VERMONT

Agency of Natural Resources

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Endangered & Threatened Species Takings Permit

Statutory Authority: 10 V.S.A. Section 5408

1. Permittee:
US Fish and Wildlife Service
Lake Champlain Fish and Wildlife Resource Offices
11 Lincoln St.
Essex Junction, VT 05452
802.872.0629 x12
dave_tilton@fws.gov

2. Permit Period
Effective Date: 9/10/2013
Expiration Date: 9/9/2014
Authorization #EH-2013-15
Amendment # 0

3. Principal Officer: Dave Tilton

4 .Subpermittee(s):
Lake Champlain Fish and Wildlife Management Cooperative Interagency sea lamprey control team (Staff from VT Fish and Wildlife Dept., NY State DEC, and the US Fish and Wildlife Service). Contact: Michael Calloway, 802.872.0629 x18 or 662.361.8656, michael_calloway@fws.gov

5. Authorized Species:

Common Name	Scientific Name
cylindrical papershell	*Anodontoides ferrusacianus*

6. Authorized Activity:
Application of the lampricide TFM-HP and TFM-Bar for Stone Bridge Brook, VT to control larval sea lamprey (*Petromyzon marinus*).

7. Location Where Authorized Activity May Be Conducted:
Stone Bridge Brook in the Town of Milton at Lake Road downstream to the mouth.

8. Findings

General

A. The Permittee is seeking an Endangered and Threatened Species Taking Permit under 10 V.S.A. § 5408 to authorize aquatic pesticide application to the Stone Bridge Brook to control larval sea lamprey (*Petromyzon marinus*). Stone Bridge Brook was previously treated with lampricide in 1991.

B. The sea lamprey is a fish that parasitizes other fish, scarring or killing its host. A substantial body of information collected by the Permittee and others indicates that the sea lamprey is depressing coldwater and some warm water fisheries in Lake Champlain. The negative impacts of sea lamprey parasitism have been documented in the Great Lakes where sea lamprey control programs have been in effect for more than 50 years.

C. The proposed lampricide treatment is part a long-term sea lamprey control program for Lake Champlain initiated by the Permittee, along with the Lake Champlain Fish

and Wildlife Management Cooperative, the New York State Department of Environmental Conservation, and the U.S. Fish and Wildlife Service in 2002. This program was developed in response to an eight-year experimental sea lamprey control program conducted on Lake Champlain between 1990 and 1997. The experimental program demonstrated the efficacy of the lampricide TFM in effectively reducing numbers of sea lamprey to levels resulting in significant improvement in salmonid survival and fishing quality in Lake Champlain. A primary goal of the long-term sea lamprey control program is to prevent the economic harm from sea lamprey parasitism as well as to enhance the propagation of salmonid and other fisheries in Lake Champlain.

D. The Stone Bridge Brook system is one of 23 Lake Champlain tributaries in Vermont, New York and Quebec that are a source of sea lamprey production. Using quantitative assessment sampling (QAS) protocols, the U.S. Fish and Wildlife Service estimated a larval sea lamprey population of 11,609 in 2011, including 466 transformers (See permit application Attachment 1). The QAS methodology identifies populations of consequence and provides fishery managers with data that can be judged in the context of other rivers in the basin. Experience from the Great Lakes sea lamprey control program has shown the importance of comprehensively controlling all sources of lamprey production in attaining the goal of reduced lamprey impacts on host fish species (See permit application Attachment 1).

Enhancement of the Propagation of Species

E. The Permittee states that the proposed lampricide treatment is necessary to enhance the propagation and restoration of native lake trout and landlocked Atlantic salmon populations in Lake Champlain and will also benefit other Lake Champlain fish species, including walleye, northern pike and the endangered lake sturgeon.

F. From the conclusion of the experimental sea lamprey control program in 1997 to the initiation of the long term program in 2002, the parasitic-phase sea lamprey population rebounded and lamprey wounding approached and exceeded pre-control levels. Wounding rates on Lake Champlain landlocked Atlantic salmon (*Salmo salar*) and lake trout continued to increase through the first five years of long-term control; however, substantial declines in wounding have been documented since 2007 (see Table 1 of permit application Attachment 1).

G. Program wounding rate objectives are 15 wounds per 100 salmon and 25 wounds per 100 lake trout (USFWS et al. 2001). The 2012 wounding rate for salmon in the Main Lake was 21 wounds per 100 fish. Salmon wounding rates in the inland sea and Mallets Bay declined slightly to 14 wounds per 100 fish. The 2012 wounding rate for lake trout in the Main Lake was 40 wounds per 100 fish. Walleye (*Sander vitreum*) 2012 wounding rates also continue to remain higher than the objective of 2 wounds per 100 fish at a rate of 3.9 per 100 fish (see Table 2 of permit application Attachment 1).

H. There is evidence indicating that comprehensive lampricide applications result in drops in wounding rates, and lower wounding rates correlate to healthier fish populations (see pages 4 and 6 of permit application Attachment 1).

Economic Impact

I. The Permittee also states that the sea lamprey control program, of which the proposed lampricide treatment is a part, provides substantial economic and recreational benefits to the Lake Champlain region. According to the documentation provided by Permittee, realization of the full benefits of sea lamprey control is estimated to have an annual economic impact of up to $42 million in fishing-related expenditures and $59 million including all water-based recreation expenditures. Thus, ineffective control or no control of sea lamprey will result in substantial economic losses, particularly in businesses significantly dependent on water-based recreation in the Lake Champlain region.

Non-Chemical Alternatives

J. Currently, the only non-chemical control alternatives proven effective in certain situations are construction of barriers to spawning-phase sea lamprey migration and spawning-phase sea lamprey trapping. The screening process to determine appropriate long-term control strategies for the Stone Bridge Brook determined that trapping should be attempted before lampricide application is used. However, the failure of trapping to sufficiently control the current sea lamprey ammocoetes population has led the Permittee to propose a TFM treatment, while continuing trapping activities. The Permittee states it will reassess the need for continued periodic lampricide treatments as future improvements in non-chemical control technologies are made.

Proposed Lampricide Treatment

K. The Permittee is proposing an aquatic pesticide treatment in the Stone Bridge Brook to control larval sea lamprey. As shown in Figure 2, the primary application point (AP) on the Stone Bridge Brook is at Lake Road. The treatment is proposed to occur September 4-December 1, 2013; or 2014 if a 2013 treatment is not conducted.

L. 3-Trifluoromethyl-4-nitrophenol (TFM) is being proposed for use in the Stone Bridge Brook. There are two proposed TFM products, TFM-HP (EPA Reg. No. 6704-45), a liquid formulation, and TFM Bar (EPA Reg. No. 6704-86), a 2 pound water-soluble solid bar formulation. The concentration of active ingredient in TFM-HP is equivalent to 33% TFM, and isopropanol, which is used as the solubilizer, is the primary inert ingredient. The concentration of active ingredient in TFM Bar is equivalent to 23% TFM. TFM-HP and TFM Bar are aquatic pesticides that are registered by the U.S. Environmental Protection Agency to control sea lamprey larvae in tributaries to the Great Lakes, the Finger Lakes, and Lake Champlain.

M. TFM Bars are used in supplemental applications on a limited basis in small tributaries (less than 3 cfs and water velocity of 0.3 to 0.5 ft/sec) entering treated streams, to block larval sea lamprey escapement into TFM-free water at tributary mouths. According to the product label, the bars are formulated to dissolve and

release the active ingredient at a constant rate in flowing water; bars will dissolve in approximately 8 to 10 hours at 17 °C and 10 to 12 hours at 12 °C in current velocities of 0.09 to 0.12 meters/sec. More rapid velocities will cause the bar to dissolve faster.

N. The Permittee is proposing to apply TFM Bars or TFM-HP at one supplemental application point just below Beebe Hill Rd on the Stone Bridge Brook (Figure 2), concurrent with passage of the mainstem lampricide block at those points.

O. Depending on results of 2013 surveys, TFM bars or a compact masterflex pump set up on the shoreline with TFM-HP may be used to treat fresh water inputs near the confluence with the mainstem to compensate for dilution in areas that could otherwise be used by the sea lamprey to escape the lampricide block. Locations will be provided to the Agency at least one month before the scheduled treatment date.

P. The Permittee is proposing to apply TFM for 12 consecutive hours to achieve a target in-stream lampricide concentration at the sampling station immediately downstream of the AP of no greater than 1.5 times the minimum lethal concentration to sea lamprey (1.5 x MLC). MLC is the concentration of lampricide that produces 99.9 percent mortality among sea lamprey larvae during a 9-hour exposure for a given water chemistry. The MLC will be determined by the results of an on-site toxicity test and diurnal stream pH and alkalinity analysis in the days prior to treatment. The MLC may be adjusted during treatment to compensate for shifts in pH or alkalinity that differ from pre-treatment conditions. A possible 14 hour treatment period will provide the Permittee with the opportunity to accommodate changes in flow, pH, and weather conditions to allow for the needed nine hour exposure time at 1.0 x MLC throughout the stream. The Permittee will treat at the lowest concentration and/or duration that will be expected to maintain a 9-hr lethal block (1.0 x MLC or greater) in all downstream areas, based on previous treatment experience, and stream flow, water chemistry, and weather conditions at the time of treatment.

Q. TFM-HP and TFM Bars are restricted-use pesticides. Persons applying these pesticides are required to follow the "Standard Operating Procedures for Application of Lampricides in the Great Lakes Fishery Commission's Integrated Management of Sea Lamprey Control Program" (hereinafter "SOP"). Specific application instructions and formulas for application rates are included in the SOP. The toxicity of lampricides varies depending on stream water pH and total alkalinity. Thus, the amount of lampricide applied and application rate is based on stream conditions at the time of treatment, including discharge and water chemistry.

Treatment Monitoring

R. The Permittee is proposing to use five water sampling stations on the Stone Bridge Brook, located as shown in Figure 2.

S. During lampricide application, water samples will be collected and analyzed every ½ hour at the most upstream sampling station to control the TFM application rate.

TFM concentrations will be monitored at least once every 2 hours at all downstream sampling stations, by hand or by deployment of automatic water samplers to assess concentrations and duration of the lampricide block passing each point.

T. Water chemistry samples will be collected at least once every 2 hours at each station during the periods that the lampricide block passes through each point (Figure 2). Adjustments will be made to the application rate and target concentration to compensate for unexpected variation in pH and/or total alkalinity at Station 1 during the treatment. Water chemistry will be monitored at stations with automatic water samplers using pH/temperature data recorders; samples will be analyzed for total alkalinity at least at the times of deployment and retrieval of the samplers and data recorders.

Post-Treatment Monitoring

U. To assess non-target mortality post-treatment, the Permittee is proposing that a crew will walk systematically pre-defined sections, comprising about 20% of the treated reaches of the Stone Bridge Brook, within approximately 36 hours after the lampricide block passes each section. These include sections immediately downstream of each primary AP, where the maximum lampricide concentrations and exposure durations are expected to occur. The crew will thoroughly inspect all visible river bottom areas of each section and record observations of non-target organism mortalities except lamprey.

V. All dead fish (excluding lamprey), amphibians, mussels and other large invertebrates encountered will be identified and enumerated, if possible. Other organisms not identified in the field will be collected, if possible, and retained for identification. Results of non-target mortality surveys will be submitted to the VT ANR by May 1 of the year following the treatment.

W. The Permittee is proposing to assess treatment effects on the Stone Bridge Brook lamprey populations by means of a QAS survey during the year following the year of treatment.

Risks to Listed Endangered or Threatened Species and Mitigation Measures

X. One state-listed endangered or threatened mussel is known to inhabit the reach of the Stone Bridge Brook proposed for lampricide application (see Section 5 above). There are no known state-listed endangered or threatened fish within Stone Bridge Brook.

Y. Two TFM toxicity tests conducted in 2006 on the cylindrical papershell indicate that the TFM no observed effect concentrations (NOEC) for this species is 2.3x MLC and 2.6 x MLC and the lowest observed effect concentration (LOEC) is 2.9 MLC and 3.2 x MLC .

Z. Additional TFM toxicity tests conducted on the juvenile and adult common eastern floater (*Pyganodon cataracta*) and eastern elliptio (*Elliptio complanata*) indicated that the TFM no observed effect concentration (NOEC) for these species was 1.6 x

MLC or greater. The lowest observed effect concentrations (LOEC's) in these tests ranged from 1.9 x MLC to >2.5 x MLC.

AA. A study is currently underway to determine the acute toxicity of TFM to selected life stages of the snuffbox mussel. Preliminary results of one week old mussels showed a 96.7% survival rate at 1.5 MLC and 93.5 % survival rate at 1.8 MLC.

Advice of the Endangered Species Committee

BB. On June 7, 2013, representatives from the Endangered Species Committee (ESC), Vermont Fish & Wildlife (VFW), and the Applicant (USFWS) met to discuss the 2013 application to treat the Stone Bridge Brook with TFM-HP and TFM bars, as well as continue previous conversations regarding long term implications stemming from the use of lampricide.

CC. ESC representatives requested USFWS update their non-target mortality tables with data from the last two treatments and that each year in the future they update and forward to the ESC copies of those updated tables after May 1.

DD. The ESC remains concerned about the high mortality of mudpuppies. There are no known records of mudpuppies in Stone Bridge Brook. If mudpuppy mortality is noted after treatment of Stone Bridge Brook, the ESC asked that USFW follow preservation protocols as outlined for the Lamoille River. This includes collecting dead mudpuppies in such a way that they could be sexed and age classed.

EE. On July 11, 2013, the ESC met to discuss final recommendations regarding the Stone Bridge Brook lampricide permit application. The ESC stated that they remain concerned that there continues to be a *"lack of information on long and short-term implications on non-target Threatened and Endangered (E&T) species."* However, the ESC applauded the efforts of the USFWS and the state ANR to meet with the ESC to work out continuing issues concerning the long-term effects of lampricides in the Lake Champlain ecosystem.

9. Statutory Determination

A. 10 V.S.A. § 5408(a) provides: "[A]fter obtaining the advice of the Endangered Species Committee, the Secretary may permit, under such terms and conditions as the Secretary may prescribe by rule any act otherwise prohibited by this chapter done for any of the following purposes: scientific purposes; to enhance the propagation or survival of a species; economic hardship; zoological exhibition, educational purposes; or special purposes consistent with the purposes of the federal Endangered Species Act."

B. The Permittee has requested an Endangered and Threatened Species Taking Permit for the following purpose: Enhance the Propagation of a Species and Economic Hardship.

C. The state of Vermont recognizes the value which plants, fish and wildlife in their

natural environment have for public enjoyment, ecological balance, and scientific study.

D. The state of Vermont recognizes the need for protection and preservation of these plants, fish and wildlife in their natural environment.

E. The General Assembly of Vermont intends that the species of wildlife and wild plants normally occurring within this state which may be found to be threatened or endangered within the state should be accorded protection as necessary to maintain and enhance their numbers.

F. The General Assembly of Vermont intends that the state should assist in the protection of species of wildlife and wild plants which are determined to be threatened or endangered elsewhere pursuant to the federal Endangered Species Act.

G. The General Assembly of Vermont intends to allow for the orderly development of Vermont without undue hardship being caused by the protections provided by the Threatened and Endangered Species Act by providing for the issuance of permits.

H. Pursuant to 10 V.S.A. § 5408(a), the ANR Secretary hereby determines, based upon the findings detailed above and after receiving advice from the Endangered Species Committee, that the proposed activity is consistent the purposes of the 10 V.S.A. Chapter 123. An Endangered and Threatened Species Takings Permit is authorized as conditioned below.

10. General Permit Conditions

A. The general conditions set out in 10 V.S.A. Chapter 123 are hereby incorporated into this permit. All activities authorized by this permit shall be carried out in accordance with, and for the purposes described in, the application. The continued validity of this permit is subject to the complete and timely compliance with all applicable conditions and the filing of all required information.

B. The validity of this permit is expressly conditioned upon compliance with all applicable federal, state and local laws, regulations, and permits.

C. By acceptance of this permit, the Permittee and its heirs, successors and assigns agree to provide the Agency with unrestricted access, at reasonable times, to the property covered by this permit for the purposes of monitoring and managing the populations of state-listed species, and otherwise ensuring compliance with this permit and with the Endangered and Threatened Species Law.

D. The permit is valid for use by the named Permittee and Subpermittee only. Transfer of the permit shall require prior written authorization of the Secretary.

E. The Agency maintains continuing jurisdiction over this project and may at any time modify, suspend, revoke, or terminate this permit upon a finding of good cause, or order the Permittee to undertake remedial measures if necessary to ensure the protection and conservation of endangered or threatened species at the location of the permitted activity.

11. Specific Permit Conditions

A. The Permittee is authorized to use TFM-HP (EPA Reg. No. 6704-45) and TFM-Bar (EPAReg. No. 6704-86) Sea Lamprey Larvicide, in one concurrent treatment of Stone Bridge Brook, in the Town of Milton, downstream of Lake Road. The treatment shall only occur after Labor Day (September 2nd) and prior to December 1st of 2013 or between the same dates in 2014 if the treatment is not performed in 2013.

B. The specific products used, TFM-HP and TFM-Bar, must be registered with the U.S. Environmental Protection Agency and the Vermont Agency of Agriculture, Food and Markets for use in Vermont at the time of the treatment. All products shall be handled, applied, and disposed of in full conformance with all label requirements and state and federal regulations in effect at the time of the treatment.

C. The Permittee will be allowed a primary application of TFM at Lake Road and a supplemental introduction of TFM at Beebe Hill Road to boost the TFM concentration to desired levels.

D. The Permittee may conduct applications using TFM-Bar (solid formulation) in up to 5 small tributaries to Stone Bridge Brook. Locations of application points on the stream will be submitted to the Agency no less than one month prior to application. Applications shall be conducted in strict accordance with procedures in the permit application and Standard operating procedures for *Application of Lampricides in the Great Lakes Fisheries Commission's Integrated Management of Sea Lamprey (Petromyzon marinus) Program* (Adair and Sullivan 2006).

E. No treatment shall occur in Stone Bridge Brook unless the surface elevation of Lake Champlain on the day of treatment is at or below 98 feet NGVD as measured at the permanent U.S.G.S. gauging station located at Burlington, Vermont.

F. Treatment shall only occur in Stone Bridge Brook when the measured flow rate on the day of treatment is between 2 cfs and 12 cfs.

G. The Permittee shall conduct the treatment at the concentration that will be expected to maintain a 9-hr lethal block (1.0 x MLC or greater) in all downstream areas and that will not exceed a target in-stream lampricide concentration at the upstream-most sampling site below the proposed application point of 1.5 times the minimum lethal concentration to sea lamprey (1.5 x MLC), as determined by an on-site toxicity test conducted on or after September 1 of the year of the treatment.

H. The Permittee shall introduce TFM-HP for the shortest duration that will be expected to maintain a 9-hr lethal block (1.0 x MLC) in all downstream areas and shall not introduce such lampricide for longer than 14 hours.

I. The Permittee shall collect and analyze water samples from sampling stations in accordance with the sampling station locations, parameters, methods and sampling

frequencies outlined in the In-stream TFM Monitoring section of Attachment 1 of the Endangered and Threatened Species Takings Permit Application.

J. Except for samples collected for water use advisory purposes, the Permittee shall determine TFM concentrations with analytical instruments accurate to within 0.1 parts per million.

K. During the first two scheduled sampling times, the Permittee shall take samples at the upstream-most sampling station below the Lake Road primary application and below the Beebe Hill Road supplementary boost application from one-quarter, one-half and three-quarters of the distance across the treated section of each river. If sample analyses demonstrate that TFM concentrations are uniform across the river (the near shore measurements are within 0.1 parts per million TFM of the midstream measurement), the Permittee may collect future samples from one location only. If TFM concentrations are not uniform, the Permittee shall take three samples across the river at future scheduled sampling times until the results indicate that the concentrations are uniform, at which time subsequent sampling may be conducted at one location only.

L. If during the permitted treatment, the TFM concentration from a single river sample at the most upstream sampling station exceeds the authorized target TFM concentration (defined in condition G. above) by a factor of 0.1x MLC (i.e. 1.6 x MLC) or more, the Permittee shall adjust the TFM feed rate downward to reduce the TFM feed rate until the in-stream TFM concentration no longer exceeds the authorized target concentration.

M. The Permittee shall conduct the Stone Bridge Brook TFM treatment in compliance with all of the requirements established in the following documents:

Standard Operating Procedures for Application of Lampricides in the Great Lakes Fishery Commission Integrated Management of Sea Lamprey (Petromyzon marinus) Control Program Sea Lamprey Control, Marquette, Michigan. Special Report 92-001.4. (Adair and Sullivan 2006);

Contingency Plan for Accidental Spillage of Lampricides During Lake Champlain Sea Lamprey Control Operations (2011);

N. If the authorized treatment in Stone Bridge Brook is delayed until 2014, the Permittee shall submit any new research findings or other factual information not previously available pertaining to effects of lampricides on any of the species covered by this permit as soon as possible but no later than 30 days prior to treatment in 2014.

O. The Permittee shall conduct a post-treatment survey in the treated reaches of Stone Bridge Brook to estimate abundance of sea lamprey and other lamprey species using the standard Quantitative Assessment Sampling (QAS) methodology within one year after treatment. The results of the survey shall be submitted to the Agency within six months of completion of the survey.

P. A post-treatment mortality assessment will be conducted in accordance with the SOP and as defined in the Aquatic Nuisance Control (ANC) Permit #2013-C01. Post-treatment mortality assessment crews will walk systematically pre-defined sections of each treated stream reach within 36 hours of the lampricide block passage. All visible river-bottom in each section will be inspected and observations of non-target organism mortalities except lamprey will be recorded. Non-target assessment sections comprise about 20% of the treated reaches and are defined based on the locations of USFWS sea lamprey QAS transects as follows: One section will start immediately below each lampricide application point; equal in length to the distance between two transects. Four additional sections will be assessed on each stream reach between transects 3-4, 9-10, 15-16, and 21-22. Results of non-target mortality surveys will be submitted to the VT ANR by May 1 of the year following the treatment. The post-treatment QAS survey results will be submitted by December 31 of the year following the year of treatment.

Q. USFWS will preserve any dead specimens of listed species that are collected according to the protocol worked out with the following scientists during 2012:

Mussels – Mark Ferguson

R. The Permittee shall submit a final lampricide treatment report to the Agency by May 1 of the year following treatment. The report shall include at a minimum: (1) batch numbers and quantity used of TFM-HP, TFM-Bar (if used); (2) the results from the onsite toxicity test and MLC determination; (3) the treatment duration; (4) all raw data from pre-, during and post-treatment water chemistry monitoring; (5) river discharge records; (6) non-target, non-lamprey post-treatment mortality counts; and (7) a summary of the day-of-treatment activities. In the event that conditions warrant introduction of lampricide for a period of time exceeding 12 consecutive hours but not longer than 14 consecutive hours, the Permittee shall also include in the report documentation justifying the need for lampricide introduction in excess of 12 consecutive hours.

Issued by: _____ Date: 9-9-13

Deb Markowitz, Secretary
Agency of Natural Resources

Appeal

If you wish to appeal this determination, please contact the Vermont Environmental Court. Appeals to that Court must be filed within 30 days of the date of an appealable decision. The appellant must attach to the Notice of Appeal the entry fee of $225.00, payable to the State of Vermont. The Notice of Appeal must specify the parties taking the appeal and the statutory provision under which each party claims party status; must designate the act or decision appealed from; must name the Environmental Court; and must be signed by the appellant or its attorney. The appeal must give the address or location and description of the property, project or facility with which the appeal is concerned and the name of the applicant or any permit involved in the

appeal. The appellant must also serve a copy of the Notice of Appeal in accordance with Rule 5(b)(4)(B) of the Vermont Rules for Environmental Court Proceedings. For more information, see the Vermont Rules for Environmental Court Proceedings, available online at www.vermontjudiciary.org. The address for the Court is 2418 Airport Road, Suite 1, Barre, Vermont 05641 (Tel. 802-828-1660).