (Johnson et al. 1999). As a result, an interim lake sturgeon treatment protocol was established which limited maximum TFM treatment concentrations to 1.3 times the minimum lethal concentration (MLC; based on the pH and total alkalinity of the stream water). The TFM/Bayluscide lampricide mixture was not included in the treatment protocol at this time due to a lack of toxicity data.

Laboratory toxicity bioassays conducted in 1998 at the Upper Midwest Environmental Sciences Center (UMESC) defined the no observable mortality concentrations for large young-of-year lake sturgeon exposed to TFM or TFM/Bayluscide (Boogaard et al., 2003). Results indicated that the TFM/ 1% Bayluscide mixture was less toxic to age 0 lake sturgeon than TFM alone and that larger lake sturgeon were less susceptible to lampricide toxicity. The first draft of this lake sturgeon protocol instituted in 1999 stipulated for sturgeon streams that (1) lampricide treatment concentrations be limited to 1.2 times MLC for TFM/1% Bayluscide mixture and 1.0 times MLC for TFM alone and (2) lampricide treatments occur after August 1, allowing lake sturgeon time to grow to a larger size.

Between 1999 and 2005, agents of the Sea Lamprey Control Program determined that the lampricide concentration limits set by the lake sturgeon protocol were resulting in reduced lampricide treatment effectiveness on several high producing sea lamprey streams. An exception was added to the protocol in 2005 which permitted treatment concentrations up to the demonstrated lake sturgeon LC25 in circumstances where adequate control could not be achieved otherwise. In 2006, the concentration portion of the lake sturgeon protocol was suspended indefinitely due to increased evidence that concentration limitations were significantly reducing treatment effectiveness and impairing sea lamprey control. Recognition that suspension of the concentration portion of the lake sturgeon protocol resulted in a procedures that were not significantly different from the more general “Procedures for Protecting Populations of State-Listed Endangered and Threatened Species During Lampricide Treatments” led to removal of the “Protocol for Application of Lampricides to Streams with Populations of Young-of-Year Lake Sturgeon (*Acipenser fulvescens*)” (then TOP:011.xA) from the Standard Operating Procedures. It is important to note that removal of TOP:011.xA in 2015 did not result in any operational change to the existing approach used to treat streams with populations of young of the year lake sturgeon.

Studies on lampricide toxicity to lake sturgeon are continuing in order to better inform agents and partners about the effects of lampricide treatments to lake sturgeon. A series of stream-side bioassays and in situ exposures of lake sturgeon to TFM were conducted in Great Lakes streams during 2011 and 2012 (Pratt, 2013). Results indicated that (1) lake sturgeon survival is higher during field treatments than previous lab studies predicted and (2) lake sturgeon survival is lower in higher alkalinity streams. Preliminary results of laboratory studies conducted at UMESC between 2012 and 2014 (Boogaard, unpublished) indicate that age 0 lake sturgeon mortality is less likely in low alkalinity streams where lake sturgeon are around 100 mm in length or larger. Additional laboratory experiments examining the effect of alkalinity on TFM/ 1% Bayluscide toxicity to lake sturgeon are forthcoming.

The legacy effects of lampricide treatments on lake sturgeon and the effect of adult sea lamprey wounding on adult lake sturgeon are largely unknown. The Sea Lamprey Control Program continues to take actions to protect lake sturgeon during lampricide treatments and reduced lamprey numbers throughout the Great Lakes basin likely have beneficial effects for lake sturgeon populations. Improvements in stream treatment techniques have significantly reduced the amount of lampricide required to control sea lamprey which results in decreased lampricide exposure of non-target species, including lake sturgeon. Research into alternative treatment strategies that might further protect lake sturgeon during treatments is ongoing. A successful alternative treatment approach must ensure effective sea lamprey control.

#### References:

- Boogaard, M.A., Bills, T.D., and Johnson, D.A. 2003. Acute Toxicity of TFM and a TFM/Niclosamide Mixture to Selected Species of Fish, Including Lake Sturgeon (*Acipenser fulvescens*) and Mudpuppies (*Necturus maculosus*), in Laboratory and Field Exposures. *Journal of Great Lakes Research* 29, Supplement 1, 529–541.
- Hay-Chmielewski, E. M., and G. E. Whelan, editors. 1997. Lake sturgeon rehabilitation strategy. Michigan Department of Natural Resources, Special Report 18, Ann Arbor, MI.
- Hayes, D. B., and D. C. Caroffino, editors. 2012. Michigan's lake sturgeon rehabilitation strategy. Michigan Department of Natural Resources, Fisheries Special Report 62, Lansing.
- Johnson, D.A., Weisser, J.W., and Bills, T.D. 1999. Sensitivity of lake sturgeon (*Acipenser fulvescens*) to the lampricide 3-triflouromethyl-4-nitrophenol (TFM) in field and laboratory exposures. Great Lakes Fishery Commission, Technical Report 62. Ann Arbor, MI.
- LRBOI (Little River Band of Ottawa Indians). 2008. Nmé (Lake Sturgeon) Stewardship Plan for the Big Manistee River and 1836 Reservation. Natural Resources Department, Special Report 1, Manistee.
- Pratt, T.C., O'Connor, L.M., Steeves, T.B., Stephens, B.E., Boogaard, M.A., and Kaye, C.A. 2013. *In Situ* Assessment of Lampricide Toxicity to Age-0 Lake Sturgeon. Great Lakes Fishery Commission, Project Completion Report. Ann Arbor, MI.