Environmental Assessment

Addition of Hoisington Brook

to

A Long-Term Program of Sea Lamprey Control in Lake Champlain
Final Supplemental Environmental Impact Statement (August 2001)

Prepared July 2019 by the
U.S. Fish and Wildlife Service

as a member of the

Lake Champlain Fish and Wildlife Management Cooperative

U.S. Fish and Wildlife Service
Vermont Department of Fish and Wildlife
New York State Department of Environmental Conservation

Executive Summary

This environmental assessment (EA) addresses the proposed geographic expansion of the long-term sea lamprey control program (program) on Lake Champlain and is written pursuant to National Environmental Policy Act (NEPA) requirements.

After completing an Environmental Impact Statement (EIS; NYSDEC et al. 1990), the New York Department of Environmental Conservation, the Vermont Fish and Wildlife Department, and the U.S. Fish and Wildlife Service (USFWS), who collectively form the Lake Champlain Fish and Wildlife Management Cooperative (Cooperative), began controlling sea lamprey in 1990 as part of an eight-year experimental program. At the conclusion of the experimental program, the Cooperative conducted an extensive evaluation of the program's impacts on sea lamprey populations, the salmonid fisheries, forage fish populations, and the local economy (Lake Champlain Fisheries Technical Committee 1999). In 2001, the Cooperative prepared a Supplemental Environmental Impact Statement (SEIS), which outlined a long-term program of sea lamprey control for Lake Champlain (U.S. Fish and Wildlife Service et al. 2001). The long-term program included Lake Champlain tributaries and control strategies not originally included in the experimental program. Implementation of the long-term program is ongoing. In 2008 and 2017, the USFWS prepared EAs that added five additional tributaries to the sea lamprey control program (Bouffard 2008, Young 2017).

Since 1990, the Cooperative has conducted lampricide treatments on 20 tributaries to Lake Champlain. Lampricide has also been applied to five river deltas in New York where deep-water electrofishing surveys identified off-shore populations of sea lamprey. Non-chemical control methods (i.e. different types of trap-integrated barriers) are currently used on eight small streams. Trapping of spawning adult sea lamprey is a control method used where feasible and when state and provincial concerns preclude the use of lampricide. Trap-integrated barriers have been deployed at approximately a dozen other sites since 1990, but are no longer used at those locations because of their ineffectiveness. New trap-integrated barrier technologies are currently in development that will continue to enhance effectiveness and efficiency of trapping operations.

Despite the increased efforts and measurable improvements in the program to control sea lamprey, wounding rates on monitored host species remain high. For this reason, the Cooperative proposes to expand the sea lamprey control program to include an additional tributary and delta that provide habitat for an uncontrolled larval sea lamprey population discovered since the completion of the 2017 EA.

Alternatives considered

Alternative 1

(Proposed Action) - Expansion of the sea lamprey control program outlined in the SEIS[1]

This alternative increases the scope of the ongoing, long-term sea lamprey control program by adding Hoisington Brook and delta in Westport, New York. Recent population surveys documented sea lamprey larvae in this Lake Champlain tributary at numbers that warrant control. In 2018, USFWS fish biologists screened Hoisington Brook and its delta for technical feasibility and environmentally and socially acceptable control techniques. Section 3.1 outlines control strategies for each stream. Implementation of this alternative is expected to further reduce the parasitic sea lamprey population of Lake Champlain, increase the survival rates of all fish populations affected by sea lamprey parasitism, enhance Lake Champlain's sport-fisheries, and result in socio-economic benefits associated with these outcomes.

Alternative 2

(No Action) - Continue sea lamprey control program as outlined in the SEIS and subsequent EAs

This alternative would maintain sea lamprey control at its current geographic scope as outlined in the SEIS and subsequent EAs. Sea lamprey would remain uncontrolled in Hoisington Brook where they will continue to reproduce and contribute to the parasitic lamprey population of Lake Champlain. Taking No Action would mean wounding rates on host species could increase in response to this new source of uncontrolled sea lamprey production. No benefits to host species, sport-fisheries, or socio-economic gains would be realized.

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[1]The SEIS provides a detailed description of the environmental setting of Lake Champlain emphasizing water quality and basin characteristics, known sea lamprey distributions, and the human environment. It inventories state and federally listed endangered and threatened species and their habitats, and non-listed species of concern affected by ongoing sea lamprey control activities. Impacts to water, humans, wetlands, endangered and threatened species, plants, invertebrates, fish, amphibians, reptiles, birds, and mammals are discussed and mitigating measures are described. Unavoidable adverse impacts, beneficial impacts, irreversible and irretrievable commitments of resources, and growth-inducing impacts of long-term sea lamprey control are also discussed.

This EA is a tiered document (40 C F.R. §§1508.28 and 1502.20) which relies on the SEIS (U.S. Fish and Wildlife Service et al. 2001) and subsequent EAs (Bouffard 2008 and Young 2017). This evaluation of the proposed action for Hoisington Brook and its delta uses habitat and species assessment data in addition to information included in the SEIS. The SEIS and other supporting materials are available online at https://www.fws.gov/lcfwro/sealamprey/NEPA.html

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1. Purpose of Proposed Action

The purpose of this EA is to examine impacts associated with geographically expanding the sea lamprey control program. The purpose of the Proposed Action is to further reduce the Lake Champlain parasitic sea lamprey population by adding a recently colonized tributary not covered in the SEIS (U.S. Fish and Wildlife Service, et al. 2001). The experimental sea lamprey control program (1990-1998) and more recent long-term control (2008-2018) have provided benefits to the Lake Champlain fishery, the local economy, the aquatic ecosystem (Lake Champlain Fisheries Technical Committee 1999, Marsden et al. 2003). Over the last 10 years while sea lamprey control has suppressed wounding on host species, the fishery has responded with measurable increases in population size structure and angler satisfaction. Economic valuations have estimated a favorable 3.48:1 economic benefit:cost ratio generating upwards of a net $20 million for the basin (Gilbert 1999). Implementation of the Proposed Action would allow the Cooperative to deliver sea lamprey control to a new tributary where sea lamprey populations have expanded thereby enabling increased effort directed at the restoration of Lake Champlain fish communities.

2. Need for Proposed Action

Wounding rates on salmonids have dropped and approached goals set forth in the SEIS, but appear to have plateaued at a level that remains high (Figure 1). Currently, lampricide treatments are authorized on 19 tributaries and 5 deltas. Eight streams use trap-integrated barriers that block and capture migrating sea lamprey to prevent them from accessing suitable spawning habitat or redistributing to other habitats. During the development of the long-term program of sea lamprey control, target wounding rates were set for lake trout, landlocked Atlantic salmon (Table 1) and walleye. These targets were based on comparisons to wounding rates achieved in the Great Lakes sea lamprey control program, measured and achievable levels of host species survival and growth seen during the experimental program, and further reductions expected through increasing the scope of control efforts.

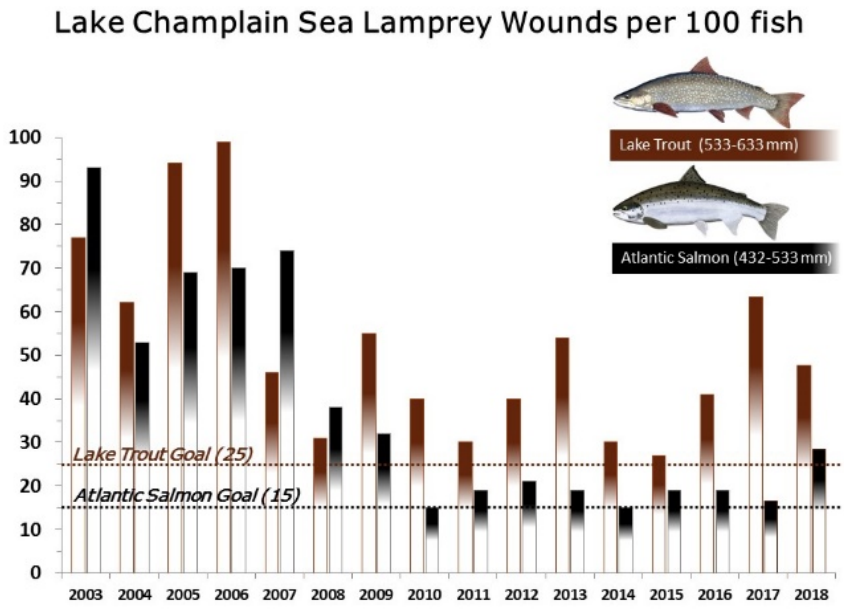

Figure 1. History of Lake Champlain lamprey wound monitoring on lake trout and Atlantic salmon.

Table 1. Sea lamprey wounding rates for Lake Champlain landlocked Atlantic salmon and Lake Trout: programmatic targets, historical extremes, and current status. Wounds per 100 fish have been rounded to the nearest whole number.

	Lamprey wounds per 100 fish			
Species	**Objective**	**Lowest**	**Highest**	**2018**
Lake trout	25	27 *(2015)*	99 *(2006)*	47
Landlocked salmon	15	15 *(2014)*	93 *(2003)*	28

Sea lamprey reproductive effort is geographically distributed among tributaries in response to the presence of sea lamprey larvae which are indicative of past reproductive success in a particular tributary. Adult sea lamprey do not home to their natal rivers (Bergstedt and Seelye 1995); instead, adult sea lamprey are attracted to pheromone odorants released by river-resident larvae (Vrieze et al. 2011) and are believed to select rivers where the detected presence of larvae indicates favorable spawning and larval rearing conditions. While most spawning adults return to rivers with established larval populations, straying into uncolonized tributaries does occur and can lead to populations becoming established in previously unoccupied rivers. The Proposed Action is needed to address a newly discovered uncontrolled larval population.

Sea lamprey control has been shown to contribute to the restoration of biological and ecological form and function. In the 1990s, the Great Lakes Fishery Commission declared success in rehabilitating lake trout populations in Lake Superior after more than 35 years of sea lamprey control. Subsequently, stocking was halted in most Lake Superior waters in 1996 (Heinrich et al. 2003). In Lake Champlain, record numbers and record sizes of Atlantic salmon have been seen by both anglers and fishery managers as survival and condition of this species have improved in response to sea lamprey control. The increased abundance of adult landlocked Atlantic salmon in spawning runs has resulted in documented successful natural reproduction in the Winooski River and Boquet River for the first time in over 150 years (USFWS, unpublished data).

Sea lamprey control in Lake Champlain benefits the lake-wide fish community. While few monitoring data exist for these less-preferred host species, native members of the fish community such as northern pike, burbot, whitefish walleye, catfishes, and basses are documented to be parasitized by sea lamprey and suffer unknown levels of mortality in response. The recent Lake Champlain Lake Sturgeon Recovery Plan attributes sea lamprey control and the reduction of lamprey-induced mortality on the Vermont state-endangered lake sturgeon as a critical step in sturgeon recovery and largely responsible for recent improvements in the Lake Champlain lake sturgeon population (MacKenzie 2016).

Sea lamprey control in the Great Lakes has produced dramatic improvements in the fishery and major economic benefits to the Great Lakes states' economy. Lupi et al. (2003) estimated that sea lamprey control on the St. Mary's River alone would equate to a $2.6 to $4.7 million dollar benefit to Michigan's recreational angling economy. The Congressional Office of Technology Assessment (OTA 1993) estimated that terminating sea lamprey control on the Great Lakes would result in a loss of $675 million annually due to lost fishing opportunities and indirect economic impacts. Sturtevant and Cangelosi (2000) estimated that sea lamprey control produced a benefit of $2.1 to $4.3 billion per year for the Great Lakes states.

Substantial economic benefits are also a factor in justifying sea lamprey control on Lake Champlain. Estimated benefits and costs of the eight-year experimental sea lamprey control program indicated a favorable benefit:cost ratio of 3.48:1. Continuation of sea lamprey control on Lake Champlain has been

estimated to generate up to an additional 1.2 million days of fishing and $42.2 million in fishing-related expenditures, as well as an estimated $59.3 million in additional water-based recreation expenditures each year (Gilbert 1999). More and larger sport fish with fewer attached lamprey and prominent lamprey scars provide socio-economic benefits as the result of increased angling satisfaction and effort. Emerging improvements in tributary fisheries for landlocked Atlantic salmon are a particularly unique and highly-prized opportunity for anglers without boats.

In addition to the above benefits, the Proposed Action responds to contingencies for expansion established in the long-term sea lamprey control program. SEIS, p. 324:

> *"In addition to the streams discussed in Section VIII.A above, several streams provide the potential for the establishment of additional sea lamprey populations (Table VIII-22). Alternative 1 (Proposed Action) recognizes the need for the program to be flexible in terms of the streams included for control. These streams should be periodically assessed for presence of larval sea lamprey infestations. Should new or previously undiscovered populations of sea lamprey be found, the stream will be subjected to sea lamprey control screening as described for the Proposed Action. Should inclusion into the sea lamprey control program be recommended, appropriate environmental review and permitting would be addressed prior to implementation of a control strategy."*

Studies in the Great Lakes show that a single sea lamprey-producing tributary, left untreated, can have a relatively large impact on the lake-wide population of sea lamprey (Wells 1980). For this reason, it is important that the Lake Champlain Sea Lamprey Control Program continues to monitor and adapt to the changing scope of tributary colonization as detected through regular surveys of larval lamprey populations in the basin.

3. Alternatives

3.1. Alternative 1 (Proposed Action)

Expansion of the sea lamprey control program outlined in the SEIS.

This alternative increases the scope of the ongoing, long-term sea lamprey control program by adding Hoisington Brook and delta in Westport, New York. Recent electrofishing surveys of larvae and spring trapping of migrating adults have both established the use and colonization of this tributary by sea lamprey and its need for control. In 2018, Hoisington Brook was screened for technical feasibility and environmentally and socially acceptable control techniques. Control strategies for each stream are outlined in section 3.1.1.1. Implementation of this alternative is expected to further reduce the parasitic sea lamprey population of Lake Champlain, increase the survival rates of all fish populations affected by sea lamprey parasitism, enhance Lake Champlain's sport-fisheries, and result in socio-economic benefits associated with these outcomes.
In the following sections, we analyze the potential control options based on technical feasibility, cost and impacts to non-target organisms, humans, and the environment. We have identified unique impacts of each control strategy on the stream proposed for inclusion. For a general discussion of impacts and proposed mitigation of various control options common to all streams, please refer to SEIS section VII.A (p.89-211).

3.1.1 Hoisington Brook and Delta

Sea lamprey habitat and population

Hoisington Brook (Figure 2) flows into Lake Champlain at Northwest Bay in the town of Westport, New York. Sea lamprey have access to approximately 0.26 km (0.16 mi) of stream from its confluence with Lake Champlain (44° 11.127'N, 73° 25.937'W) to a natural barrier near the Rte. 9N Bridge (44° 11.037'N, 73° 26.054'W). The relatively short portion of Hoisington Brook accessible to sea lamprey consists primarily of rubble/cobble substrate suitable for sea lamprey spawning. The preferred larval habitat for sea lamprey is located at or below the lake-influenced depositional zone. This includes the delta area adjacent to the mouth of the brook in Lake Champlain proper.

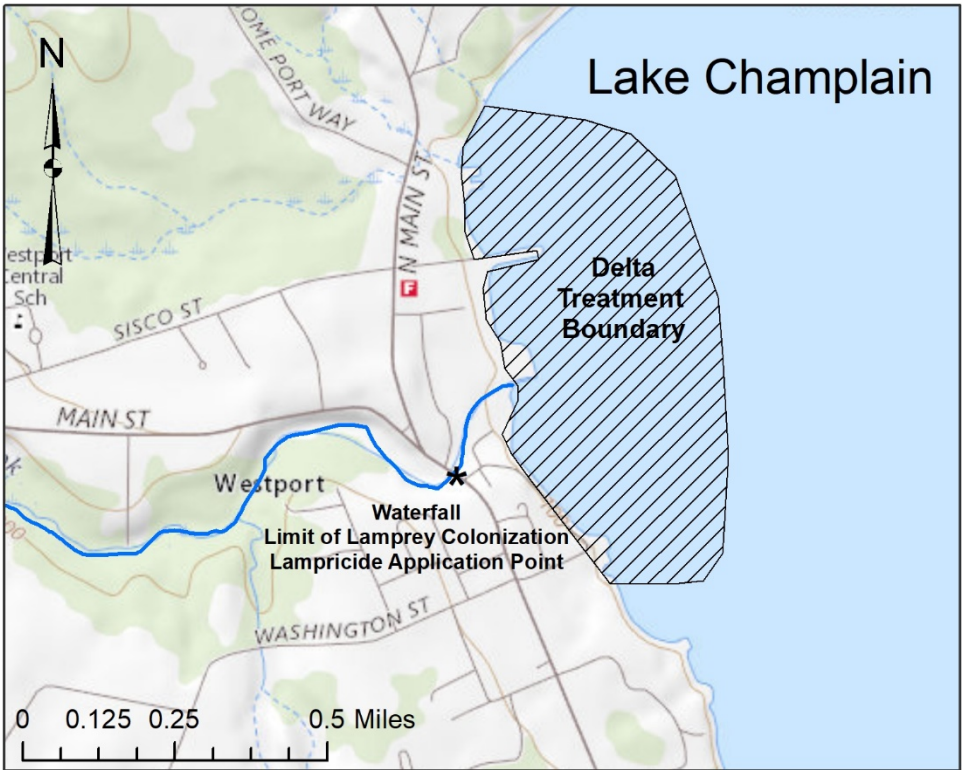

Figure 2. Map of proposed treatment boundaries on Hoisington Brook and Delta - Westport, New York.

Sea lamprey were first collected during a standard detection survey of Hoisington Brook in 2017. During that brief detection survey, 26 larval were collected of which three were transforming phase larvae, preparing to emigrate from the river that fall and recruit to the parasitic lake population. Ten were ages 1-3, stream-resident larvae and thirteen were young-of year larvae, hatched within the preceding 2-3 months. The presence of transforming larvae, 1-3 year old larvae, and young-of-year larval lamprey confirm the presence of multiple year classes and repeated successful spawning efforts in this tributary. Larval lamprey were found in areas immediately downstream of the waterfall and in the lake-influenced area near the confluence. As a result of this detection, experimental adult trapping was conducted in the spring of 2018 to document and assess the spawning run. Despite very poor trapping efficiency, adult trap catch in 2018 was 160 individuals. This was the highest catch among the eight tributaries where trapping was used as a control method that year. Given this large spawning run and the existing larval population, the USFWS expects a considerable number of juvenile parasitic lamprey to begin emigrating from Hoisington Brook in the coming years.

Control Options

For an explanation of the chemical structure, mode of action, properties, and different formulations of **TFM**: *3-trifluoromethyl, 4-nitrophenol* and **Niclosamide**: *5-Chloro-N-(2-chloro-4-nitrophenyl)-2-hydroxybenzamide,* please refer to pages 17-19 and Appendices B, C, and F of the SEIS.

TFM Treatment

- Technical considerations: Using TFM to treat Hoisington Brook would be a technically feasible control option based on its physical characteristics and relatively short length of lamprey-colonized habitat. Water chemistry analyses will be required prior to conducting a TFM treatment to determine the appropriate dose needed to eliminate sea lamprey larvae while minimizing effects on non-target species. A dye plume or plume modeling study may also be required prior to conducting a TFM treatment. There is no need for maintenance applications of lampricide to maintain target concentrations due to the short stream reach and lack of other tributary inflows.
- Non-target concerns: There are no known populations of federal or state listed (threatened or endangered) species in Hoisington Brook. The use of TFM will not result in new or additional non-target effects that have been previously considered, evaluated, permitted, and monitored during the history of the program.
- Human impacts: A TFM treatment may affect riparian landowners who draw water for domestic use from the stream or surrounding lakeshore area and any farms which use the affected water for irrigation of crops or watering livestock. Water-use advisories, notification of treatment to landowners, and provision of alternative water supplies for domestic and agricultural use will mitigate any adverse impacts. Water-use advisories for a Hoisington Brook TFM treatment would include the treated portion of the brook and may extend along the lakeshore up to a ½ mile in opposite directions from its mouth in Northwest Bay. In 2019, a detailed toxicity study was performed by an independent laboratory to determine the dose at which TFM showed evidence of health effects (Murphy and Goodnight 2019). The results of the study confirmed that current practices used to administer TFM are safe as specifically regulated by both the Vermont and New York State Departments of Health.
- Habitat impacts: There are no unique impacts that differ from those addressed in sections VII and VIII of the SEIS.
- Cost: A TFM treatment of Hoisington Brook would cost approximately $2,000 depending on the discharge and water chemistry at the time of treatment.

TFM/Niclosamide Treatment

- Technical considerations: The low discharge and short extent of Hoisington Brook present no opportunities for significant cost savings typically realized from combined TFM/Niclosamide treatments. These conditions would make a combination treatment technically complicated and challenging and therefore, susceptible to wider fluctuations in lethal concentrations than would result from a TFM-only treatment.

Bayluscide 3.2% granules

- Technical considerations: Bayluscide 3.2% granule application is appropriate for the Hoisington Brook delta. Deepwater electrofishing surveys will be conducted to identify areas of infestation. Bayluscide granules can be applied by boat to infested areas of the Hoisington Brook delta to eliminate larvae.
- Non-target concerns: No threatened or endangered species are known to exist within the treatment area of the Hoisington Brook delta. Therefore, no special measures are necessary and typical treatment protocol will be followed. The use of Bayluscide will not result in new or additional non-target effects that have been previously considered, evaluated, permitted, and monitored during the history of the program. See SEIS section VII.A.1 for additional information regarding non-target impacts and section VII.A.2. for standard mitigating measures.
- Human impacts: No unique impacts that differ from those addressed in SEIS section VII.A.1.b.
- Habitat impacts: No unique impacts that differ from those addressed in SEIS section VII.A.1.c.
- Cost: A Hoisington Brook delta treatment is similar in size and scope as the previously treated and nearby Mill Brook delta. Based on the Mill Brook delta treatments, the Hoisington Brook delta treatment would cost approximately $15,000.

Installation of Trap-Integrated Barrier

- Technical considerations: The extent of spawning habitat in relation to the mouth and fluctuating lake levels in the downstream sections of Hoisington Brook are not conducive to establishment of a sea lamprey trap-integrated barrier. High lake levels would allow lamprey to circumvent any barrier to reach suitable spawning habitat. A trap-integrated barrier is not proposed for use at this time.

3.1.1.1 Hoisington Brook and Delta Control Strategies

Technically feasible control strategies for Hoisington Brook and Delta include the use of lampricides in the form of TFM for stream treatments and granular Bayluscide for delta treatments. Under the current circumstances, the following sea lamprey control strategies are recommended:

1. Treat Hoisington Brook at river mile 0.16 with TFM every four years or as determined by routine assessment surveys. The treatment interval could be adjusted should assessment surveys indicate slow recolonization, early metamorphosis, or the relative success of experimental trapping efforts.
2. Treat Hoisington Delta with granular Bayluscide every four years as determined by routine assessment surveys. The treatment interval could be adjusted should assessment surveys indicate slow recolonization or early metamorphosis.

3.2. Alternative 2 (No Action)

Continue sea lamprey control program as outlined in the SEIS and Subsequent EA.

Selection of this No Action alternative would limit sea lamprey control to the streams currently included in the long-term sea lamprey control program as outlined in the SEIS and subsequent EA's. Future changes to the program (e.g. inclusion of other streams and/or control techniques) may still be considered following the appropriate environmental review in accordance with NEPA.

3.3. Alternative considered but dismissed

During the development of the long-term sea lamprey control program, a number of alternatives were either considered and dismissed (SEIS section V.D.), or deemed unacceptable (SEIS section V.E.). The evaluation of the applicability and acceptability of those alternatives has not changed. The following alternative was considered but dismissed during the development of a potentially expanded sea lamprey control program as outlined in the Proposed Action.

3.3.1. Abandon sea lamprey control

This alternative was deemed socially and ecologically unacceptable. Abandoning sea lamprey control while continuing salmonid restoration efforts provides limited to marginal opportunities for successfully achieving those goals. Efforts and funds directed toward the culture and stocking of Atlantic salmon and lake trout for the purpose of restoring those native species would no longer be justified considering the probability of success and the benefit:cost ratio. The goal of the Proposed Action is to achieve greater benefits from the sea lamprey control program. Abandoning both sea lamprey control and salmonid stocking was addressed in SEIS section V.D.1. This alternative was dismissed because of the favorable economic assessment of the experimental program, because it would be socially unacceptable, and because this management action would result in increased wounding and subsequent mortality of non-salmonid fishes.

3.4. Control techniques under development

3.4.1 Use of pheromones to control sea lamprey populations

Research into new sea lamprey control techniques such as the use of sea lamprey pheromones continues in the Great Lakes. Research is currently focused on identifying optimal scenarios for implementation of pheromones as a control measure. While this research is promising, techniques are still in the initial phases of development and testing. Prior to implementation of pheromone-mediated control, additional review and pesticide registration needs to take place. When and if pheromones become a feasible control technique, their use may reduce the sea lamprey control program's reliance on pesticides. Proper NEPA review will also be necessary before sea lamprey pheromones can be used for control on Lake Champlain.

4. Affected Environment

4.1. General Description

For a general description of the Lake Champlain Basin, please refer to SEIS section VI.A.

4.2. Lake Basins and Sea Lamprey-producing Tributaries

For a full description of all Lake Basins, including land use patterns, recreational activities, and water usage, please refer to SEIS section VI.B.

Hoisington Brook flows into the Main Lake Basin of Lake Champlain.

The methods currently being used by sea lamprey control program on Lake Champlain are shown on the map in Figure 3.

4.3. Human Resources

For a description of human resources, please refer to SEIS section IV.C.

4.4. Water Resources

For a description of water quality and water usage please refer to SEIS section IV.D.

4.5. Biological Resources

For a general description of the biological resources including wetlands, plants, invertebrates, fish, amphibians, reptiles, birds, and mammals, their protection status, and their potential for adverse impacts, please refer to SEIS, section VI.E. Table 2 lists the species of fish known to be present in the tributaries proposed in this EA for inclusion in the long-term sea lamprey control program (unpublished, New York State Department of Environmental Conversation survey collection data). One mussel survey was conducted at Hoisington Brook and found 2 species of commonly occurring mussels (Lyttle 1996). Table 3 provides information on mussel species presence and distribution in New York waters of Lake Champlain.

Table 2. Fish species known to be present in the reach accessible to sea lamprey in Hoisington Brook.

Common Name	Scientific Name
American eel	*Anguilla rostrata*
Atlantic salmon	*Salmo salar*
Blacknose dace	*Rhinichthys atratulus*
Bluntnose minnow	*Pimephales notatus*
Brown bullhead	*Ameiurus nebulosus*
Brown trout	*Salmo trutta*
Common shiner	*Luxilus cornutus*
Creek chub	*Semotilus atromaculatus*
Eastern silvery minnow	*Hybognathus regius*
Fallfish	*Semotilus corporalis*
Log perch	*Percina caprodes*
Longnose dace	*Rhinicthys cataractae*
Pumpkinseed	*Lepomis gibbosus*
Rainbow trout	*Oncorhynchus mykiss*
Spottail shiner	*Notropis hudsonius*
Tessellated darter	*Etheostoma olmstedi*
White sucker	*Catostomus commersonii*
Yellow perch	*Perca flavescens*

Table 3. Mussel species known to occur in New York tributaries to Lake Champlain.

Common Name	Scientific Name	Documented in Lake Champlain at mouth of Hoisington Brook	Present in NY tributaries adjacent to Hoisington Brook	Present in NY tributaries to Lake Champlain
Eastern elliptio	*Elliptio complanata*	X	X	X
Eastern lampmussel	*Lampsilis radiata*	X	X	X
Pocketbook mussel	*Lampsilis cardium*			X
Giant floater	*Pyganodon grandis*			X
Creeper (Squawfoot)	*Strophitus undulatus*		X	
Eastern floater	*Pyganodon cataracta*		X	X

Lake Champlain Sea Lamprey
Population Distribution and Control Methods

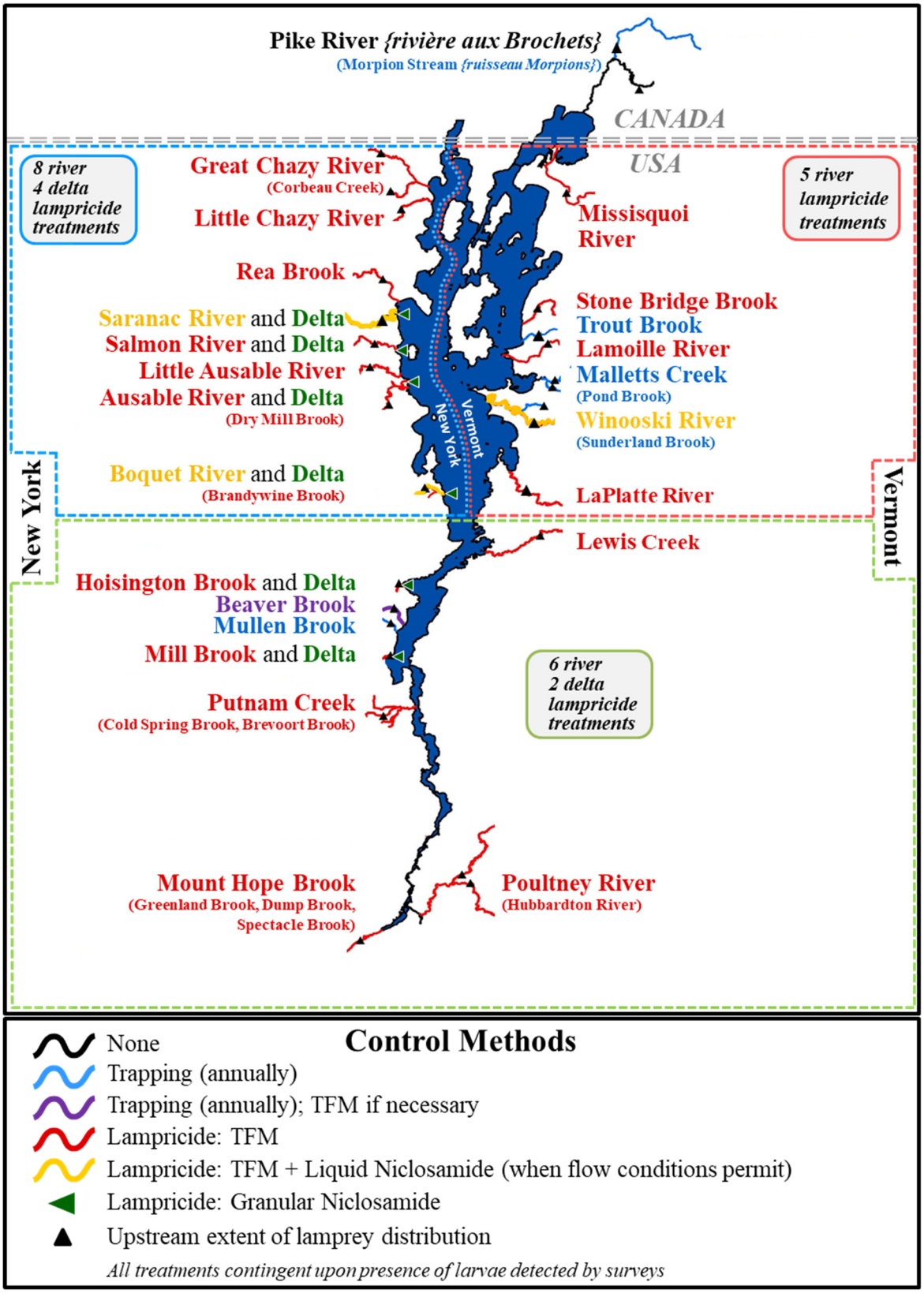

Figure 3. Current known populations of sea lamprey in Lake Champlain and the methods used to control them.

5. Environmental Consequences

5.1. Alternative 1 (Proposed Action)

Expansion of the sea lamprey control program outlined in the SEIS

5.1.1. Adverse Impacts

For a discussion of adverse impacts to water, humans, wetlands, threatened and endangered species, plants, invertebrates, fish, amphibians, reptiles, birds, mammals, and user conflicts related to Alternative 1, please refer to SEIS section VII.A.1 and the subsequent EAs section 5. The toxicity of lampricides to non-target aquatic organisms continues to be evaluated. Adverse impacts resulting from the implementation of Alternative 1 would be similar to those encountered under the current sea lamprey control program. Only spatial differences exist as sea lamprey control activities are carried out in new locations. A water use advisory for the stream and adjacent lakeshore areas would be issued, typical of all lampricide treatments in the Basin. Impacts to wetlands resulting from lampricide treatments (SEIS section VII.A.1.c.) would be limited to wetlands lying within areas influenced by Lake Champlain at lake levels below 102 feet or 31.1 meters in elevation.

5.1.2. Mitigating Measures

For a discussion of mitigating measures related to water, humans, wetlands, threatened and endangered species, plants, invertebrates, fish, amphibians, reptiles, birds, mammals, and user conflicts related to the long-term sea lamprey control program, please refer to SEIS section VII.A.2. No additional mitigating measures are required for the implementation of Alternative 1.

5.1.3. Unavoidable Adverse Impacts

For a discussion of unavoidable adverse impacts related to the long-term sea lamprey control program, please refer to SEIS section VII.A.3. Implementation of Alternative 1 would cause no additional adverse impacts beyond those identified in the SEIS.

5.1.4. Beneficial Impacts

For a discussion of beneficial impacts related to the long-term sea lamprey control program, please refer to SEIS section VII.A.4. Implementation of Alternative 1 would further enhance the beneficial impacts identified in the SEIS.

5.1.5. Irreversible and Irretrievable Commitments of Resources

For a discussion of irreversible and irretrievable commitments of resources related to the long-term sea lamprey control program, please refer to SEIS section VII.A.5. Implementation of Alternative 1 would cause no greater commitments of irreversible or irretrievable resources beyond those identified in the SEIS.

5.1.6. Growth Inducing Impacts

For a discussion of growth inducing impacts including types of growth, characterization of the Lake Champlain fisheries, ancillary growth, competition for growth, and infrastructure capacity related to the long-term sea lamprey control program, please refer to SEIS section VII.A.6. Implementation of Alternative 1 could potentially increase the growth related to Lake Champlain's fisheries.

5.2. Alternative 2 (No Action)

Continue sea lamprey control program as outlined in the SEIS.

5.2.1. Adverse Impacts

Under Alternative 2 there would be no adverse impacts to water quality, humans, or the flora and fauna of the stream identified in the Proposed Action. Adverse impacts to fish populations, sport fisheries, non-fishing related lake activities on Lake Champlain and derived economic benefits may result from the failure to control sea lamprey successfully. Sales of fishing licenses, fishing tackle, live bait, and services associated with the angling public may suffer declines under Alternative 2. Adverse impacts to the fishery may increase, despite no change in the level of control, because sea lamprey are capable of exploiting uncontrolled habitats at increasing rates over time.

5.2.2. Mitigating Measures

Adverse impacts identified under Alternative 2 could be partially mitigated by fisheries managers through a redirection of effort away from the salmonid fishery. If the effects of sea lamprey parasitism on the salmonid fishery increase, fishery management efforts may be reprioritized and directed toward fish species that are better able to survive among rising numbers of sea lamprey.

5.2.3. Unavoidable Adverse Impacts

Adverse impacts to fish populations, sport fisheries, non-fishing related lake activities on Lake Champlain, and derived economic benefits may result sea lamprey are not successfully controlled. Sales of fishing licenses, fishing tackle, live bait, and services associated with the angling public may suffer declines under Alternative 2.

5.2.4. Beneficial Impacts

Beneficial impacts associated with the implementation of Alternative 2 would include no addition of pesticide to the environment, the lack of additional temporary water-use advisories associated with lampricide treatments, no additional risks to aquatic organisms, and no agency funds directed toward sea lamprey control on the tributaries identified in the Proposed Action.

5.2.5. Irreversible and Irretrievable Commitments of Resources

Under Alternative 2 there would be no additional commitments of resources.

5.2.6. Growth Inducing Impacts

There would be no additional growth inducing impacts beyond those identified in the SEIS.

5.3. Cumulative Impacts

SEIS section VII.D describes the cumulative impacts of the long-term sea lamprey control program on Lake Champlain's fisheries, fish community dynamics, mussel species, and the region's social and economic structure. The addition of Hoisington Brook to the existing Lake Champlain Sea Lamprey Control Program poses no new quantifiable or perceived cumulative impacts because of its size, relative to the other controlled rivers in the basin.

The inclusion of Hoisington Brook would increase the total amount of lampricides applied within the Lake Champlain basin. However, the additional treatment will not have a cumulative impact of accumulating lampricides in the environment because both TFM and Niclosamide are readily detoxified by biotic and abiotic processes and do not accumulate in the environment (Hubert 2003; Dawson 2003).

6. List of Preparers

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- M.S. Fish and Wildlife Biology
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4 years sea lamprey research experience, University of Vermont
12 years as a fish biologist with the U.S. Fish and Wildlife Service working exclusively on the Lake Champlain Sea Lamprey Control Program

Christopher P. Mason- Lake Champlain Sea Lamprey Control, Fisheries Technician
- B.S. Natural Resource Mgmt. (Fisheries)

4 years as a fish biologist (Anadromous Restoration) with the MD DNR
5 years as a fish technician with the U.S. Fish and Wildlife Service working exclusively on the Lake Champlain Sea Lamprey Control Program

New York State Department of Environmental Conservation

Lance Durfey – Regional Fisheries Manager
M.S. Fisheries Management
B.S. Natural Resources (Fisheries Science)
30 years of experience with NYSDEC as fish biologist and former Treatment Supervisor for the Lake Champlain and Finger Lakes Sea Lamprey Control Programs

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