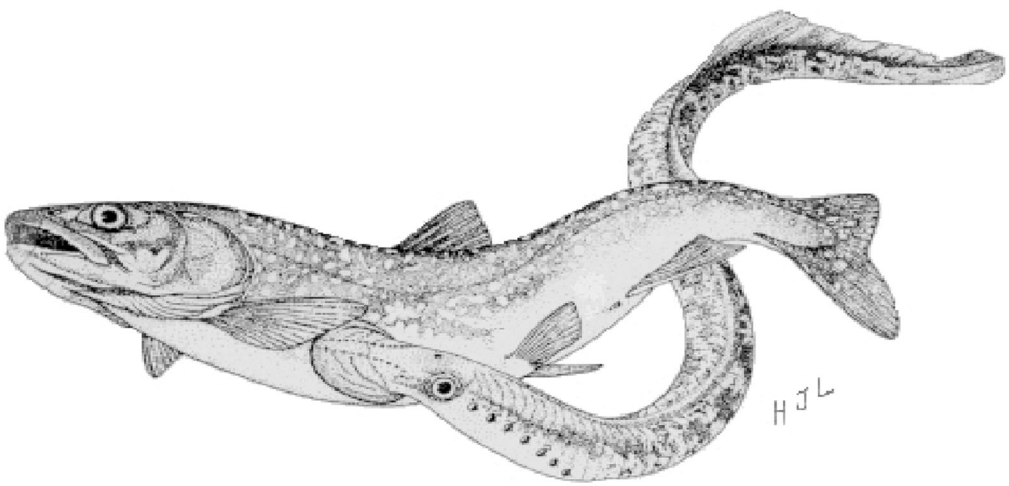
INTEGRATED MANAGEMENT OF SEA LAMPREYS IN THE GREAT LAKES 2009

ANNUAL REPORT TO THE

GREAT LAKES FISHERY COMMISSION



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In 2009, the St. Marys River lentic work was conducted using an innovative lampricide application technology employing a high pressure spray system.

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EXECUTIVE SUMMARY

This report summarizes activities in the integrated management of sea lampreys conducted by the Canadian Department of Fisheries and Oceans (DFO) and the United States Fish and Wildlife Service (USFWS) in the Great Lakes during 2009. Lampricide treatments were conducted on 94 tributaries. Larval assessment crews surveyed 427 Great Lakes tributaries and 59 lentic areas to assess control effectiveness, plan future TFM treatments, and establish production capacity of streams. Assessment traps were operated in 72 tributaries across the Great Lakes to estimate the spawning-phase population in each Great Lake.

We evaluate spawning-phase sea lamprey populations relative to fish community objectives for each of the lakes. In Lake Superior, sea lamprey abundance (26,698) was within target levels of 38,000 ± 19,000 for the second consecutive year. In Lake Michigan, sea lamprey abundance (59,800) marks the second consecutive year of decline and was within target levels of 57,000 ± 13,000. In Lake Huron, sea lamprey abundance (121,653) has decreased from the 2008 abundance estimate yet remained above target levels of 73,000 ± 20,000. In Lake Erie, spawning abundance (35,635) was significantly greater than the 2008 estimate and above target levels of 3000 ± 1,000. In Lake Ontario, spawning abundance was estimated to be 38,473, which was above target levels of 31,000 ± 4,000.

INTRODUCTION

The sea lamprey (*Petromyzon marinus*) is a destructive invasive species in the Great Lakes that contributed to the collapse of lake trout (*Salvelinus namaycush*) and other native species in the mid-20th century and continues to affect efforts to restore and rehabilitate the fish community. Sea lampreys attach to large bodied fish and extract blood and body fluids. It is estimated that about half of sea lamprey attacks result in the death of their prey and an estimated 18 kg (40 lbs) of fish are killed by every sea lamprey that reaches adulthood. The Sea Lamprey Management Program (SLMP) is administered by the Great Lakes Fishery Commission (GLFC) and implemented by two control agents: the Department of Fisheries and Oceans Canada (DFO) and the United States Fish and Wildlife Service (USFWS). The SLMP is a critical component of fisheries management in the Great Lakes because it facilitates the rehabilitation of important fish stocks by significantly reducing sea lamprey-induced mortality.

As part of the *Strategic Plan for Great Lakes Fishery Management*, the lake committees developed fish-community objectives for each of the Great Lakes. The fish-community objectives include goals for the SLMP that, if achieved, should establish and maintain self-sustaining stocks of lake trout and other salmonines by minimizing sea lamprey impacts on these stocks. The lake committees have agreed to sea lamprey abundance and lake trout marking targets for each of the lakes. This report outlines the program conducted by the control agents and the GLFC in 2009 to meet these targets.

FISH-COMMUNITY OBJECTIVES

Each lake committee has published qualitative goals for sea lamprey management in their fish-community objective documents. During 2004, the lake committees agreed to explicit sea lamprey suppression targets designed to meet their fish-community objectives. In lakes Superior, Michigan, and Erie the targets were developed from a five-year period when marking rates resulted in a tolerable annual rate of mortality on lake trout. A target and range of sea lamprey abundance was calculated for these lakes from the estimated abundance over a five-year period when marking rates were closest to five A1-3 marks per 100 lake trout >533 mm. Similarly, a target and range were developed for Lake Ontario from the estimated abundance of sea lampreys over a five-year period when marking rates were closest to two A1 marks per 100 lake trout >431 mm. In Lake Huron, the sea lamprey abundance target and range were calculated as 25% of the estimated average lake-wide population during the five-year period prior to the completion of the fish community objectives (1989–1993).

The performance of the SLMP is evaluated annually by contrasting spawning-phase sea lamprey abundance with the lake trout marking rate against these targets. The lake-wide abundance is estimated by the control agents using a combination of mark-recapture and trapping efficiency estimates of spawning-phase migrants in streams with traps, and regression model-predicted estimates in streams without traps. Lake trout marking rates are assessed and collected by the member agencies that comprise the lake committees and their technical committees.

The sea lamprey abundance targets presented here for lakes Superior, Michigan, Erie and Ontario have changed from what was included in previous reports. For each of these lakes, a five-year time period was selected during which wounding was at or near the target of 5 wounds per 100 lake trout (2 wounds per 100 lake trout for Lake Ontario). The spawning-phase abundance targets were then defined as the average of the spawning-phase estimates for that five year time period. Since the model for estimating spawning-phase abundance is annually updated using all the available data, the spawning-phase estimates for previous years can change, which in turn, causes the spawning-phase targets to change. Because the Lake Huron Committee set a fixed number for the spawning-phase target, the target for Lake Huron does not change.

Lake Superior

The Lake Superior Committee established the following goal for sea lamprey management in Lake Superior:

Suppress sea lampreys to population levels that cause only insignificant mortality on adult lake trout.

The target and range of sea lamprey abundance for Lake Superior were calculated from the average abundance of sea lampreys estimated for the five-year period, 1994-1998, when marking rates were closest to five marks per 100 fish (5.2 A1-3 marks per 100 lake trout >533mm). The calculated target abundance in Lake Superior is 38,000 ± 19,000 sea lampreys**.**

Spawning-phase sea lamprey abundance in Lake Superior was estimated to be 26,698 (95% CI: 22,943-32,361), and was within the target range for the second consecutive year during 2009. The lake trout marking rate currently exceeds the target of five marks per 100 fish and has trended upward since 1994.

Lake-wide estimates of spawning-phase sea lamprey exceeded the Lake Superior target during 1999-2008. The control agents responded by surveying all known and potential sources of sea lampreys during 2004-2006. Treatment effort has been increased and all significant sources have been treated.

Lake Michigan

The Lake Michigan Committee established the following goal for sea lamprey management in Lake Michigan:

Suppress the sea lamprey to allow the achievement of other fish community objectives.

Sea lamprey management has the most direct effect on achieving objectives for lake trout and other salmonines:

Establish self-sustaining lake trout populations.

Establish a diverse salmonine community capable of sustaining an annual harvest of 2.7 to 6.8 million kilograms (6 to 15 million pounds), of which 20-25% is lake trout.

The target and range of sea lamprey abundance for Lake Michigan were calculated from the average abundance of sea lampreys estimated for the five-year period, 1988-1992, when marking rates were closest to five marks per 100 fish (4.7 A1-3 marks per 100 lake trout >533mm). The calculated target abundance in Lake Michigan was 57,000 ± 13,000 sea lampreys.

Populations were less than or within the target range prior to the 2000 spawning year, but had shown a significant trend upward to a peak abundance of 167,126 by 2007. Abundance declined markedly in 2008. During 2009, sea lamprey abundance declined further to 59,800 (95% CI: 56,131- 64,700), which is within the target range. The marking rates have trended upward, and have exceeded target levels since 1995.

The trend of increasing sea lamprey abundance between 2000 and 2007 led the Commission to increase assessment and treatment effort in Lake Michigan. The causes of the increase in sea lamprey abundance may be due to reduced lampricide control effort, increased production of sea lampreys upstream of deteriorated barriers, and increased survival of juvenile lampreys due to changes in the fish community. However, all known and likely sources of sea lampreys have been surveyed and control efforts have targeted all potential sources of sea lampreys in the lake.

Beginning in 2001, treatment effort increased with special emphasis on increasing suppression in Lake Michigan. The Manistique River was treated in 2003, 2004, 2007 and 2009. Treatments of smaller streams that were located near other streams scheduled for treatment (geographic efficiencies) increased the number of streams that were treated each year. Beginning in 2005, the states and tribes of Michigan and Wisconsin agreed to relax previous restrictions on TFM concentrations in select lake sturgeon streams to maximize treatment effectiveness. Treatments of streams where lake sturgeon reproduction exists were scheduled later during the year, when larval lake sturgeon exceed 100mm in length and may be less vulnerable.

Lake Huron

The Lake Huron Committee established the following specific goal for sea lamprey management in Lake Huron:

Reduce sea lamprey abundance to allow the achievement of other fish community objectives. Obtain a 75% reduction in parasitic-phase sea lampreys by the year 2000 and a 90% reduction by the year 2010 from present levels.

This sea lamprey objective supports the other fish-community objectives, specifically the salmonine objective:

Establish a diverse salmonine community that can sustain an annual harvest of 2.4 million kg, with lake trout the dominant species and anadromous (stream-spawning) species also having a prominent place.

The sea lamprey abundance target and range for Lake Huron were calculated as 25% of the estimated average lake-wide population during the five-year period prior to the publication of the fish-community objectives (1989–1993). The target using these data was 73,000 ± 20,000 sea lampreys in Lake Huron. Unlike the other Great Lakes, this explicit target was not based on observed marking rates that resulted in a tolerable annual lake trout mortality rate.

During 2009, the spawning-phase sea lamprey population was estimated at 121,653 (95% CI: 108,027 – 142,209), which exceeds the suppression target, but represents a significant decrease from 2008. Sea lamprey abundance in Lake Huron has been greater than target levels throughout the last 20 years. Since 2001, the population estimates have been significantly lower than estimates during the previous 10 years.

High sea lamprey abundance in Lake Huron during the 1980s and 1990s was attributed to production from the St. Marys River. The larval population in the river was estimated at 5.2 million during the mid 1990s and was considered large enough to produce the majority of parasitic-phase sea lampreys in the lake. The large discharge and the complexity of the St. Marys River precludes traditional treatment applications. During 1997, an innovative control strategy was implemented in the river that integrated spot treatments of zones of high larval density with 3.2% granular Bayluscide (gB), a bottom-release formulation of lampricide, with the sterile-male-release technique (SMRT) and the operation of spawning-phase traps. During 1998-2001, approximately 850 ha of larval habitat was treated, and along with SMRT and trapping, have contributed to a decline in larval sea lamprey abundance in the river and to reduced spawning-phase abundance and lake trout marking rates in Lake Huron since 2001. This integrated approach continued through 2009.

Lake Erie

The *Fish-Community Goals and Objectives for Lake Erie* does not include a specific sea lamprey objective, however it does acknowledge that effective sea lamprey management is needed to support the fish-community objectives for Lake Erie, especially those related to lake trout restoration:

Eastern basin – provide sustainable harvests of walleye, smallmouth bass, yellow perch, whitefish, rainbow smelt, lake trout, rainbow trout, and other salmonines; restore a self-sustaining population of lake trout to historical levels of abundance.

The lake trout management plan for rehabilitation of self-sustaining stocks in the eastern basin of Lake Erie prescribed a maximum annual mortality of less than 40% to permit the establishment and maintenance of suitable stocks of spawning adults. Mortality was to be controlled through management of fishery exploitation and continued suppression of sea lampreys.

The target and range of sea lamprey abundance for Lake Erie were calculated from the average abundance estimated for the five-year period, 1991-1995, when marking rates were closest to five marks per 100 fish (4.4 A1-3 marks per 100 lake trout >533mm). The calculated target abundance in Lake Erie was 3,000 ± 1,000 sea lampreys.

During 2009, spawning-phase sea lamprey abundance in Lake Erie was estimated to be 35,635 (95% CI: 28,574 – 46,451). This level of abundance exceeds all pre-control estimates.

Consequently, spawning-phase abundance was greater than target in 2009 as was the lake trout marking rate.

The initial round of stream treatments during 1986 and continued control efforts during the following eight years resulted in an annual sea lamprey population within the target range. During the late 1990s, sea lamprey abundance recovered to pre-treatment levels, which was probably due to deferral of some treatments, failure to treat all sea lamprey-infested areas in some streams, and lower treatment efficacy resulting from measures designed to reduce lampricide use and protect non-target organisms. Beginning in 1999, the GLFC responded to burgeoning sea lamprey abundance with the application of concerted control effort to the major sea lamprey producing streams in Lake Erie, resulting in suppression to target levels for four years. Spawning-phase sea lamprey abundance rebounded during the period from 2005 to 2007, once again exceeding pre-control levels. In response to the observed increases, a whole-lake treatment strategy was implemented and all known infested tributaries to Lake Erie were treated in two consecutive years, beginning in 2008. The impact of this approach should be evident in spawning-phase abundance estimates, beginning in 2010.

Lake Ontario

The Lake Ontario Committee established the following goal for sea lamprey management in Lake Ontario:

Suppression of sea lamprey populations to early 1990's levels.

The Lake Ontario Committee revised its lake tout rehabilitation plan in 1983. The plan recognized that continued control of sea lampreys is necessary for lake trout rehabilitation and included a specific objective for sea lampreys:

Controlling sea lampreys so that fresh wounding rates (A1) of lake trout larger than 431 mm is less than 2 marks/100 fish.

This objective is intended to maintain the annual lake trout survival rate at 60% or greater to support a target spawning stock of 0.5 to 1.0 million adults of multiple year classes. Along with sea lamprey management, angler and commercial exploitation will also be controlled so that annual harvest does not exceed 120,000 fish in the near term.

The target for Lake Ontario sea lamprey abundance was first calculated using the same marking statistics as the other lakes (A1-3 marks). The target and range were revised during 2006, using A1 marks exclusively which have been more consistently recorded on Lake Ontario. Also, the target marking rate of less than two A1 marks per 100 fish was explicitly identified as producing tolerable mortality in the lake trout rehabilitation plan. The sea lamprey target and range were calculated from the average abundance during the five-year period, 1993-1997, when marking rates were closest to two marks per 100 fish (1.6 A1 marks per 100 lake trout >431mm). The calculated target abundance in Lake Ontario was 31,000 ± 4,000 sea lampreys.

Sea lamprey abundance in Lake Ontario during 2009 was estimated to be 38,473 (95% CI: 35,080 – 42,640), and is greater than the target. Marking rates on lake trout were below target in 2009.

LAMPRICIDE CONTROL

Tributaries harbouring sea lamprey larvae are periodically treated with lampricides to eliminate or reduce larval populations before they recruit to the lake as parasitic-phase lampreys. Treatment units administer and analyze TFM, or TFM/Niclosamide mixtures (TFM augmented with Bayluscide 70% Wettable Powder or 20% Emulsifiable Concentrate) during stream treatments, and apply gB to control populations inhabiting lentic areas. Specialized equipment and techniques are employed to maintain lampricide concentrations required to eliminate approximately 95% of the sea lamprey larvae, while minimizing the risk to non-target organisms. In this section, we identify lampricide applications conducted in 2009 (Figure 1, Table 1), history of lampricide treatments in each of the Great Lakes, and highlights of the 2009 treatments.

The Lampricide Control Task Force (LCTF) was established by the GLFC during December 1995 with charges to improve the efficiency of lampricide control, maximize sea lampreys killed in stream and lentic treatments (while minimizing lampricide use, costs, and impacts on aquatic ecosystems), and define lampricide control options for near and long-term stream selection and target setting. The task force's report on the charges during 2009 is presented in the LCTF Report.

Since 2006, the control agents have employed strategies to maximize treatment efficacy, while continuing to protect non-target organisms. These strategies include: targeting lampricide concentrations at greater than minimum lethal concentrations (MLC) in all treated stream reaches; extending the duration of lampricide treatment blocks by one or two hours; conducting secondary lampricide applications to treat backwaters, springs, and small feeder streams that offer refuge to larvae from the primary treatment, and; scheduling treatments during periods when favourable flow conditions are likely to exist.

Table 1. Summary of lampricide applications in tributaries of the Great Lakes, 2009.

Lake	Number of Streams	Discharge (m^3/s)	TFM[1] (kg)	Bayluscide[1] (kg)	Distance (km)
Superior	27	127.3	11,827.5	649.9	527.6
Michigan	25	174.1	31,913.7	291.9	1,248.5
Huron	19	62.1	12,856.5	498.3	728.3
Erie	10	49.0	9,811.9	32.7	471.0
Ontario	13	23.0	3,830.0	2.5	107.4
Total	**94**	**435.5**	**70,239.6**	**1,475.3**	**3,082.8**

[1]Lampricide quantities are reported in kg of active ingredient.

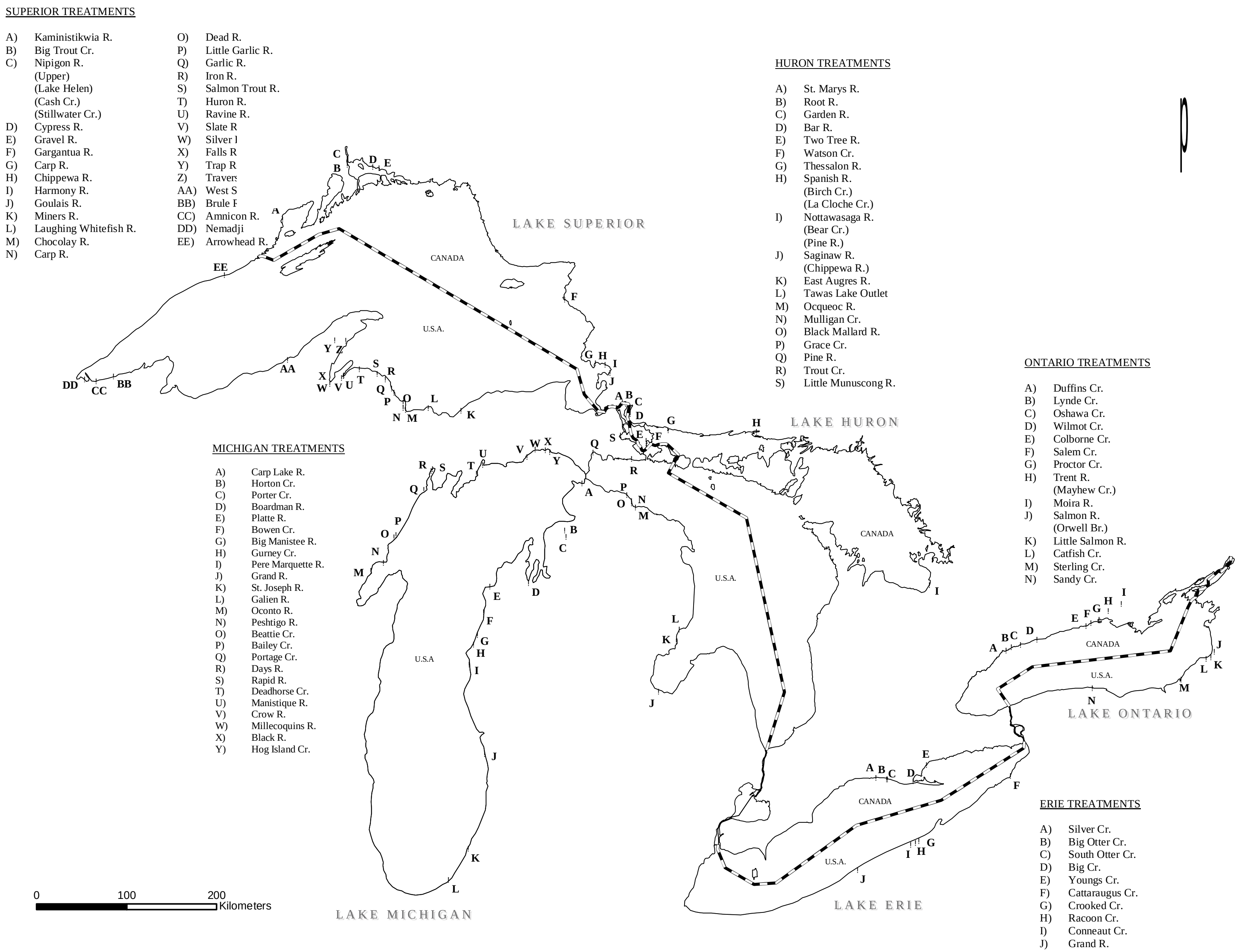

Figure 1. Location of tributaries treated with lampricide in 2009.

Lake Superior

Lake Superior has 1,566 tributaries (833 Canada, 733 U.S.). One hundred fifty-three tributaries (57 Canada, 96 U.S.) have historical records of larval sea lamprey production. Of these, 94 tributaries (36 Canada, 58 U.S.) have been treated with lampricides at least once during 2000-2009. Fifty-one tributaries (18 Canada, 33 U.S.) are treated on a regular cycle. Table 2 provides details on the application of lampricides to Lake Superior tributaries and lentic areas treated during 2009.

- Lampricide treatments were completed in 27 tributaries (7 Canada, 20 U.S.) and in 11 lentic areas (8 Canada, 3 U.S.). Of these, the lentic applications on Lake Helen as well as the Falls and the Ravine rivers were conducted in conjunction with TFM treatment of the streams. Enhancement strategies to improve treatment efficacy were implemented in 23 tributaries in 2009.

- The West Sleeping River was treated for the first time during 2009. The low discharge necessitated extensive supplemental application of TFM to effectively maintain lampricide concentrations.

- The Amnicon River was treated in July at low discharge. Treatment evaluation surveys during early September revealed a large number of residuals (larvae that survive treatment) in the estuary, which was re-treated in October.

- The Nemadji River was treated further upstream than past treatments.

- The Little Garlic River was treated during low water and beaver dams in the upper reaches contributed to a residual popluation. The river is scheduled for treatment again during 2010 due to residuals.

- The Huron River was added to the schedule due to the presence of residual larvae and was successfully treated.

- The Arrowhead River was treated for the first time since 1983.

- Treatment of Pearl River was deferred due to low discharge conditions. It has been rescheduled for treatment during 2010.

- Sheppard Creek, a tributary to the Goulais River system, was deferred in 2009 due to high flow conditions in the fall. It has been rescheduled for treatment during 2010.

- Treatment of the Agawa River during 2008 was limited to the lower reach of the river due to low stream discharge. The 2009 treatment, scheduled to address sea lamprey larvae residing in the untreated poriton of the river was deferred and rescheduled for 2010.

- The first time treatment of Big Trout Creek was hampered by low stream discharge and the presence of numerous beaver impoundments. A portion of the stream was deemed untreatable and the entire system is scheduled for retreatment during 2010.

Table 2. Details on the application of lampricides to tributaries of Lake Superior, 2009 (letter in parentheses corresponds to location of stream in Figure 1 and italics indicate tributaries where enhancement strategies were implemented).

Tributary	Date	Discharge (m^3/s)	TFM (kg)[1,2]	Bayluscide (kg)[1,3]	Distance Treated (km)
<u>Canada</u>					
Kaministiquia R. (A)	Aug 12	---	---	121.9[3]	---
Big Trout Cr. (B)	Jul 27	0.4	93.4	0.0	12.3
Big Trout Cr. (B)	Oct 15	---	---	53.7[3]	---
Nipigon R. (C)					
Nipigon R. (Upper)	Aug 18	57.7	5,022.4	79.8	11.6
Lake Helen	Aug 19	---	---	19.6[3]	---
Cash Cr.	Jul 23	0.6	247.9	0.0	28.6
Cash Cr.	Oct 14	---	---	25.8[3]	---
Stillwater Cr.	Jul 24	0.1	23.6	0.0	1.2
Stillwater Cr.	Oct 14	---	---	34.5[3]	---
Cypress R. (D)	Jul 22	0.3	45.0	0.0	5.1
Cypress R. (D)	Jul 28	---	---	21.1[3]	---
Gravel R. (E)	Jul 28	---	---	121.3[3]	---
Gargantua R. (F)	Jul 8	0.7	39.4	0.0	1.4
Carp R. (G)	Jun 18	1.0	55.4	0.0	8.5
Chippewa R. (H)	Jul 23	---	---	30.5[3]	---
Harmony R. (I)	Jun 18	0.3	15.0	0.0	2.9
Goulais R. (J)	Jun 10	23.2	1,525.3	0.2	130.4
Total (Canada)		**84.3**	**7,067.4**	**508.4**	**202.0**
<u>United States</u>					
Miners R. (K)	Sep 2	0.9	197.4	0.0	4.8
Laughing Whitefish R. (L)	Aug 24	0.1	61.1	0.0	8.1
Chocolay R. (M)	Jul 14	3.4	506.9	0.0	48.3
Carp R. (N)	Sep 10	1.1	213.3	0.0	8.5
Dead R. (O)	Aug 26	---	---	78.4[3]	---
Little Garlic R. (P)	Aug 4	0.1	18.0	0.0	8.1
Garlic R. (Q)	Jul 21	1.0	148.6	0.0	9.7
Iron R. (R)	Sep 2	2.5	214.7	0.0	4.8
Salmon Trout R. (S)	Sep 1	2.0	168.5	0.0	12.9
Huron R. (T)	Oct 5	6.0	447.0	0.0	11.6
Ravine R. (U)	Aug 23	0.4	37.2	14.5[3]	2.6
Slate R. (V)	Aug 22	1.6	73.6	0.0	0.8
Silver R. (W)	Aug 21	4.5	264.3	0.0	7.3
Falls R. (X)	Aug 24	1.4	179.4	48.6[3]	0.5
Trap Rock R. (Y)	May 18	1.0	118.5	0.0	14.5
Traverse R. (Z)	May 14	0.4	63.5	0.0	19.3
West Sleeping R. (AA)	Aug 19	0.1	51.4	0.0	7.3
Brule R. (BB)	Jul 10	4.0	646.6	0.0	10.3
Amnicon R. (CC)	Jul 9	0.2	212.2	0.0	13.4
Nemadji R. (DD)	Jun 13	3.1	825.2	0.0	132.0
Arrowhead R. (EE)	Jun 12	9.2	312.7	0.0	0.8
Total (United States)		**43.0**	**4,760.1**	**141.5**	**325.6**
Total for lake		**127.3**	**11,827.5**	**649.9**	**527.6**

[1] Lampricide quantities are reported in kg of active ingredient.
[2] Includes a total of 186 TFM bars (38.1 kg active ingredient) applied in 15 streams.
[3] Includes gB applied to lentic areas.

Lake Michigan

Lake Michigan has 511 tributaries. One hundred twenty-two tributaries have historical records of larval sea lamprey production, and of these, 76 tributaries have been treated with lampricides at least once during 2000-2009. Thirty-eight tributaries are treated on a regular cycle including annual treatments. Table 3 provides details on the application of lampricides to tributaries treated during 2009.

- Lampricide treatments were completed in 25 tributaries. Enhancement strategies to improve treatment efficacy were implemented in 18 tributaries in 2009.

- Treatments of Deadhorse and Hog Island creeks, and the Black River required additional application sites due to beaver activity and low discharge. In addition, the recommended upper application site on Hog Island Creek and the East Branch of the Black River were moved downstream as a result of low discharge.

- The Rapid River was treated in segments due to extreme flow conditions. In May, high discharge limited the treatment of the Rapid River to a few tributaries. Treatment of the mainstream was completed during October when sufficient flow was present to treat the lower stretch of river and treatment of the upper end was completed in early November.

- Treatment of the Manistique River commenced during May with independent treatments of the upper Fox and Driggs rivers. The North Branch of Stutts Creek was also treated independently in early September. Treatment of the mainstream and remaining tributaries occurred later in September. The 2009 treatment was completed at historically low discharge, particularly in the West Branch, resulting in extended flow times and additional application sites. Despite suitable collecting conditions, notably low densities of sea lamprey larvae were observed during the treatment.

- The Rogue River, a tributary to the Grand River, was treated for the first time.

- Due to the high density of sea lamprey found during a lentic survey, a supplemental gB treatment of the lentic area was conducted in conjunction with the successful TFM treatment of Horton Creek.

- Sea lamprey distribution in the main Paw Paw River extended further upstream than has been known historically. The upper segment of the Paw Paw River required six additional application sites and was treated independently from the main river.

- Due to the presence of the federally endangered Hungerford's crawling water beetle (*Brychius hungerfordi*), the Carp Lake River was successfully treated under the conditions of a Biological Opinion drafted to meet the requirements of Section 7 consultation of the Endangered Species Act.

- A combined treatment crew including personnel from the Sea Lamprey Control Centre (DFO), the Marquette Biological Station, and the Ludington Biological Station successfully treated the Manistee River. Secondary treatments of the bayous and backwaters associated with the mainstream treatment were completed, reducing potential freshwater refuges for sea lampreys.

Table 3. Details on the application of lampricides to tributaries and lentic areas of Lake Michigan, 2009 (letter in parentheses corresponds to location of stream in Figure 1 and italics indicate tributaries where enhancement strategies were implemented).

Tributary	Date	Discharge (m^3/s)	TFM (kg)[1,2]	Bayluscide (kg)[1,3]	Distance Treated (km)
Carp Lake R. (A)	May 2	2.1	347.0	0.0	15.3
Horton Cr. (B)	Oct 16	0.4	122.9	3.63	0.8
Porter Cr. (C)	Oct 18	0.4	136.9	0.0	6.1
Boardman R. (D)	Jun 26	0.3	79.1	2.03	5.5
Platte R. (upper) (E)	Jun 29	3.3	950.7	0.13	29.5
Bowen Cr. (F)	Aug 26	0.6	153.3	0.0	5.6
Big Manistee R. (G)	Aug 10	62.3	9,962.0	121.43	120.8
Gurney Cr. (H)	Aug 6	0.3	45.2	0.0	1.9
Pere Marquette R. (I)	Jul 7	18.1	4,446.3	34.43	198.0
Grand R. (J)					
Crockery Cr.	Sep 1	1.1	537.5	0.0	52.5
Rogue R.	Sep 9	4.1	1,279.7	0.13	11.3
St. Joseph R. (K)					
Paw Paw R.	May 18	11.3	5,554.5	0.0	148.8
Galien R. (L)	Jun 13	2.1	567.7	0.0	25.8
Oconto R. (M)	May 4	19.1	2,099.6	19.3	29
Peshtigo R. (N)	Oct 29	24.6	1,915.5	22.8	19.3
Beattie Cr. (O)	Apr 29	0.6	48.9	0.0	3.2
Bailey Cr. (P)	Apr 30	0.5	26.1	0.0	2.6
Portage Cr. (Q)	Oct 17	0.3	34.0	0.0	10.5
Days R. (R)	May 3	2.3	272.5	0.0	24.7
Rapid R. (S)	May 2	4.4	517.2	0.0	48.3
Deadhorse Cr. (T)	Jun 25	0.1	6.5	0.0	2.7
Manistique R. (U)	Sep 17	14.2	2,505.2	88.03	450.8
Crow R. (V)	Jun 28	0.6	126.2	0.0	5.0
Millecoquins R. (W)					
Cold Cr.	Jul 15	0.3	31.5	0.0	1.6
Black R. (X)	Jun 25	0.6	123.0	0.0	22.5
Hog Island Cr. (Y)	Jun 25	0.1	24.7	0.0	6.4
Total for Lake		**174.1**	**31,913.7**	**291.9**	**1,248.5**

[1]Lampricide quantities are reported in kg of active ingredient.
[2]Includes 448 TFM bars (93.3 kg active ingredient) applied in 12 streams.
[3]Includes gB applied in spot treatments or to lentic areas.

Lake Huron

Lake Huron has 1,761 tributaries (1,334 Canada, 427 U.S.). One hundred eighteen tributaries (56 Canada, 62 U.S.) have historical records of larval sea lamprey production. Of these, 75 tributaries (36 Canada, 39 U.S.) have been treated with lampricide at least once during 2000-2009. Forty-four tributaries (21 Canada, 23 U.S.) are treated on a regular cycle. Table 4 provides details on the application of lampricides to tributaries and lentic areas treated during 2009.

- Lampricide treatments were completed in 18 tributaries (8 Canada, 10 U.S.) and the St. Marys River. Enhancement strategies to improve treatment efficacy were implemented in 17 tributaries in 2009.

- A total of 138 ha (86 Canada, 52 U.S.) of larval habitat in the St. Marys River was treated with gB. All work relating to the St. Marys application was performed by DFO personnel. For the first time, this lentic work was conducted using an innovative lampricide application technology employing a high pressure spray system.

- Tawas Lake Outlet and its tributary, Cold Creek, were treated, as were Silver and Sims creeks (tributaries to Tawas Lake). Treatment collections indicated that larvae migrated downstream from Cold Creek into Tawas Lake Outlet rather than originating from spawning activity in the outlet proper.

- Saddler Creek, a tributary of the East AuGres River, was treated further upstream than in past treatments.

- Treatment of the Spanish River was deferred due to excessive discharge caused by heavy rains. Two tributaries, Birch and La Cloche creeks, were successfully treated earlier in the year. The Spanish River has been rescheduled for treatment during 2010.

- Treatment of Marl Creek was deferred due to extreme flow variations caused by a large scale irrigation system operating within the stream. The treatment has been rescheduled for April 2010, prior to the start-up of the irrigation pumps.

Table 4. Details on the application of lampricides to tributaries of Lake Huron, 2009 (letter in parentheses corresponds to location of stream in Figure 1 and italics indicate streams/tributaries where enhancement strategies were implemented).

Tributary	Date	Discharge (m^3/s)	TFM (kg)[1,2]	Bayluscide (kg)[1,3]	Distance Treated (km)
<u>Canada</u>					
St. Marys R. (A)	Jun 12	---	---	479.7[3]	---
Root R. (B)	Sep 2	3.7	211.0	0.0	51.7
Garden R. (C)	Jul 14	10.0	627.3	0.1	73.7
Bar R. (D)	Oct 19	0.3	22.6	0.0	5.6
Two Tree R. (E)	May 13	0.5	78.8	0.0	10.5
Watson Cr. (F)	May 12	0.1	6.6	0.0	1.5
Thessalon R. (Lower) (G)	Jul 6	8.4	617.9	0.1	32.7
Spanish R. (H)					
Birch Cr.	Jun 5	2.8	122.9	0.0	18.4
La Cloche R.	Jun 7	1.4	79.0	0.0	15.2
Nottawasaga R. (I)					
Bear Cr.	Jun 8	0.5	154.6	0.0	5.0
Pine R.	Jun 10	3.2	1,062.2	0.0	53.8
Total (Canada)		**30.9**	**2,982.9**	**479.9**	**268.1**
<u>United States</u>					
Saginaw R. (J)					
Chippewa R.	May 28	12.1	6,197.6	16.7	183.1
East AuGres R. (K)	Jul 10	1.4	436.8	0.0	19.3
Tawas Lake Outlet (L)	Jul 11	2.7	571.1	0.0	33.0
Ocqueoc R. (upper) (M)	Aug 22	6.4	1,154.0	0.0	35.4
Black Mallard R. (N)	May 4	0.6	83.6	1.7[3]	9.2
Grace Cr. (O)	May 1	0.2	12.6	0.0	2.6
Mulligan Cr. (P)	Apr 30	0.2	10.7	0.0	0.5
Pine R. (Q)	May 28	6.5	1,294.3	0.0	161.0
Trout Cr. (R)	Oct 20	0.3	33.3	0.0	1.6
Little Munuscong R. (S)	Oct 18	0.8	79.6	0.0	14.5
Total (United States)		**31.2**	**9,873.6**	**18.4**	**460.2**
Total (for lake)		**62.1**	**12,856.5**	**498.3**	**728.3**

[1] Lampricide quantities are reported in kg of active ingredient.
[2] Includes a total of 141 TFM bars (29.4 kg active ingredient) applied in 11 streams.
[3] Includes gB applied to lentic areas.

Lake Erie

Lake Erie has 842 tributaries (525 Canada, 317 U.S.). Twenty-two tributaries (11 Canada, 11 U.S.) have historical records of larval sea lamprey production. Of these, 11 tributaries (5 Canada, 6 U.S.) have been treated with lampricides at least once during 2000-2009. Seven tributaries (2 Canada, 5 U.S.) are treated on a regular cycle. In addition, larval production has been documented in the St. Clair River, three U.S. tributaries of the St. Clair River, and two tributaries to Lake St. Clair (1 Canada, 1 U.S.), none of which have required treatment during 1999-2009. Production of larvae in these tributaries, with the exception of the St. Clair River, has been minor and intermittent. Table 5 provides details on the application of lampricides to tributaries treated during 2009.

- Fall lampricide treatments were completed in all known infested tributaries (5 Canada, 5 U.S.). Nine streams were treated as prescribed for the the second stage of an experimental whole-lake strategy of consecutive treatments designed to suppress and maintain abundance at or below the lake-wide target of 3,000 spawning-phase sea lampreys.

- South Otter Creek was added to the treatment schedule due to the presence of 4 year classes of larval lampreys that were detected by assessment surveys during August, 2009. This stream will be treated again in the fall of 2010 to complete the second round of consecutive treatments.

- Enhancement strategies to improve the efficacy of lampricide treatments were implemented in 7 tributaries in 2009.

- Low numbers of larval sea lampreys were noted in the Canadian and U.S. streams during the 2009 treatments. No larvae were observed during the treatments of Silver, Big Otter and Young's creeks nor in the previously treated portion of Raccoon Creek.

- Raccoon Creek was treated 2.3 km further upstream than during 2008. No larvae were detected upstream of the 2008 application point during distribution surveys conducted during 2007. Subsequent surveys conducted during 2009 revealed larvae at one of three sites upstream of the 2008 application point.

- Tributaries to Cattaraugus Creek including Derby and Coon brooks and Spooner, Thatcher and Connoisarauley creeks were successfully treated. A sudden increase in discharge from heavy rains reduced lampricide concentrations to less than MLC in the lower segments of Cattaraugus (main) and Clear creeks. These reaches are scheduled for re-treatment during 2010, pending results of treatment evaluation surveys.

Table 5. Details on the application of lampricides to tributaries of Lake Erie, 2009 (letter in parentheses corresponds to location of stream in Figure 1 and italics indicate tributaries where enhancement strategies were implemented).

Tributary	Date	Discharge (m^3/s)	TFM[1,2] (kg)	Bayluscide[1] (kg)	Distance Treated (km)
Canada					
Silver Cr. (A)	Oct 28	0.2	79.6	0.0	5.1
Big Otter Cr. (B)	Sep 11	3.6	1,544.2	0.6	74.8
South Otter Cr. (C)	Sep 17	0.4	368.8	0.0	34.3
Big Cr. (D)	Sep 14	5.1	2,109.5	0.2	95.9
Young's Cr. (E)	Sep 21	0.6	131.2	0.0	0.4
Total (Canada)		**9.9**	**4,233.3**	**0.8**	**210.5**
United States					
Cattaraugus Cr. (F)	Oct 3	27.9	4,005.8	31.9	103.0
Crooked Cr. (G)	Oct 8	0.3	101.2	0.0	10.6
Raccoon Cr. (H)	Oct 4	0.2	26.2	0.0	5.2
Conneaut Cr. (I)	Oct 2	5	742.1	0.0	104.7
Grand R. (J)	Oct 12	5.7	703.3	0.0	37
Total (United States)		**39.1**	**5,578.6**	**31.9**	**260.5**
Total (for lake)		**49.0**	**9,811.9**	**32.7**	**471**

[1] Lampricide quantities are reported in kg of active ingredient.
[2] Includes a total of 80 TFM bars (16.7 kg active ingredient) applied in 3 streams.

Lake Ontario

Lake Ontario has 659 tributaries (405 Canada, 254 U.S.). Sixty-six tributaries (31 Canada, 35 U.S.) have historical records of larval sea lamprey production, and of these, 41 tributaries (21 Canada, 20 U.S.) have been treated with lampricides at least once during 2000-2009. Twenty-nine tributaries (13 Canada, 16 U.S.) are treated on a regular cycle. Table 6 provides details on the application of lampricides to tributaries treated during 2009.

- Treatments were completed in 13 tributaries (8 Canada, 5 U.S.) and the lentic area of the Moira River. Enhancement strategies to improve treatment efficacy were implemented in 6 tributaries in 2009.

- Sandy Creek, located west of Rochester, NY, was treated using a 24 hour application strategy to counter impacts of significant pH fluctuations that led to deferral of treatments in 2007 and 2008. An on-site toxicity test was completed prior to the start of the treatment to determine the MLC necessary to impart 100% mortality of sea lamprey larvae over a 24 hour period. Non-target mortality of an estimated 1,200 stonecats was observed in the lower reach of the river.

- Orwell Brook was treated for the third consecutive year to address residual populations in numerous beaver impoundments. Annual treatments will contiue until the proposed sea lamprey barrier is in place. Constuction of the barrier is expected to be completed during the summer of 2010.

- The TFM treatment of the Moira River was cancelled due to high spring flow conditions. Larval assessment surveys were conducted to deliniate the larval distribution within the lentic areas. Those areas harbouring sea lamprey larvae were treated with gB in the fall.

- The treatment of Colborne Creek was halted after six hours of application due to heavy rains and rapidly increasing discharge. No residual sea lampey larvae were found in post-treatment assessment surveys.

Table 6. Details on the application of lampricides to tributaries of Lake Ontario during 2009 (letter in parentheses corresponds to location of stream in Figure 1 and italics indicate tributaries where enhancement strategies were implemented).

Tributary	Date	Discharge (m^3/s)	TFM (kg)[1,2]	Bayluscide (kg)[1,3]	Distance Treated (km)
Canada					
Duffins Cr. (A)	Jun 5	2.5	669.3	0.0	20.7
Lynde Cr. (B)	May 24	0.8	262.3	0.0	36.3
Oshawa Cr. (C)	May 22	1.3	389.9	0.0	23.4
Wilmot Cr. (D)	May 25	1.1	311.2	0.0	19.0
Colborne Cr. (E)	May 27	0.7	73.3	0.0	0.9
Salem Cr. (F)	Apr 29	0.2	55.4	0.0	2.2
Proctor's Cr (G)	May 21	0.2	70.9	0.0	5.9
Trent R. (H)					
Mayhew Cr.	Apr 16	0.6	160.0	0.0	2.5
Moira R. (I)	Sep 9	---	---	21.8 [3]	---
Total (Canada)		**7.4**	**1,992.3**	**21.8**	**110.9**
United States					
Salmon R. (J)					
Orwell Br.	Apr 27	2.9	253.6	0.0	11.2
Little Salmon R. (K)	Apr 24	6.5	425.5	0.0	38.8
Catfish Cr. (L)	Apr 25	2.1	152.0	0.0	5.4
Sterling Cr. (M)	Apr 23	2.5	374.8	2.5	10.3
Sandy Cr. (N)	Apr 19	1.6	631.8	0.0	41.7
Total (United States)		**15.6**	**1,837.7**	**2.5**	**107.4**
Total (for Lake)		**23.0**	**3,830.0**	**24.3**	**218.3**

[1] Lampricide quantities are reported in kg of active ingredient.
[2] Includes a total of 18 TFM bars (3.7 kg active ingredient) applied in 2 streams.
[3] gB applied to lentic areas.

ALTERNATIVE CONTROL

The GLFC has embarked on a program to develop alternatives to lampricide treatments to provide a broader spectrum of tactics to control sea lamprey populations. Current alternative control methods include trapping of spawning-phase sea lampreys, release of sterilized males to suppress reproductive success, and operation and construction of low-head barriers to block spawning migrations. New applications of alternative control including sterile-female release, the use of lamprey pheromones, and trapping technologies are currently being investigated.

Sterile-Male-Release Technique

During 2009, spawning-phase sea lampreys were captured from 25 tributaries throughout the Great Lakes for use in SMRT (Figure 2). These males were transported to the sterilization facility at the U.S. Geological Survey Hammond Bay Biological Station, sterilized with the chemosterilant bisazir, marked with a fin clip and released into the St. Marys River. Laboratory and field studies have shown that treated male sea lampreys are sterile and sexually competitive (produce mating pheromones and exhibit typical spawning behaviors). Furthermore, studies show that in areas where sterile males are released, the number of eggs hatching in nests is reduced. Table 7 provides a summary of the SMRT program activities in 2009.

The Reproduction Reduction Task Force (RRTF) was formed in 2003 and coordinates the activities of the sterile-male-release technique and trapping for control. A report outlining the progress of this task force is presented in the RRTF Report.

- A total of 22,302 spawning-phase male sea lampreys were delivered to the sterilization facility from trapping operations in Superior (459), Michigan (6,971), Huron (12,947), and Ontario (1,925).

- A total of 19,212 sterilized male sea lampreys were released in the St. Marys River from May to July. The estimated resident population of spawning-phase sea lampreys in the St. Marys River was 13,424. Assessment traps removed 5,287 sea lampreys, an estimated reduction in reproduction of 39% through trapping. The ratio of sterile to resident male sea lampreys remaining in the St. Marys River was estimated at 3.8:1 (19,212 sterile:5,044 estimated resident after trapping).

- The theoretical reduction from trapping and enhanced sterile male release was estimated at 87% during 2009. The theoretical reduction in reproduction from trapping and the enhanced sterile male release program averaged 86% during 1997-2009. Prior to the enhanced program (1991-1996), the theoretical reduction in reproduction averaged 58%.

- The release of sterile males combined with the removal of sea lampreys by traps reduced the theoretical number of effective fertile females in the St. Marys River from about 5,088 to 643 during 2009.

- In the St. Marys River rapids, 1 normal male lamprey was observed spawning and 9 nests were sampled (approximately 2,350 eggs). Average egg viability in nests was 26% (range 0% - 98%). Average egg viability (weighted by nests per year) during 1997-2008 was 30%.

- A study to examine the potential for using sterilized females for sea lamprey management continued in the Trout River (Rogers City, Michigan). About 20,000-30,000 female lampreys are available annually that could allow expansion of this integrated management technique. The primary objective of the four-year study is to determine if application of a high number of sterile females to a tributary can prevent or forestall additional lampricide treatments. Secondary objectives of the study include determining if sterile females are surviving and participating in spawning, and to investigate the viabilities of eggs in random samples. A total of 5,009 sterilized female sea lampreys were released into the Trout River between May 30 and June 21. Sea lampreys were observed resting, nest building, and/or actively spawning in 58 nests. Observations of 712 sterile females, 5 normal females, 1 sterile male and 58 normal males were made between June 2 and June 30. Eggs were sampled from 78 nests and had an average viability of 5.6% (range 0% - 100%).

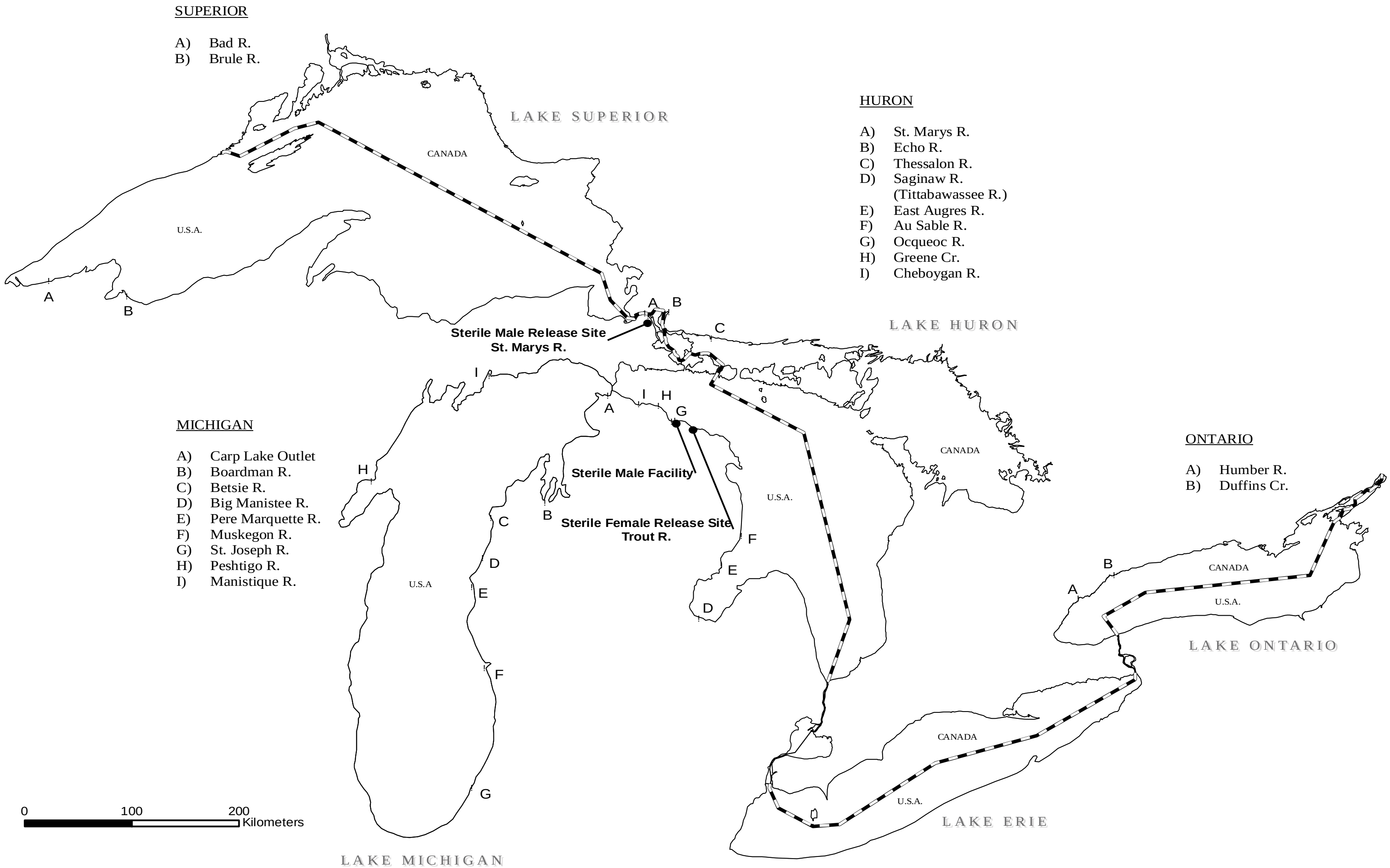

Figure 2. Locations of trapped tributaries that contributed spawning-phase sea lamprey for sterilization during 2009, release sites, and the sterilization facility.

Table 7. Theoretical effects of trapping and sterile male release, and theoretical suppression of reproduction in the estimated population of sea lampreys in the St. Marys River during 1991-2009.

Year	Population estimate	Percent males	Percent removed by traps	Sterile males released	Estimated ratio sterile:normal males	Theoretical percent reduction in reproduction[1]	Theoretical reproducing females[2]
1991	35,582	53	42	7,516	0.7:1	65	5,805
1992	19,508	58	39	4,508	0.7:1	63	3,029
1993	45,620	56	22	4,832	0.2:1	38	12,534
1994	10,624	57	53	2,667	1:1	76	1,091
1995	19,608	55	44	4,238	0.7:1	67	2,873
1996	22,255	63	20	3,650	0.3:1	39	4,922
Refocused efforts entirely on the St. Marys River							
1997	8,162	56	30	17,181	5.4:1	89	402
1998	20,235	57	35	16,743	2.2:1	80	1,771
1999	19,860	60	53	26,285	4.7:1	92	638
2000	38,829	64	48	43,184	3.3:1	88	1,670
2001	25,311	63	45	31,459	3.6:1	88	1,113
2002	13,619	63	59	22,684	6.4:1	94	289
2003	27,011	66	33	27,963	2.3:1	80	1,860
2004	19,864	70	27	26,472	2.6:1	80	1,203
2005	18,790	64	45	30,581	4.6:1	90	673
2006	24,836	65	41	25,879	3:1:1	84	1,389
2007	22,808	65	25	32,152	2.9:1	81	1,559
2008	17,513	64	41	22,072	3.3:1	86	875
2009	13,424	62	39	19,212	3.8:1	87	643

[1] $\left[f = 1 - \left(\frac{1-t}{s:n+1} \right) \right]$ Where f is the theoretical reduction in reproduction from sterile males and trapping, t is the proportion of animals trapped and $s:n$ is the ratio of sterile to normal males

[2]Theoretical reproducing females = the theoretical reduction in reproduction (f) x female population estimate.

Barriers

The *Strategic Vision of the Great Lakes Fishery Commission for the First Decade of the New Millennium* contains a milestone which states that 50% of sea lamprey suppression and a 20% reduction in TFM use will be accomplished through alternative control technologies, including barriers. The sea lamprey barrier program priorities are:

1) Operate and maintain existing sea lamprey barriers.
2) Ensure sea lamprey migration is blocked at important barrier sites.
3) Construct structures in streams where they
   a. provide control where other options are impossible, excessively expensive, or ineffective;
   b. provide a cost-effective alternative to lampricide control;
   c. improve cost-effective control in conjunction with pheromone-based control methods, trapping, the sterile male program, and lampricide treatments; and
   d. are compatible with a systems watershed plan.

The Barrier Task Force (BTF) was established by the GLFC during April 1991 to coordinate efforts of the USFWS, DFO, and U.S. Army Corps of Engineers (USACOE) on the construction, operation, and maintenance of sea lamprey barriers. The task force's report on the charges, which were revised during 2008, is presented in the BTF Report.

Lake Superior

Operation and Maintenance

- There are 15 sea lamprey barriers on Lake Superior (Figure 3). Eleven of these were purpose-built by the Commission. The remainder were modifications to existing structures or barriers constructed by others that ensure sea lampreys remain blocked at those sites.

- Routine maintenance, spring start-up, and safety inspections were performed on 11 barriers (5 Canada, 6 U.S.).

- Repairs or improvements were conducted on 1 Canadian barrier:

    - Big Carp River – Completed repairs to the control system.

Ensure Blockage to Sea Lamprey Migration

- Black Sturgeon River – The Black Sturgeon Dam, located 17 km upstream of the mouth, protects more than 2,500 km of watershed from larval sea lamprey infestation. However, it has been identified as an impediment of walleye rehabilitation in Black Bay in an Ontario Ministry of Natural Resources (OMNR) report. During 2009, a Fisheries Management Zone 9 Advisory Council (FMZ9 Council) was formed to review fisheries issues in Canadian waters of Lake Superior, beginning with those related to the Black Sturgeon Dam. The FMZ9 Council has concluded that to allow unimpeded access of invasive species to the entire watershed is undesirable. Two options are currently under consideration: 1) refurbish the existing dam and retrofit trap and sort fish passage; 2) construct a new sea lamprey barrier at the former Camp 1 site (67km upstream of the mouth) and decommission the existing dam. The GLFC and DFO remain convinced that any option that would increase sea lamprey production and subsequent risk to the fish community of Lake Superior is unacceptable.

- Consultation to ensure blockage at a barrier was conducted with a partner agency on 1 U.S. tributary (Table 8).

Table 8. Status of concurrence requests for barrier removals, replacements, or fish passage projects in Lake Superior tributaries.

Mainstream	Tributary	Lead Agency	Project	SLMP Position	Comments
Menge Creek		SWP [1]	Culvert replacement	Concur	Not a lamprey barrier

[1]Superior Watershed Partnership.

Construction

- A construction project was initiated on 1 Canadian tributary:
    - Whitefish River (tributary to the Kaministiquia River) – Reset level loggers at the potential barrier site. Cross sections of the proposed barrier site were measured. Fish community assessment surveys were conducted in the watershed during 2009.

Lake Michigan

Operation and Maintenance

- There are 10 sea lamprey barriers on Lake Michigan (Figure 3). Five of these were purpose-built by the Commission. The remainder were modifications to existing structures or barriers constructed by others that ensure sea lampreys remain blocked at those sites.

- Routine maintenance, spring start-up, and safety inspections were performed on 8 barriers.

- The electrical barrier and the fishway on the Pere Marquette River were operated from April 1 through July 3 without interruption. The fishway passed 2,921 steelhead, 4,460 suckers, 74 brown trout, and 13 Chinook salmon.

- No repairs or improvements were conducted on barriers in the U.S.

Ensure Blockage to Sea Lamprey Migration

- An intensive effort to inventory and ground truth the information contained in the National Inventory of Dams (NID) has been undertaken for barriers located on tributaries to the Great Lakes. During 2009, 79 additional barriers were inventoried totalling 287 existing barriers in the Lake Michigan basin.

- Consultations to ensure blockage at barriers were conducted with partner agencies on 6 U.S. tributaries (Table 9).

Table 9. Status of concurrence requests for barrier removals, replacements, or fish passage projects in Lake Michigan tributaries.

Mainstream	Tributary	Lead Agency	Project	SLMP Position	Comments
Milwaukee River		WDNR [1]	Bridge St. Dam	Concur	Support fishway with conditions
Thompson Creek		MDNRE [2]	Hatchery Dam	Do not concur	Temporarily remove stop logs, monitor for infestation
Kalamazoo River		MDNRE [2]	Allegan Dam	Do not concur	Infested up to dam
Pere Marquette River	Baldwin River	Green Bay NFWCO [3]	Hatchery Dam	Do not concur	Infested up to dam
Ahnapee River	Silver Creek	WDNR [1]	Algoma Dam	Do not concur	Potential upstream infestation
Duck Creek		Green Bay NFWCO [3]	Pamprin Park Dam	Concur	Not a lamprey barrier

[1] Wisconsin Department of Natural Resources.
[2] Michigan Department of Natural Resources and Environment.
[3] National Fish and Wildlife Conservation Office.

Construction

- Construction projects were initiated, ongoing, or completed on 2 tributaries.
    - Manistique River – U.S. Army Corps of Engineers is the lead agency administering this project. The existing Manistique Paper, Inc. dam location has been identified as the most feasible site for a new barrier. Hydrology and hydraulic analysis were completed to determine site suitability and the maximum crest height of the new structure.
    - Trail Creek – USACOE is the lead agency administering this project. The project partnership agreement between the USACOE, GLFC and Indiana Department of Natural Resources was signed. Construction is planned for 2010.

Lake Huron

Operation and Maintenance

- There are 17 sea lamprey barriers on Lake Huron (Figure 3). Thirteen of these were purpose-built by the Commission. The remainder were modifications to existing structures or barriers constructed by others that ensure sea lampreys remain blocked at those sites.
- Routine maintenance, spring start-up, and safety inspections were performed on 11 barriers (4 Canada, 7 U.S.).

- The electrical component of the combination low-head/electrical barrier in the Ocqueoc River was operated from March 10 through August 13. The electrical field operated almost continuously between April 1 and April 30, deactivating only 3 times for a total of 12 hours when water levels dropped below the 18 inches needed to maintain an effective barrier height.

- No repairs or improvements were conducted on barriers in Canada or the United States.

Ensure Blockage to Sea Lamprey Migration

- An intensive effort to inventory and ground truth the information contained in the NID has been undertaken for barriers located on U.S. tributaries to the Great Lakes. During 2009, 19 additional barriers were inventoried, totalling 217 in the Lake Huron basin.

- Saugeen River - Rehabilitation of Denny's Dam has been postponed until 2011 pending the completion of an unrelated OMNR dam rehabilitation project. The Denny's Dam project will be jointly funded by the GLFC and the OMNR.

- Consultations with partner agencies regarding ensured blockage at barriers were conducted on 7 U.S. tributaries (Table 10).

Table 10. Status of concurrence requests for barrier removals, replacements, or fish passage projects in Lake Huron tributaries.

Mainstream	Tributary	Lead Agency	Project	SLMP Position	Comments
Cheboygan River	Hodges Creek	Alpena NFWCO[1]	Culvert replacement	Concur	Upstream of sea lamprey barrier
Cheboygan River	Van Hellon Creek	Alpena NFWCO[1]	Culvert replacement	Concur	Upstream of sea lamprey barrier
Cheboygan River	Black River	Alpena NFWCO[1]	Dam removal	Concur	Upstream of sea lamprey barrier
Ocqueoc River	Silver Creek	Alpena NFWCO[1]	Culvert replacement	Concur	Not a sea lamprey barrier, within sea lamprey distribution
Alcona River	Black River	Alpena NFWCO[1]	Culvert replacement	Concur	Within sea lamprey distribution
Shiawasee River	Bad River	Alpena NFWCO[1]	Culvert replacement	Concur	Tributary not infested
Shiawasee River	Potato Creek	Alpena NFWCO[1]	Culvert replacement	Concur	Not a lamprey barrier

[1] National Fish and Wildlife Conservation Office.

Construction

- Construction projects were initiated or are ongoing on 4 Canadian tributaries.
    - Still River – A new access road to the barrier site was constructed in 2009. Barrier reconstruction is projected for summer 2010.

- Root, Nottawasaga (Pine) and Bighead rivers - Fish community assessment surveys were conducted on these streams to investigate barrier feasibility.

Lake Erie

Operation and Maintenance

- There are 6 sea lamprey barriers on Lake Erie (Figure 3). All of these were purpose-built by the Commission. A barrier on Normandale Creek that is also displayed in Figure 3 washed out in 2008 and is scheduled to be rebuilt during 2010.

- Routine maintenance, spring start-up, and safety inspections were performed on 6 Canadian barriers.

- Repairs or improvements were conducted on 5 Canadian barriers:

  - Big Creek – Upgraded monorail system.

  - Clear Creek – Completed repairs to downstream banks.

  - Little Otter – Road into the site was repaired. Completed repairs to downstream banks.

  - Venison Creek – Completed repairs to downstream banks.

  - Youngs Creek – Installed new handrails along steps to the barrier.

Ensure Blockage to Sea Lamprey Migration

- An intensive effort to inventory and ground truth the information contained in the NID has been undertaken for barriers located on U.S. tributaries to the Great Lakes. During 2009, 298 additional barriers were inventoried totalling 409 existing barriers in the Lake Erie basin.

- No consultations with partner agencies regarding ensured blockage at barriers were conducted.

Construction

- Construction projects were initiated or ongoing on 3 tributaries (2 Canada, 1 U.S.).

  - Normandale Creek – A high water event in 2008 breached a dam at the OMNR Normandale Fish Hatchery, sending a wave of water downstream that destroyed three road bridges and the low-head sea lamprey barrier. The OMNR removed and disposed of the barrier materials on behalf of the DFO. The OMNR and DFO – Fish Habitat Management branch have approved the reconstruction of the barrier once the OMNR relocates the lower stream channel to crown land. DFO has completed drawings for the new barrier and reconstruction is expected for summer 2010.

  - Big Otter Creek – Fish community assessment surveys were conducted in 2009 to investigate barrier feasibility.

  - Chagrin River – A high water event during 2005 destroyed the Daniels Park Dam on the mainstream of the Chagrin River. Plans to rebuild the dam included a hydraulic analysis that indicates the dam was not a complete block to spawning-phase sea lampreys prior to 2005 and previous lack of recruitment was likely due to poor spawning and larval habitat. Quality habitat for sea lampreys is found in the East Branch of Chagrin River but an existing barrier at the mouth of this tributary has denied sea lampreys access. Based on the hydraulic analyses at both dam sites, the presence of the dam at the mouth of the East Branch and the absence of larval sea lamprey in the river, this risk of infestation is considered to be low and no further action is planned for a new barrier. The river will continue to be monitored for the presence of spawning-phase sea lampreys and larval recruitment.

Lake Ontario

Operation and Maintenance

- There are 15 sea lamprey barriers on Lake Ontario (Figure 3). Nine of these were purpose-built by the Commission. The remainder were modifications to existing structures or barriers constructed by others that ensure sea lampreys remain blocked at those sites.

- Routine maintenance, spring start-up, and safety inspections were performed on 11 Canadian barriers.

- Repairs or improvements were conducted on 7 Canadian barriers:

  - Cobourg Creek – Installed new handrails.
  - Credit River – Repaired handrails.
  - Duffins Creek – Installed a section of fence upstream.
  - Grafton Creek – Repaired upstream section of bank around abutment.
  - Graham Creek – Installed handrails and repaired downstream section of bank.
  - Salmon River – Installed handrails on upstream walkway to trap.
  - Wesleyville Creek – New stop-logs were ordered and installed prior to spring spawning run.

Ensure Blockage to Sea Lamprey Migration

- An intensive effort to inventory and ground truth the information contained in the NID has been undertaken for barriers located on U.S. tributaries to the Great Lakes. During 2009, 29 additional barriers were inventoried totalling 114 in the Lake Ontario basin.

Construction

- Construction projects were initiated, or ongoing on 2 tributaries (1 Canada, 1 U.S.)
    - Orwell Brook - Hydrological and geotechnical surveys have been completed. Design and construction contracting assistance is in progress. Construction is expected to begin in summer 2010.
    - Rouge River - The Toronto and Region Conservation Authority (TRCA) is in the process of completing a Fisheries Management Plan for the Rouge River. TRCA has inquired about the possibility of constructing a seasonally operated sea lamprey barrier as an alternative to ongoing lampricide treatments. A potential barrier site was identified downstream from the confluence of the Rouge River and its major tributary, Little Rouge River. Level logger gauges have been installed and fish community assessment sampling was conducted during 2009.

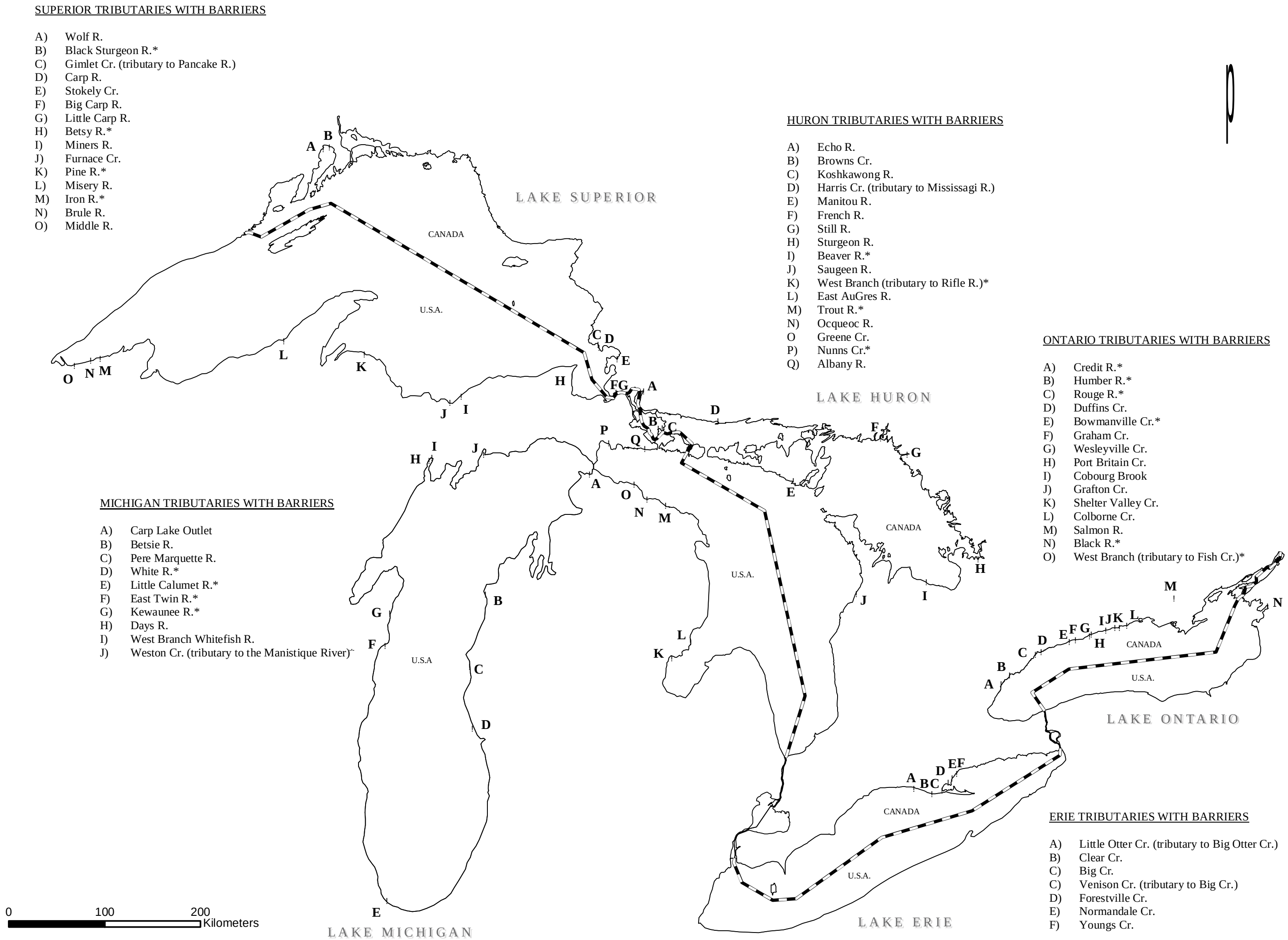

Figure 3. Locations of tributaries with sea lamprey barriers. Structures that have been modified or constructed by others that prevent the upstream migration of sea lampreys are indicated by an asterisk. Note: Normandale Cr. (Lake Erie) barrier washed out in 2008.

ASSESSMENT

The SLMP has two assessment components that target the larval and spawning phases of the life-history of sea lampreys:

1. The larval-phase component assesses the relative abundance and distribution of larval sea lampreys in streams and lentic zones. These data are used to predict the streams and lentic zones most likely to contain larvae greater than 100 mm total length at the end of the growing season during the year of sampling. These projections are used to establish the priorities for the lampricide treatment program in the next year.

2. The spawning-phase component annually assesses the stock size of spawning-phase lampreys in each of the lakes. Because this phase is comprised of individuals that have evaded control efforts, the time series of spawning-phase abundance is used to evaluate the success of the SLMP.

A report outlining the progress of the Assessment Task Force (ATF) is presented in the ATF Report.

Larval Assessment

Tributaries considered for lampricide treatment during 2010 were assessed during 2009 to estimate the density and size structure of larval sea lamprey populations. Assessments were conducted with backpack electrofishers in waters <0.8m deep. Waters ≥0.8m in depth were surveyed with gB. Survey sites were randomly selected in each tributary, larval sea lamprey catches were adjusted for gear efficiency, and lamprey lengths were forecast to the estimated end of the growing season. The number of large sea lamprey larvae in each tributary was estimated by multiplying the mean density of larvae ≥100mm (number per m^2) by an estimated area of suitable habitat (m^2). Tributaries were ranked for treatment during 2010 based on a cost per kill of larval sea lampreys ≥100mm, as estimated using this index of abundance and average treatment costs. Additional surveys are used to define the distribution of sea lampreys within a stream, evaluate lampricide treatments, and to establish the sites for lampricide application. Lentic areas are monitored for relative abundance and spatial distribution of larvae.

Lake Superior

- Larval assessment surveys were conducted on a total of 133 tributaries (68 Canada, 65 U.S.) and offshore of 29 tributaries (13 Canada, 16 U.S.). The status of larval sea lamprey populations in historically infested Lake Superior tributaries and lentic areas are presented in Tables 11 and 12.

- Surveys to estimate the abundance of larval sea lampreys were conducted in 38 tributaries (18 Canada, 20 U.S.) and offshore of 15 tributaries (10 Canada, 5 U.S.). The status of larval sea lamprey populations in historically infested Lake Superior tributaries and lentic areas is presented in Tables 11 and 12, respectively.

- Surveys to evaluate the presence of new larval sea lamprey populations were conducted in 52 tributaries (40 Canada, 12 U.S.). Three new populations were discovered in D'Arcy Creek and Old Woman River (Canada) as well as a small population in the Sioux River (U.S.).

- Post-treatment assessments were conducted in 38 tributaries (18 Canada, 20 U.S.) to determine the effectiveness of lampricide treatments conducted during 2008 and 2009.

- Surveys to evaluate barrier effectiveness were conducted in 8 tributaries (2 Canada, 6 U.S.).

- Biological collections for researchers or training purposes were conducted in 8 tributaries (1 Canada, 7 U.S.).

- Seabed classification sonar (RoxAnn) was used to map 413 ha of substrate offshore of the Nipigon and Pigeon rivers. This information will be used to evaluate the geographic extent of larval habitat and further delineate sea lamprey abundance and distribution in these lentic areas.

- A rotary screw trap was placed in the Agawa River during the fall of 2009 to collect metamorphosed sea lampreys migrating to Lake Superior. The trap captured a total of 20 metamorphosed sea lampreys during the 8 weeks of operation.

Table 11. Status of larval sea lampreys in Lake Superior tributaries with a history of sea lamprey production and estimates of abundance from tributaries surveyed during 2009.

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment)		Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
			Residuals Present	Recruitment Evident			
Canada							
East Davignon Cr.	May-72	May-07	---	No	---	---	Unknown
West Davignon Cr.	Jun-04	Aug-08	No	No	---	---	Unknown
Little Carp R.	May-08	Jul-08	No	---	---	---	Unknown
Big Carp R.	Sep-07	Aug-08	No	No	---	---	Unknown
Cranberry Cr.	Jun-04	Oct-09	Yes	Yes	19,586	4,197	***2010***
Goulais R.	Jun-09	Jul-09	Yes	Yes	---	---	***2010***[2]
Boston's Cr.	Never	Jun-09	---	No	---	---	Unknown
Horseshoe Cr.	Never	Jul-05	---	No	---	---	Unknown
Havilland Cr.	Never	Jul-09	---	Yes	---	---	Unknown
Stokely Cr.	Jun-08	Jul-08	No	---	---	---	Unknown
Tier Cr.	Never	Jul-09	---	No	---	---	Unknown
Harmony R.	Jun-09	Jul-09	Yes	Yes	---	---	Unknown
Sawmill Cr.	Jun-68	Jul-09	---	Yes	763	109	Unknown
Jones Landing Cr.	Never	Jun-08	---	No	---	---	Unknown
Tiny Cr.	Never	Jul-09	---	Yes	---	---	Unknown
Chippewa R.	Oct-04	Sep-09	Yes	Yes	12,045	2,536	***2010***
Unger Cr.	Never	Sep-09	---	Yes	---	---	***2010***
Batchawana R.	Sep-07	Oct-08	Yes	Yes	---	---	2011
Digby Cr.	Never	Sep-09	---	Yes	---	---	Unknown
Carp R.	Jun-09	Jul-09	No	---	---	---	Unknown
Pancake R.	Jun-08	Jul-09	Yes	Yes	---	---	2012
Westman Cr.	Never	Aug-07	---	No	---	---	Unknown
Agawa R.	Oct-08	Jun-09	Yes	Yes	---	---	***2010***[1]
Sand R.	Sep-71	Jun-09	---	Yes	---	---	Unknown
Baldhead R.	Never	Jun-09	---	No	---	---	Unknown
Gargantua R.	Jul-09	Aug-09	No	---	---	---	Unknown
Old Woman R.	never	Jun-09	---	Yes	---	---	Unknown
Michipicoten R.	Aug-08	Aug-09	Yes	Yes	---	---	2012
Dog R.	Aug-63	Aug-09	---	Yes	11,285	1,516	***2010***
White R.	Aug-05	Sep-09	Yes	Yes	34,976	3,997	2011
Pic R.	Jul-06	Aug-09	No	No	---	---	2012
Little Pic R.	Sep-94	Jun-09	---	Yes	---	---	Unknown
Prairie R.	Jul-94	Jun-09	---	No	---	---	Unknown
Steel R.	Jul-08	Aug-08	No	---	---	---	2012
Pays Plat R.	Jul-07	Aug-09	Yes	Yes	---	---	2011
Little Pays Plat Cr.	Jul-07	Jul-07	No	---	---	---	Unknown
Gravel R.	Jul-08	Sep-09	Yes	Yes	---	---	2011
Little Gravel R.	Jul-08	Aug-09	Yes	Yes	---	---	2011
Cypress R.	Jul-09	Aug-09	Yes	---	---	---	Unknown
Jackpine R.	Never	Jun-09	---	No	---	---	Unknown
Jackfish R.	Jul-08	Aug-08	Yes	---	---	---	Unknown

Table 11 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment) Residuals Present	Recruitment Evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Nipigon R.							
Upper Nipigon R.	Aug-09	Sep-09	Yes	---	---	---	Unknown
Lower Nipigon R.	Aug-06	Aug-08	Yes	No	---	---	Unknown
Cash Cr.	Jul-09	Aug-09	No	---	---	---	Unknown
Polly Cr.	Jul-87	Aug-09	No	No	---	---	Unknown
Stillwater Cr.	Jul-09	Aug-09	No	---	---	---	Unknown
Big Trout Cr.	Aug-09	Sep-09	Yes	---	---	---	***2010***[1]
Otter Cove Cr.	Aug-71	Jul-02	No	No	---	---	Unknown
Black Sturgeon R.	Aug-05	Sep-07	No	Yes	---	---	2011
Big Squaw Cr.	Jun-72	Jun-09	---	No	---	---	Unknown
Wolf R.	Jul-07	Aug-09	Yes	Yes	---	---	2011
Coldwater Cr.	Jul-07	Aug-09	Yes	Yes	---	---	2011
Pearl R.	Aug-04	Aug-08	Yes	Yes	14,843	1,002	***2010***
D'Arcy Cr.	Never	Aug-09	---	Yes	---	---	***2010***
Blende Cr.	Aug-64	Aug-05	---	No	---	---	Unknown
MacKenzie R.	Jul-08	Aug-08	No	Yes	---	---	Unknown
Neebing-McIntyre Floodway							
McIntyre R.	Jul-07	Aug-09	Yes	Yes	---	---	Unknown
Neebing R.	Jul-08	Aug-09	Yes	Yes	---	---	Unknown
Kaministiquia R.	Aug-06	Sep-09	Yes	Yes	---	---	***2010***[1]
Cloud R.	Jul-08	Aug-08	No	---	---	---	Unknown
Pine R.	Jul-73	Aug-09	---	Yes	---	---	Unknown
Pigeon R.	Jul-07	Aug-09	Yes	Yes	---	---	Unknown
United States							
Waiska R.	Jul-07	Aug-09	No	No	---	---	Unknown
Sec. 11 SW Trib.	Never	Aug-09	---	Yes	---	---	Unknown
Pendills Cr.	Sep-88	Aug-09	---	Yes	100	0	Unknown
Grants Cr.	Jun-08	Jul-08	No	No	---	---	Unknown
Naomikong Cr.	Jul-63	Jul-07	---	No	---	---	Unknown
Ankodosh Cr.	Jun-08	Jul-08	No	Yes	---	---	Unknown
Roxbury Cr.	Jun-08	Jul-08	No	No	---	---	Unknown
Galloway Cr.	Jul-07	Jul-08	No	No	---	---	Unknown
Tahquamenon R.	Oct-06	Oct-09	Yes	Yes	---	---	***2010***[1]
Betsy R.	Oct-06	Aug-09	No	Yes	33,772	1,407	***2010***
Three Mile Cr.	Jun-62	Jul-08	---	No	---	---	Unknown
Little Two Hearted R.	Jun-08	Sep-08	No	No	---	---	2012
Two Hearted R.	Jun-08	Oct-09	Yes	Yes	138,661	3,896	***2010***
Dead Sucker R.	Jul-75	Sep-09	---	No	0	0	Unknown
Sucker R. (Alger)	Sep-06	Sep-09	Yes	Yes	---	---	***2010***[1]
Chipmunk Cr.	Sep-62	Jul-04	---	No	---	---	Unknown
Carpenter Cr.	Aug-05	Sep-09	Yes	Yes	248	142	2011
Sable Cr.	Sep-89	Aug-08	---	Yes	---	---	Unknown
Hurricane R.	Never	Aug-08	---	Yes	---	---	Unknown
Sullivans Cr.	Jul-04	Sep-09	No	Yes	7,900	227	2011
Seven Mile Cr.	Jul-67	Sep-09	---	No	---	---	Unknown

Table 11 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment) Residuals Present	Recruitment Evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Beaver Lake Cr.							
Lowney Cr.	Jul-06	Aug-09	Yes	Yes	19,986	11,719	***2010***
Mosquito R.	Jun-73	Aug-08	---	No	---	---	Unknown
Miners R.							
Downstream of Barrier	Sep-09	Oct-09	No	No	---	---	2013
Upstream of barrier	Sep-09	Oct-09	No	No	---	---	Unknown
Munising Falls Cr.	Sep-64	Jun-09	---	Yes	---	---	Unknown
Anna R.	Sep-65	Jul-09	---	Yes	---	---	Unknown
Furnace Cr.	Jul-07	Aug-09	Yes	Yes	5,295	5,242	***2010***
Five Mile Cr.	Jul-07	Oct-08	No	No	---	---	Unknown
Au Train R.							
Upper	Jul-08	Oct-08	Yes	Yes	---	---	2011
Buck Bay Cr.	Jul-08	Oct-08	No	No	---	---	2011
Lower	Aug-97	Jul-08	---	Yes	---	---	2011
Rock R.	Jul-02	May-09	---	No	---	---	Unknown
Deer Lake Cr.	Aug-70	May-09	---	No	---	---	Unknown
Laughing Whitefish R.	Aug-09	Oct-09	No	No	---	---	2013
Sand R.	Jul-85	Oct-09	---	Yes	---	---	Unknown
Chocolay R.	Jul-09	May-09	---	---	---	---	2012
Carp R.	Sep-09	Oct-08	---	---	---	---	2013
Dead R.	Jul-06	Jul-09	Yes	Yes	68,412	10,715	***2010***
Harlow Cr.	Jun-07	Oct-09	Yes	Yes	29,842	3,536	***2010***
Little Garlic R.	Aug-09	Oct-09	Yes	Yes	34,841	122	***2010***
Garlic R.	Jul-09	Oct-09	Yes	Yes	---	---	2012
Iron R.	Sep-09	Oct-09	Yes	No	---	---	2013
Salmon Trout R. (Marquette Co.)	Sep-09	Oct-09	No	No	---	---	2013
Pine R.	Jul-04	Oct-09	No	Yes	5,591	0	Unknown
Huron R.	Oct-09	Aug-09	No	---	---	---	2013
Ravine R.	Aug-09	Oct-09	Yes	Yes	---	---	***2010***[1]
Slate R.	Aug-09	Oct-09	No	No	---	---	2013
Silver R.	Aug-09	Oct-09	No	No	---	---	***2010***[1]
Falls R.	Aug-09	Oct-09	No	No	---	---	***2010***[1]
Six Mile Cr.	May-63	Aug-09	---	Yes	385	308	Unknown
Sturgeon R.	Oct-06	Aug-09	Yes	Yes	---	---	***2010***[1]
Pilgrim R.	Aug-62	Jun-09	---	No	---	---	Unknown
Trap Rock R.	May-09	Aug-09	Yes	No	---	---	2012
McCallum Cr.	Aug-63	Sep-05	---	No	---	---	Unknown
Traverse R.	May-09	Aug-09	Yes	No	---	---	2012
Little Gratiot R.	Aug-72	Jun-08	---	No	---	---	Unknown
Eliza Cr.	Jul-07	Aug-09	Yes	Yes	207	38	2012
Gratiot R.	Jun-06	Aug-09	No	Yes	3,316	175	2011
Smiths Cr.	May-64	Jun-07	---	No	---	---	Unknown
Boston-Lily Cr.	Aug-62	Jun-07	---	No	---	---	Unknown

Table 11 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment) Residuals Present	Recruitment Evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Salmon Trout R. (Houghton Co.)	Jul-08	Sep-08	No	No	---	---	Unknown
Mud Lake Outlet	Oct-73	Sep-05	---	No	---	---	Unknown
Graveraet R.	Aug-63	Aug-09	---	No	---	---	Unknown
Elm R.	Jul-07	Aug-09	No	No	---	---	Unknown
Misery R.							
Barrier downstream	Aug-07	Jun-09	No	Yes	---	---	2012
Barrier upstream	Sep-00	Aug-09	---	No	---	---	Unknown
East Sleeping R.	Jul-08	Oct-08	No	No	---	---	2012
West Sleeping R.	Aug-09	Oct-09	No	No	---	---	2013
Firesteel R.	Jul-08	Oct-08	Yes	Yes	---	---	2011
Ontonagon R.	Oct-08	Aug-09	Yes	Yes	---	---	2012
Potato R.	Jun-08	Sep-08	No	---	---	---	2011
Floodwood R.	Never	Jun-07	---	No	---	---	Unknown
Cranberry R.	Jun-08	Sep-08	Yes	Yes	---	---	2011
Little Iron R.	Sep-75	Jul-08	---	No	---	---	Unknown
Union R.	May-64	Aug-09	---	No	---	---	Unknown
Black R.	Sep-06	Sep-09	No	Yes	151,731	34,793	***2010***
Montreal R.	Jul-75	Aug-07	---	No	---	---	Unknown
Washington Cr.	Jun-80	Aug-09	---	No	---	---	Unknown
Bad R.	Oct-08	Oct-09	Yes	Yes	---	---	2011
Fish Cr.- Eileen Twp.	Sep-07	Oct-09	Yes	Yes	112,676	26,002	***2010***
Sioux R.	Never	Sep-09	---	Yes	---	---	Unknown
Red Cliff Cr.	Sep-07	Aug-08	No	No	---	---	2012
Raspberry R.	Jun-63	Aug-08	---	No	---	---	Unknown
Sand R.	Aug-07	Oct-09	Yes	Yes	1,854	506	2011
Cranberry R.	Never	Jun-06	---	No	---	---	Unknown
Iron R.							
Barrier downstream	Aug-07	Aug-08	No	No	---	---	Unknown
Barrier upstream	Oct-64	Aug-08	---	No	---	---	Unknown
Reefer Cr.	Oct-64	Aug-08	---	No	---	---	Unknown
Fish Cr. – Orienta Twp.	Oct-64	Aug-08	---	No	---	---	Unknown
Brule R.	Jul-09	Oct-09	No	Yes	---	---	2012
Poplar R.	May-08	Aug-08	No	No	---	---	2012
Middle R. (barrier downstream)	May-08	Oct-09	Yes	Yes	---	---	2011
Amnicon R.	Oct-09	Sep-09	---	---	---	---	2012
Nemadji R.	Jun-09	Oct-09	Yes	Yes	3,887	672	2011
St. Louis R.	Sep-87	Sep-07	---	Yes	---	---	Unknown
Sucker R. (St. Louis)	Never	Jul-06	---	No	---	---	Unknown
Gooseberry R.	Aug-76	Jul-06	---	No	---	---	Unknown
Splitrock R.	Aug-76	Jul-06	---	No	---	---	Unknown
Poplar R.	Jul-77	Jul-06	---	No	---	---	Unknown
Arrowhead R.	Jun-09	Jul-06	No	---	---	---	2013

[1] Stream being treated based on expert judgement.

Table 12. Status of larval sea lampreys in historically infested lentic areas of Lake Superior during 2009.

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Canada				
Goulais R.	Goulais Bay	Jul-08	Jul-08	Aug-85
Havilland Cr.	Havilland Bay	Jul-06	Jul-06	Never
Stokely Cr.	Havilland Bay	Jul-09	Jul-09	Aug-07[1]
Harmony R.	Batchawana Bay	Jul-09	Jul-09	Aug-87
Chippewa R.	Batchawana Bay	Sep-08	Sep-08	Jul-09
Batchawana R.	Batchawana Bay	Sep-09	Sep-09	Oct-07
Carp R.	Batchawana Bay	Jul-06	Jul-06	Aug-07
Agawa R.	Agawa Bay	Aug-09	Aug-09	Never[1]
Michipicoten	Marina Area	Aug-09	Aug-09	Never[1]
Gravel R.	Mountain Bay	Aug-09	Aug-09	Jul-09[1]
Little Gravel R.	Mountain Bay	Aug-09	Aug-09	Jul-06
Little Cypress R.	Cypress Bay	Aug-78	Aug-78	Never
Cypress R.	Cypress Bay	Aug-09	Aug-09	Jul-09
Jackpine R.	Nipigon Bay	Jul-02	Jul-89	Never
Jackfish R.	Nipigon Bay	Jul-07	Aug-05	Never
Nipigon R.	Helen Lake	Sep-09	Sep-09	Aug-09[1]
Nipigon R.	Nipigon Bay	Jul-03	Jul-03	Aug-05
Nipigon R.	Polly Lake	Aug-05	Jul-90	Jul-87
Big Trout Cr.	Nipigon Bay	Sep-09	Sep-09	Oct-09
Black Sturgeon R.	Black Bay	Aug-09	Jul-04	Never
Wolf R.	Black Bay	Aug-09	Aug-09	Never
MacKenzie R.	MacKenzie Bay	Aug-08	Jul-07	Jul-07
Current R.	Thunder Bay	Aug-09	Aug-09	Never[1]
Neebing-McIntyre Floodway	Thunder Bay	Aug-05	Jul-90	Never
Kaministiquia R. (lower)	Thunder Bay	Sep-09	Sep-09	Aug-09[1]
Pigeon R.	Pigeon Bay	Sep-09	Sep-09	Never[1]
United States				
Grants Cr.	Tahquamenon Bay	Sep-05	Never	Never
Ankodosh Cr.	Tahquamenon Bay	Jul-08	Jul-08	Never[2]
Roxbury Cr.	Tahquamenon Bay	Jul-08	Jul-08	Never[2]
Dead Sucker R.	Offshore Dead Sucker R.	Sep-09	---	Never
Galloway Cr.	Tahquamenon Bay	Jul-07	Jul-88	Never
Sucker R.	Grand Marais Harbor	Sep-09	Aug-90	Never
Carpenter Cr.	West Bay	Sep-09	Sep-09	Never[1]
Beaver Lake Cr.	Beaver Lake	Jun-09	Jun-09	Never[2]
Anna R.	Munising Bay	Jul-09	Jul-09	Never[2]
Miners R.	Miners Lake	Sep-08	Sep-08	Sep-09
Furnace Cr.	Furnace Bay	Aug-09	Aug-09	Sep-79[1]
Furnace Cr.	Furnace Lake – Offshore Hanson Cr.	Aug-09	Aug-09	Never[2]
Furnace Cr.	Furnace Lake – Offshore Gongeau Cr.	Aug-09	Aug-09	Never[2]
Dead R.	Presque Isle Harbor	Sep-08	Sep-08	Aug-09[1]
Harlow Cr.	Harlow Lake – Offshore Bismark Cr.	Jul-09	Jul-09	Never[2]
Little Garlic R.	Little Garlic R.	Aug-09	Aug-09	Never[2]

Table 12 *continued.*

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Garlic R.	Garlic R. offshore mouth	Sep-05	Sep-05	Never[2]
Garlic R.	Saux Head Lake	Jul-09	Jul-09	Never[2]
Ravine R.	Huron Bay	Jul-06	Jul-06	Aug-09[1]
Slate R.	Huron Bay	Aug-09	Aug-09	Never[2]
Silver R.	Huron Bay	Aug-09	Aug-09	Never[2]
Falls R.	Huron Bay	Jul-08	Jul-08	Aug-09[1]
Trap Rock R.	Torch Lake	Aug-09	Aug-09	Never[1]
Eliza Cr.	Eagle Harbor	Jul-03	Sep-78	Never
Black R.	Black River Harbor	Sep-09	Sep-09	May-06
Fish Cr. (Eileen Twp.)	Chequamegon Bay	Sep-09	Aug-06	Never[2]
Red Cliff Cr.	Buffalo Bay	Jul-05	Jun-97	Never

[1] Scheduled for treatment during 2010.
[2] Low-density larval populations monitored with gB surveys.

Lake Michigan

- Larval assessment surveys were conducted on 97 tributaries and offshore of 13 tributaries. The status of larval sea lamprey populations in historically infested Lake Michigan tributaries and lentic areas are presented in Tables 13 and 14.

- Surveys to estimate the abundance of larval sea lampreys were conducted in 33 tributaries and offshore of 1 tributary.

- Surveys to detect the presence of new larval sea lamprey populations were conducted in 19 tributaries. A new population was discovered in Mattix Creek and is scheduled to be treated during 2010.

- Post-treatment assessments were conducted in 20 tributaries and 2 lentic areas to determine the effectiveness of lampricide treatments during 2008 and 2009.

- Surveys to evaluate barrier effectiveness were conducted in 4 tributaries.

- Surveys to collect larval lampreys for pheromone extraction were conducted in 7 tributaries.

Table 13. Status of larval sea lampreys in Lake Michigan tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed during 2009.

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment) Residuals present	Recruitment evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Brevort R.							
Lower	Oct-06	Jun-09	No	No	---	---	Unknown
Little Brevort R.	Sep-08	May-09	No	No	---	---	Unknown
Silver Cr.	Sep-08	May-09	Yes	No	---	---	2011
Paquin Cr.	Oct-87	Jun-09	---	No	---	---	Unknown
Davenport Cr.	Aug-63	May-07	---	Yes	---	---	Unknown
Hog Island Cr.	Jun-09	Aug-09	No	No	---	---	2012
Sucker R.	Jun-61	Aug-09	---	No	---	---	Unknown
Black R.	Jun-09	Oct-09	Yes	Yes	---	---	2012
Mattix Cr.	Never	Oct-09	---	Yes	763	246	***2010*** [1]
Mile Cr.	Sep-72	Aug-09	---	Yes	27	0	Unknown
Millecoquins R.							
Lower	Jul-95	Aug-09	---	Yes	6,775	4,065	***2010***
Upper	Jun-07	Sep-09	No	Yes	---	---	2011
McAlpine Cr.	Jun-07	Aug-09	No	Yes	---	---	2011
Furlong Cr.	Jun-07	Aug-09	No	Yes	---	---	2011
Cold Cr.	Jul-09	Sep-09	No	No	---	---	2012
Rock R.	May-06	Sep-09	Yes	Yes	3,061	1,347	***2010***
Crow R.	Jun-09	Oct-09	No	No	---	---	2012
Cataract R.	Aug-04	Aug-09	No	Yes	4,485	1,456	***2010***
Pt. Patterson Cr.	Sep-83	Jul-09	---	Yes	---	---	2011
Hudson Cr.	Jul-08	Oct-09	Yes	Yes	6,100	2,928	***2010***
Swan Cr.	Jul-92	May-07	No	No	---	---	Unknown
Seiners Cr.	May-84	May-07	No	No	---	---	Unknown
Milakokia R.	Oct-07	Sep-09	No	Yes	---	---	2011
Huntspur Cr.	Sep-08	Sep-09	Yes	No	---	---	2011
Bulldog Cr.	Jul-08	Sep-08	Yes	No	---	---	2011
Gulliver Lake Outlet	Oct-07	May-08	No	No	---	---	2011
Marblehead Cr.	May-05	Oct-09	No	Yes	71,483	2,042	***2010***
Manistique R.							
Above Dam	Sep-09	Aug-08	---	---	---	---	2013
Below Dam	Sep-09	Aug-08	---	---	---	---	2013
Estuary	Sep-09	Aug-08	---	---	---	---	2013
Southtown Cr.	Jun-77	Jul-07	---	Yes	---	---	Unknown
Thompson Cr.	Never	Jul-07	---	Yes	---	---	Unknown
Johnson Cr.	Aug-81	Sep-09	---	Yes	324	10	2011
Deadhorse Cr.	Jun-09	Sep-08	---	---	---	---	2012
Gierke Cr.	Never	May-07	---	Yes	---	---	Unknown
Bursaw Cr.	Jul-08	Oct-09	Yes	Yes	13,989	6,846	***2010***
Parent Cr.	Jun-91	Sep-08	---	No	---	---	Unknown
Poodle Pete Cr.	Aug-01	Oct-09	No	Yes	738	40	2011
Little Fishdam R.	May-01	Sep-09	No	No	---	---	Unknown

Table 13 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment) Residuals present	Recruitment evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Big Fishdam R.	Aug-08	Sep-09	Yes	Yes	---	---	2012
Sturgeon R.	Sep-08	Aug-09	Yes	Yes	202,381	21,312	***2010***
Ogontz R.	May-07	Aug-09	Yes	Yes	---	---	***2010***[1]
Squaw Cr.	Aug-00	May-07	No	No	---	---	Unknown
Hock Cr.	May-81	Oct-09	---	No	---	---	Unknown
Whitefish R.	Jun-08	Oct-09	Yes	Yes	---	---	2011
Rapid R.	Nov-09	Oct-08	---	---	---	---	2013
Tacoosh R.	May-07	Jul-09	No	No	---	---	2012
Days R.							
Below barrier	Oct-09	Apr-09	---	---	---	---	***2010***[1]
Above barrier	Apr-09	Apr-09	---	---	---	---	Unknown
Portage Cr.	Oct-09	Aug-08	---	---	---	---	2013
Ford R.	May-08	Oct-09	Yes	Yes	559,676	45,786	***2010***
Sunnybrook Cr.	May-71	Jul-09	---	No	---	---	Unknown
Bark R.	May-07	Jul-09	No	Yes	---	---	2011
Cedar R.	May-07	Aug-09	Yes	Yes	---	---	***2010***[1]
Sugar Cr.	May-08	Aug-08	No	No	---	---	Unknown
Arthur Bay Cr.	Apr-70	Jul-09	---	Yes	11,005	4,717	***2010***
Rochereau Cr.	Apr-63	May-07	---	No	---	---	Unknown
Johnson Cr.	Apr-63	Oct-09	---	Yes	2,426	505	***2010***
Bailey Cr.	May-09	Jul-09	Yes	No	---	---	2012
Beattie Cr.	Apr-09	Jul-09	Yes	Yes	---	---	2012
Springer Cr.	May-08	Aug-08	Yes	Yes	---	---	2012
Menominee R.	Jun-07	Jul-09	No	Yes	---	---	2011
Little R.	Aug-87	Aug-08	---	No	---	---	Unknown
Peshtigo R.	Oct-09	Oct-09	---	---	---	---	2013
Oconto R.	May-09	Jun-09	No	No	---	---	2012
Pensaukee R.	Nov-77	Jun-09	---	No	---	---	Unknown
Suamico R.	Never	Jun-09	---	No	---	---	Unknown
Ephraim Cr.	Apr-63	May-07	---	No	---	---	Unknown
Hibbards Cr.	May-07	Oct-09	No	No	269	0	2011
Whitefish Bay Cr.	May-87	Jun-09	---	No	---	---	Unknown
Lilly Bay Cr.	Apr-63	May-07	---	No	---	---	Unknown
Bear Cr.	May-75	May-07	---	No	---	---	Unknown
Door Co. 23 Cr.	May-07	Oct-09	No	No	0	0	Unknown
Ahnapee R.	Apr-64	Aug-08	---	No	---	---	Unknown
Three Mile Cr.	Sep-08	Jun-09	No	No	---	---	2012
Kewaunee R.							
Below Barrier	May-75	Aug-08	---	No	---	---	Unknown
Above Barrier	May-75	Aug-08	---	Yes	---	---	Unknown
Casco Cr.	May-07	Jun-09	No	No	---	---	Unknown
Scarboro Cr.	May-75	Aug-08	---	No	---	---	Unknown
East Twin R.	Oct-08	Jun-09	No	No	---	---	2012

Table 13 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment)		Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
			Residuals present	Recruitment evident			
Fischer Cr.	May-87	Aug-08	---	No	---	---	Unknown
Carp Lake R.	Apr-09	May-09	Yes	---	---	---	Unknown
Big Stone Cr.	Oct-07	Oct-07	Yes	---	---	---	Unknown
Big Sucker R.	Oct-07	Oct-07	Yes	---	---	---	Unknown
Wycamp Lake Outlet	May-08	Sep-08	No	Yes	---	---	Unknown
Bear R.	Never	May-09	---	No	---	---	Unknown
Horton Cr.	Oct-09	Sep-09	No	---	---	---	2012
Boyne R.	May-06	May-09	Yes	Yes	---	---	***2010***[1]
Porter Cr.	Oct-09	Sep-09	Yes	Yes	---	---	2012
Jordan R.	Sep-07	Sep-09	Yes	Yes	250,428	0	2011
Monroe Cr.	Sep-07	Oct-07	No	No	---	---	Unknown
Loeb Cr.	Oct-08	May-09	Yes	No	---	---	Unknown
McGeach Cr.	Oct-99	Jun-08	No	No	---	---	Unknown
Elk Lake Outlet	Sep-04	Sep-09	Yes	No	469	0	Unknown
Yuba Cr.	May-06	Jun-09	No	No	---	---	Unknown
Acme Cr.	Aug-63	Jun-09	---	No	---	---	Unknown
Mitchell Cr.	Oct-08	Oct-08	No	---	---	---	2012
Boardman R.	Jun-09	Jul-09	Yes	---	---	---	2012
Leo Cr.	Never	May-07	---	No	---	---	Unknown
Goodharbor Cr.	Jul-07	Sep-09	Yes	Yes	5,470	5,470	***2010***
Crystal R.	Oct-72	Sep-08	---	No	---	---	Unknown
Platte R. (upper)	Jun-09	Jul-09	No	---	---	---	2012
Platte R. (middle)	Aug-07	Sep-09	No	Yes	13,396	0	2011
Platte R. (lower)	Aug-07	Sep-09	No	Yes	3,994	0	2011
Betsie R.	Sep-06	Sep-09	No	Yes	500,041	64,599	***2010***
Bowen Cr.	Jun-09	Oct-09	No	---	---	---	2012
Big Manistee R.	Aug-09	Oct-09	Yes	---	---	---	2012
Bear Cr.	Aug-09	Oct-09	No	---	---	---	2012
L. Manistee R.	Jul-08	Oct-09	Yes	Yes	11,687	2,922	2011
Gurney Cr.	Aug-09	Oct-09	No	---	---	---	Unknown
Cooper Cr.	Jul-08	Sep-08	No	---	---	---	Unknown
Lincoln R.	Jul-06	Sep-09	Yes	Yes	181,804	122,903	***2010***
Pere Marquette R.	Jul-09	Oct-09	No	---	---	---	2012
Bass Lake Outlet	Aug-78	Jul-09	---	No	---	---	Unknown
Pentwater R. (N. Br.)	Jun-07	Oct-09	No	Yes	7,138	1,785	2011
South Branch	Never	Oct-09	---	No	---	---	Unknown
Lambricks Cr.	Sep-84	Oct-09	---	No	---	---	Unknown
Stony Cr.	Jul-87	Oct-09	---	Yes	3,475	2,955	***2010***
Flower Cr.	Sep-81	Sep-09	---	Yes	2,659	0	Unknown
White R. (below barrier)	Aug-07	Aug-09	No	Yes	408,985	15,779	***2010***
White R. (above barrier)	Aug-01	Aug-09	---	Yes	114,594	102,740	***2010***
Duck Cr.	Jul-84	Jun-09	---	No	---	---	Unknown

Table 13 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment)		Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
			Residuals present	Recruitment evident			
Muskegon R.	Aug-08	Jul-07	Yes	---	---	---	2011
Brooks Cr.	Aug-05	Jun-09	---	Yes	5,635	5,635	***2010***
Cedar Cr.	Aug-05	Jun-09	---	Yes	10,543	8,435	***2010***
Bridgeton Cr.	Aug-08	Jun-06	No	---	---	---	2011
Minnie Cr.	Aug-08	Oct-08	No	---	---	---	2011
Bigelow Cr.	Aug-08	Oct-08	No	---	---	---	2011
Big Bear Cr.	Aug-70	Jun-06	---	No	---	---	Unknown
Mosquito Cr.	Sep-68	Oct-08	---	No	---	---	Unknown
Black Cr.	Aug-08	Aug-08	No	---	---	---	Unknown
Grand R.	Never	Jul-07	---	No	---	---	Unknown
Norris Cr.	Aug-08	Oct-08	No	---	---	---	2012
Lowell Cr	Sep-65	Aug-05	---	No	---	---	Unknown
Buck Cr.	Sep-65	Oct-08	---	No	---	---	Unknown
Rush Cr.	Sep-65	Oct-08	---	No	---	---	Unknown
Sand Cr.	Jun-07	Sep-09	No	No	0	0	Unknown
Crockery Cr.	Sep-09	Sep-09	Yes	---	---	---	2013
Bass R.	Aug-04	Jul-07	No	No	---	---	Unknown
Rogue R.	Sep-09	Sep-09	No	---	---	---	Unknown
Pigeon R.	Oct-64	Jun-07	---	No	---	---	Unknown
Pine Cr.	Oct-64	Jun-07	---	No	---	---	Unknown
Gibson Cr.	Jul-84	Jul-07	---	No	---	---	Unknown
Kalamazoo R.	Never	Jul-07	---	Yes	---	---	Unknown
Bear Cr.	Aug-04	Sep-09	---	Yes	1,417	327	***2010***
Sand Cr.	Aug-04	Sep-09	---	Yes	109	0	***2010***
Mann Cr.	Jun-07	Sep-09	Yes	Yes	3,160	316	***2010***
Rabbit R.	Aug-08	Sep-09	Yes	No	---	---	Unknown
Swan Cr.	Jul-77	Sep-09	No	No	0	0	Unknown
Allegan 3 Cr.	Sep-65	Jul-07	---	No	---	---	Unknown
Allegan 4 Cr.	Oct-78	Jul-09	---	No	---	---	Unknown
Allegan 5 Cr.	Never	Jul-07	---	No	---	---	Unknown
Black R.	Oct-07	Jul-09	---	Yes	---	---	Unknown
Brandywine Cr.	Oct-85	Jun-09	---	No	---	---	Unknown
Rogers Cr.	May-98	Jun-09	---	No	---	---	Unknown
St. Joseph R.	Never	Oct-08	---	No	---	---	Unknown
Lemon Cr.	Oct-65	Sep-07	---	No	---	---	Unknown
Pipestone Cr.	Aug-03	Jul-09	No	Yes	3,822	3,822	***2010***
Meadow Dr.	Oct-65	Sep-07	---	No	---	---	Unknown
Hickory Cr.	Oct-65	Sep-07	No	Yes	---	---	Unknown
Paw Paw R.	May-09	Jul-09	No	---	---	---	2012
Blue Cr.	May-01	Jul-09	---	Yes	---	---	Unknown
Mill Cr.	May-09	Jul-09	No	No	---	---	2012
Brandywine Cr.	May-05	Oct-08	No	Yes	---	---	Unknown
Brush Cr.	May-09	Jul-09	No	No	---	---	2012

Table 13 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment)		Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
			Residuals present	Recruitment evident			
Galien R. (N. Br.)	Oct-07	Sep-09	No	Yes	1,651	1,100	***2010***
E. Br. & Dowling Cr.	Oct-07	Sep-09	No	Yes	11,003	7,336	***2010***
S. Br. & Galina Cr.	Jun-09	Sep-09	No	No	---	---	2012
Spring Cr.	Jun-09	Sep-09	No	No	---	---	2012
S. Br. Spring Cr.	Jun-09	Sep-09	No	No	---	---	2012
State Cr.	May-86	Jul-07	---	No	---	---	Unknown
Trail Cr.	Jul-06	Sep-09	No	Yes	17,421	12,721	***2010***
Donns Cr.	May-66	Sep-09	---	No	---	---	Unknown
Burns Ditch	Jul-99	Jul-08	No	No	---	---	Unknown

[1] Stream being treated based on expert judgment.

Table 14. Status of larval sea lampreys in historically infested lentic areas of Lake Michigan during 2009.

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Brevort R.	Brevort Lake (Silver Cr. – Offshore)	Jul-08	Jul-08	Never[1]
	Brevort Lake (L. Brevort R.. – Offshore)	Jul-08	Aug-74	Never
Paquin Cr.	Paquin Cr. (Offshore)	Jul-08	Jul-08	Never[1]
Hog Island Cr.	Hog Island Cr. (Offshore)	Aug-09	Aug-09	Jun-07
Black R.	Black R. (Offshore)	Jun-08	Jun-08	Never[1]
Mile Cr.	Mile Cr. (Offshore)	Jun-08	Jun-08	Never[1]
Millecoquins R.	Millecoquins Lake (Cold Cr. – Offshore)	Aug-09	Aug-09	Never[1]
Cataract R.	Cataract R. (Offshore)	Aug-09	Aug-09	Never[1]
Milakokia R.	Seul Choix Bay	Sep-07	Aug-80	Never
Manistique R.	Manistique R. (Offshore)	Jul-09	Jul-09	Aug-08
Bursaw Cr.	Bursaw Cr. (Offshore)	Jul-86	Jul-76	Never
Ogontz R.	Ogontz R. (Offshore)	Aug-07	Aug-07	Never[1]
Whitefish R.	Big Bay De Noc	Jul-07	Jul-07	Never
Rapid R.	Little Bay De Noc	Aug-09	Aug-09	Never[1]
Days R.	Little Bay De Noc	Aug-08	Aug-08	Never[1]
Escanaba R.	Little Bay De Noc	Aug-07	Jul-06	Never[1]
Portage Cr.	Portage Bay	Jul-84	Jul-77	Never
Ford R.	Green Bay	Aug-08	Aug-08	Never[1]
Cedar R.	Green Bay	Jul-09	Jul-09	Aug-08
Beattie Cr.	Green Bay	Jul-08	Jul-85	Never
Menominee R.	Green Bay	Sep-06	Sep-06	Never[1]
Carp Lake R.	Cecil Bay	Sep-09	Sep-09	Never[1]
Bear R.	Little Traverse Bay	May-09	Jun-08	May-07
Horton Cr.	Horton Bay (Lake Charlevoix)	Oct-09	Oct-09	Oct-09
Boyne R.	Boyne Harbor (Lake Charlevoix)	Sep-09	Sep-09	May-06
Porter Cr.	Lake Charlevoix	Oct-09	Jul-08	Never[1]
Jordan R.	Lake Charlevoix	Sep-08	Sep-08	May-07
Monroe Cr.	Lake Charlevoix	Jul-08	Jul-06	Never[1]
Mitchell Cr.	Grand Traverse Bay (East Arm)	May-04	May-04	Never[1]
Boardman R.	Grand Traverse Bay (West Arm)	Jul-08	May-04	Never[1]
Leland R.	Leland R. (Offshore)	Jun-09	Jun-09	Never[1]
Platte R.	Loon Lake	Sep-08	Sep-08	Never
	Platte Lake	Sep-08	Jul-03	Never[1]
Betsie R.	Betsie Lake	May-08	Aug-83	Never[1]
Big Manistee R.	Manistee Lake (Big Manistee - Offshore)	Jul-08	Jul-08	Never[1]
	Manistee Lake (Little Manistee – Offshore)	Jul-08	Jul-08	Jul-08

[1] Low-density larval population monitored with gB surveys.

Lake Huron

- Larval assessment surveys were conducted on a total of 88 tributaries (38 Canada, 50 U.S.) and 14 lentic areas (1 Canada, 13 U.S.). The status of larval sea lamprey populations in historically infested Lake Huron tributaries and lentic areas are presented in Tables 15 and 16.

- Surveys to estimate the abundance of larval sea lampreys were conducted in 33 tributaries (14 Canada, 19 U.S.) and 3 lentic areas (1 Canada, 2 U.S.).

- Surveys to detect the presence of new larval sea lamprey populations were conducted in 19 tributaries (5 Canada, 14 U.S.) and 1 Canadian lentic area. No new populations were discovered.

- Post-treatment assessments were conducted in 14 tributaries (6 Canada, 8 U.S.) to determine the effectiveness of lampricide treatments during 2008 and 2009.

- Monitoring of larval sea lampreys in the St. Marys River continued during 2009. Eight hundred and eighty-nine geo-referenced sites were sampled using deepwater electrofishing gear. Surveys were conducted according to a stratified, systematic sampling design. The larval sea lamprey population for the entire St. Marys River is estimated to be 3.3 million (95% confidence limits: 2.1 – 4.4 million).

- The downstream distribution of larval sea lampreys in the St. Marys River was further investigated during 2009 using gB. Twenty-four 500m^2 plots were surveyed downstream of the annual deepwater electrofishing assessment locations. No new populations were discovered.

- Seabed classification sonar (RoxAnn) was used to evaluate a total of 30.4 ha of lentic substrate in Tenby Bay, off of the mouths of Browns Creek and Watson Creek.

- A rotary screw trap was placed in the Root River to collect residual metamorphosed sea lampreys migrating to the North Channel after the 2009 TFM treatment. Extremely high stream conditions and problems with trap operation caused the study to be terminated earlier than anticipated. No recently metamorphosed sea lampreys were captured.

Table 15. Status of larval sea lampreys in Lake Huron tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed during 2009**.**

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment) Residuals Present	Recruitment Evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Canada							
Root R.							
Main	Sep-09	Oct-09	Yes	---	---	---	***2010***[2]
West Root	Oct-09	Jun-09	Yes	Yes	---	---	***2010***[2]
Garden R.	Jul-09	Jul-09	Yes	---	---	---	***2010***[2]
Echo R.							
Upper	Oct-99	Sep-09	---	No	---	---	Unknown
Lower	Oct-99	Sep-09	---	Yes	9,856	4,139	***2010***
Bar & Iron Cr.	Oct-08	Jul-09	Yes	Yes	---	---	Unknown
Bar R.	Oct-09	Oct-09	---	---	---	---	***2010***[2]
Sucker Cr.	May-05	Aug-07	No	No	---	---	Unknown
Two Tree R.	May-09	Oct-09	No	---	---	---	***2010***[2]
Richardson Cr.	May-09	Oct-09	Yes	Yes	---	---	2011
Watson Cr.	May-09	May-09	---	---	---	---	***2010***[2]
Gordon Cr.	May-08	Sep-08	No	Yes	---	---	***2010***[2]
Browns Cr.	Oct-03	Sep-09	Yes	Yes	242	121	***2010***[2]
Koshkawong R.	Jun-06	Sep-09	Yes	Yes	5,772	2,057	***2010***
No Name	Aug-75	Jun-08	---	Yes	---	---	Unknown
No Name	Sep-75	Jul-08	---	Yes	---	---	Unknown
MacBeth Cr.	Jun-67	Aug-05	---	No	---	---	Unknown
Thessalon R.							
Upper	Oct-07	Sep-09	No	No	---	---	***2010***[2]
Lower	Jul-09	Jul-09	No	---	---	---	***2010***[2]
Livingstone Cr.	Jun-00	Sep-09	No	No	---	---	Unknown
Mississagi R.							
Main	Aug-08	Oct-08	Yes	---	---	---	***2010***[2]
Pickerel Cr.	Jun-08	Jun-07	---	No	---	---	***2010***[2]
Blind R.	May-84	Jun-07	---	No	---	---	Unknown
Lauzon R.	Jun-07	Jun-07	No	No	---	---	***2010***[2]
Spragge Cr.	Oct-95	May-09	---	No	---	---	Unknown
No Name	Jun-06	Sep-09	Yes	Yes	---	---	***2010***[2]
Serpent R.							
Main	Jun-08	Jun-07	---	---	---	---	Unknown
Grassy Cr.	Jun-06	May-09	No	No	---	---	***2010***[2]
Spanish R.	Sep-02	Oct-08	Yes	Yes	47,470	23,735	***2010***
Aux Sables R.	Jun-08	Jun-07	---	---	---	---	***2010***
Kagawong R.	Aug-67	May-09	---	No	---	---	Unknown
Unnamed	Jun-08	Jun-08	Yes	---	---	---	***2010***[2]
Silver Cr.	Jul-04	Sep-09	No	Yes	---	---	***2010***[2]
Sand Cr.	Oct-01	Jul-09	---	Yes	5,748	1,219	***2010***
Mindemoya R.	Jun-06	Aug-07	Yes	Yes	---	---	***2010***[1]
Timber Bay Cr.	Jun-08	Jun-08	No	---	---	---	***2010***[2]

Table 15 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment) Residuals Present	Recruitment Evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Manitou R.	Oct-07	Jun-08	Yes	No	---	---	2012
Blue Jay Cr.	Oct-07	May-09	No	Yes	---	---	***2010***[2]
Kaboni Cr.	Oct-78	May-09	---	No	---	---	Unknown
Chikanishing R.	Jun-03	Apr-09	No	No	---	---	Unknown
French R. System							
O.V. Channel	Jun-06	Jul-09	No	Yes	---	---	Unknown
Wanapitei R.	Jul-05	Jun-08	No	Yes	---	---	***2010***[1]
Key R. (Nesbit Cr.)	Sep-72	Jun-07	---	No	---	---	Unknown
Still R.	Jun-96	Jul-09	---	Yes	---	---	Unknown
Magnetawan R.	Jun-06	Jul-09	No	Yes	---	---	***2010***[1]
Naiscoot R.	Jun-08	Jun-08	No	---	---	---	2012
Shebeshekong R.	Never	Jul-09	---	Yes	---	---	Unknown
Boyne R.	Jun-08	Oct-08	No	Yes	---	---	2011
Musquash R.	Sep-05	Jul-09	No	No	---	---	Unknown
McDonald Cr.	Never	Jul-09	---	No	---	---	Unknown
Simcoe/Severn System	Never	Jul-09	---	Yes	---	---	Unknown
Coldwater R.	Never	Sep-07	---	No	---	---	Unknown
Sturgeon R.	Jun-07	Sep-09	Yes	Yes	---	---	2011
Hog Cr.	Sep-78	Sep-07	---	No	---	---	Unknown
Lafontaine Cr.	Jun-68	May-07	---	No	---	---	Unknown
Nottawasaga R.							
Main	May-02	Oct-08	No	No	---	---	Unknown
Boyne R.	May-02	Oct-08	No	No	---	---	Unknown
Bear Cr.	Jun-09	Oct-09	No	---	---	---	Unknown
Pine R.	Jun-09	Sep-09	No	---	---	---	2012
Pretty R.	May-72	Jun-06	---	No	---	---	Unknown
Silver Cr.	Sep-82	Jul-09	---	No	---	---	Unknown
Bighead R.	Oct-07	Sep-09	Yes	Yes	146,325	28,557	***2010***
Bothwells Cr.	Jun-79	Jun-06	No	No	---	---	Unknown
Sydenham R.	Jun-72	May-04	No	No	---	---	Unknown
Sauble R.	Jun-04	Oct-09	No	No	---	---	Unknown
Saugeen R.	Jun-71	Oct-07	No	No	---	---	Unknown
Bayfield R.	Jun-70	May-06	No	No	---	---	Unknown
United States							
Mission Cr.	Never	Jun-09	---	No	---	---	Unknown
Frenchette Cr.	Never	Sep-08	---	No	---	---	Unknown
Ermatinger Cr.	Never	Sep-08	---	No	---	---	Unknown
Charlotte R.	Oct-81	Jun-07	---	Yes	---	---	Unknown
Little Munuscong R.	Oct-09	Oct-09	---	---	---	---	***2010***[2]
Big Munuscong R. (Mainstream)	Jun-99	Sep-08	---	No	---	---	Unknown
Big Munuscong R. (Taylor Creek)	Jun-06	Oct-09	No	Yes	63,614	1,835	***2010***
++Carlton Cr.	Sep-01	May-09	---	Yes	---	---	Unknown
Canoe Lake Outlet	May-70	May-07	---	No	---	---	Unknown

Table 15 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment)		Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
			Residuals Present	Recruitment Evident			
Caribou Cr.	May-08	Aug-09	Yes	Yes	820	60	***2010***[2]
Bear Lake Outlet	Jun-77	May-09	---	Yes	964	275	***2010***
Carr Cr.	May-78	Jun-07	---	No	---	---	Unknown
Joe Straw Cr.	May-75	May-09	---	No	---	---	Unknown
Huron Point Cr.	Never	May-09	---	Yes	---	---	Unknown
Albany Cr.							
Below Barrier	Jul-07	Aug-09	Yes	Yes	2,469	195	***2010***[2]
Above Barrier	Jul-07	Sep-08	No	No	---	---	Unknown
Trout Cr.	Oct-09	Aug-09	---	---	---	---	***20102***
Beavertail Cr.	Jun-08	Aug-08	No	No	---	---	***2010***[2]
Prentiss Cr.	May-08	Aug-08	No	No	---	---	***2010***[2]
McKay Cr.	May-08	Aug-08	Yes	No	---	---	***2010***[2]
Flowers Cr.	Sep-83	Sep-08	---	No	---	---	Unknown
Ceville Cr.	Sep-05	Oct-09	No	No	0	0	Unknown
Hessel Cr.	May-08	Aug-08	No	No	----	---	***2010***[2]
Steeles Cr.	Jun-08	Aug-08	No	No	---	---	***2010***[2]
Nunns Cr.	Sep-01	May-09	---	No	---	---	Unknown
Pine R.	Jun-09	Oct-09	Yes	Yes	---	---	***2010***[2]
McCloud Cr.	Oct-72	May-09	---	Yes	---	---	Unknown
Carp R.	Jun-07	Oct-09	Yes	Yes	---	---	***2010***[2]
Martineau Cr.	May-07	Sep-09	No	Yes	2,159	0	2012
266-20 Cr.	Aug-76	Jun-09	No	No	---	---	Unknown
Beaugrand Cr.	Never	May-07	---	No	---	---	Unknown
Little Black R.	May-67	Jun-09	No	No	---	---	Unknown
Cheboygan R.	Oct-83	Sep-09	---	Yes	---	---	Unknown
Laperell Cr.	May-00	May-08	No	No	---	---	Unknown
Meyers Cr.	Sep-99	May-08	No	No	---	---	Unknown
Maple R.	Jul-07	Jul-09	No	Yes	45,747	1,236	2011
Pigeon R.	Jul-07	Sep-09	No	Yes	125,611	0	2011
Little Pigeon R.	Aug-98	Sep-09	No	No	---	---	Unknown
Sturgeon R.	Jul-08	Aug-08	No	Yes	---	---	Unknown
Elliot Cr.	Oct-08	Oct-08	No	---	---	---	2011
Greene Cr. (below barrier)	Jun-07	Jul-09	No	Yes	7,469	0	2011
Greene Cr. (above barrier)	Jun-07	Jul-09	No	No	---	---	Unknown
Grass Cr.	May-78	May-07	No	No	---	---	Unknown
Mulligan Cr.	Apr-09	Jun-09	---	Yes	---	---	Unknown
Grace Cr.	May-09	Jun-09	Yes	No	---	---	2012
Black Mallard Cr. (lower)	May-08	Jun-09	Yes	Yes	---	---	2011
Black Mallard Cr. (upper)	May-09	Jun-09	Yes	Yes	---	---	2012
Seventeen Cr.	May-67	May-07	No	No	---	---	Unknown
Ocqueoc R. (lower)	Oct-08	Oct-08	No	---	---	---	2012
Ocqueoc R. (upper)	Aug-09	Sep-09	Yes	---	---	---	Unknown
Johnny Cr.	Sep-70	Jun-07	No	No	---	---	Unknown

Table 15 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment) Residuals Present	Recruitment Evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Schmidt Cr.	May-08	May-08	Yes	---	---	---	2011
Trout R.	Oct-07	Sep-09	No	Yes	4,500	0	2011
Swan R.	Jun-07	Sep-09	No	Yes	18,705	9,798	***2010***
Middle Lake Outlet	Jun-67	Jun-07	No	No	---	---	Unknown
Grand Lake Outlet	Never	Jun-07	---	No	---	---	Unknown
Long Lake Outlet	May-08	Sep-09	No	Yes	2,825	0	2012
Squaw Cr.	Jun-67	Sep-09	---	Yes	4.259	177	***2010***
Devils R.	May-08	Sep-08	Yes	No	---	---	2011
Black R.	Jun-07	Oct-09	No	Yes	97,261	0	2011
Au Sable R.	Jun-07	Oct-09	No	Yes	819,585	21,568	***2010***
Pine R.	May-87	Jun-09	---	No	---	---	Unknown
Tawas Lake Outlet	Jul-09	Aug-09	No	No	---	---	2013
Cold Cr.	Jul-09	Aug-09	No	No	---	---	2013
Sims Cr.	Jul-09	Aug-09	No	No	---	---	2013
Grays Cr.	Sep-05	Aug-08	No	No	---	---	Unknown
Silver Cr.	Jul-09	Aug-09	Yes	Yes	---	---	2013
East AuGres R.	Jul-09	Oct-09	Yes	Yes	---	---	2012
AuGres R.	May-07	Aug-09	Yes	Yes	286,190	87,246	***2010***
Rifle R.	Sep-08	Oct-08	Yes	---	---	---	2011
Saginaw R.							
Cass R.	Jun-08	Jul-08	No	No	---	---	Unknown
Juniata Cr.	Jun-08	Jul-08	No	No	---	---	Unknown
Scott Drain	Jun-08	Jul-08	No	No	---	---	Unknown
Tittabawasse R.	Never	Sep-08	---	No	---	---	Unknown
Chippewa R.	Jun-09	Jul-09	No	No	---	---	2012
Coldwater R.	Jun-09	Jul-09	No	No	---	---	2012
Pine R.	Jun-09	Jul-08	---	---	---	---	2012
Little Salt Cr.	May-02	Sep-08	No	No	---	---	Unknown
Big Salt Cr.	Jun-09	Sep-08	---	---	---	---	2012
North Br.	Never	Sep-08	---	No	---	---	Unknown
Carroll Cr.	May-07	Sep-09	No	Yes	1,394	0	2011
Big Salt R.	May-06	Sep-09	No	Yes	74,954	67,816	***2010***
Bluff Cr.	May-06	Sep-09	No	No	0	0	Unknown
Shiawassee R.	May-07	Sep-09	No	Yes	566,918	236,324	***2010***
Rock Falls Cr.	Never	Jun-07	---	No	---	---	Unknown
Sucker Cr.	Never	Jun-07	---	No	---	---	Unknown
Cherry Cr.	Never	Jun-07	---	No	---	---	Unknown
Mill Cr.	May-85	Aug-09	---	No	0	0	Unknown
St. Marys R.	Aug-09	Aug-09	Yes	Yes	3,300,000	---	***2010***

[1] Stream being treated based on expert judgement.
[2] Stream being treated based on North Channel scenario.

Table 16. Status of larval sea lampreys in historically infested lentic areas of Lake Huron during 2009.

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Canada				
Echo R.	Solar Lake	Jul-06	Sep-93	Jul-87
	Stuart Lake	May-90	May-90	Jul-80
Two Tree R.	North Channel	Aug-81	Aug-81	Never
Gordons Cr.	North Channel	Aug-91	Aug-91	Jul-84
Browns Cr.	North Channel	Aug-91	Aug-91	Aug-87
Koshkawong R.	North Channel	Aug-91	Aug-91	Never
No Name Cr.	North Channel	Sep-71	Sep-71	Never
Mississagi R.	North Channel	Aug-90	Aug-90	Jul-81
Lauzon R.	North Channel	Jun-07	Jun-07	2008
Kagawong R.	Mudge Bay	Jul-90	Jul-90	Aug-87
Mindemoya R.	Providence Bay	Jun-08	Jul-88	Jul-81
Manitou R.	Michaels Bay	Aug-07	Aug-07	Aug-87
Blue Jay Cr.	Michaels Bay	Aug-07	Aug-07	Aug-87
United States				
Caribou Cr.	Caribou Cr. (Offshore)	Aug-09	Aug-09	Never[1]
Albany Cr.	Albany Bay (Offshore)	Aug-09	Aug-05	Never
Trout Cr.	Trout Cr. (Offshore)	Aug-09	Aug-09	Never[2]
Beavertail Cr.	Beavertail Bay	Aug-07	Aug-07	Never[2]
McKay Cr.	McKay Bay	Jun-09	Jun-09	Jul-07
Flowers Cr.	Flowers Bay	Jul-81	Jul-80	Never
Nunns Cr.	St. Martin Bay	Jun-09	Aug-87	Never
Pine R.	St. Martin Bay	Jun-09	Jun-09	Never[2]
Carp R.	St. Martin Bay	Oct-09	Oct-09	Jun-07[1]
Martineau Cr.	Horseshoe Bay	Jun-07	Jun-07	Never[2]
Cheboygan R.	Straits of Mackinac	Sep-03	Aug-93	Never
	Burt Lake (Sturgeon R.)	Aug-08	Aug-98	Never
Elliot Cr.	Duncan Bay	Jun-09	Aug-86	Never
Hammond Bay Cr.	Hammond Bay	Jun-09	Jun-09	Never[2]
Mulligan Cr.	Mulligan Cr. (offshore)	Jun-09	Jun-09	Never[2]
Ocqueoc R.	Hammond Bay	Jun-09	Sep-86	Never
Devils R.	Thunder Bay	Jun-09	Aug-76	Never
Au Sable R.	Au Sable R. (offshore)	Aug-09	Aug-09	Never[2]
East AuGres R.	East AuGres R. (offshore)	May-07	Jun-86	Never

[1] Scheduled for treatment during 2010.
[2] Low-density larval populations monitored with gB surveys.

Lake Erie

As part of the whole-lake treatment strategy implemented in 2008, all tributaries that were treated in 2008 were also treated in 2009. Therefore, larval assessment surveys were not used in 2009 to rank streams for treatment in 2010. Larval assessments were conducted to confirm the distribution of larval sea lampreys in each infested stream, to evaluate treatments conducted in 2009, and to look for new infestations.

- Larval assessment surveys were conducted on a total of 40 tributaries (29 Canada, 11 U.S.), as well as 3 lentic areas (0 Canada, 3 U.S.). The status of larval sea lamprey populations in historically infested Lake Erie tributaries and lentic areas is presented in Tables 17 and 18.

- Post-treatment assessments were conducted in 4 tributaries (3 Canada, 1 U.S.) to determine the effectiveness of lampricide treatments during 2009.

- Assessments to detect the presence of new populations of larval sea lampreys were conducted in 21 (19 Canada, 2 U.S.) tributaries and no new populations were detected.

- South Otter Creek was found to have several re-established age classes of sea lamprey. Subsequently, this stream was treated in September 2009. It is also scheduled for a treatment again during fall 2010 as part of the whole-lake treatment strategy. A portion of the larvae and transformers captured in 2009 will have statoliths (analogous to otoliths in teleosts) removed and aged to determine the most likely timing of recruitment and metamorphosis, and whether metamorphosed sea lampreys could have recruited to the lake prior to the 2009 treatment.

Table 17. Status of larval sea lampreys in Lake Erie tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed during 2009.

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment) Residuals Present	Recruitment Evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Canada							
East Cr.	Jun-87	Aug-09	No	No	---	---	Unknown
Catfish Cr.	Jun-87	Aug-09	No	No	---	---	Unknown
Silver Cr.	Oct-09	Sep-09	--	--	---	---	Unknown
Big Otter Cr.	Sept-09	Sep-09	--	--	---	---	Unknown
South Otter Cr.	Sept-09	Aug-09	--	--	---	---	***2010*** [1]
Clear Cr.	May-91	Sep-09	No	No	---	---	Unknown
Big Cr.	Sept-09	Aug-09	--	--	---	---	Unknown
Forestville Cr.	May-89	April-08	No	No	---	---	Unknown
Normandale Cr.	Jun-87	Aug-09	No	No	---	---	Unknown
Fishers Cr.	Jun-87	April-08	No	No	---	---	Unknown
Young's Cr.	Sept-09	Sep-09	--	--	---	---	Unknown
United States							
Buffalo R.	Never	Jul-09	---	No	---	---	Unknown
Delaware Cr.	Sep-05	Jul-07	No	No	---	---	Unknown
Cattaraugus Cr.	Oct-09	Oct-09	No	---	---	---	***2010*** [2]
Halfway Br.	Oct-86	Jul-07	---	No	---	---	Unknown
Canadaway Cr.	Oct-86	Jun-08	---	No	---	---	Unknown
Crooked Cr.	Oct-09	Aug-09	---	---	---	---	Unknown
Raccoon Cr.	Oct-09	Sep-09	---	---	---	---	Unknown
Conneaut Cr.	Oct-09	Sep-09	---	---	---	---	Unknown
Wheeler Cr.	Never	May-08	No	No	---	---	Unknown
Grand R.	Oct-09	Aug-09	---	---	---	---	Unknown
Chagrin R.	Never	May-08	---	Yes	---	---	Unknown
St. Clair River/Lake St. Clair Tributaries							
Black R.	Never	Jul-07	---	No	---	---	Unknown
Mill Cr.	Never	Aug-09	---	No	---	---	Unknown
Pine R.	Apr-88	Oct-08	---	No	---	---	Unknown
Belle R.	Never	Oct-08	---	No	---	---	Unknown
Clinton R.	Never	Jul-09	---	No	---	---	Unknown
St. Clair R.	Never	Aug-09	---	Yes	---	---	Unknown
Thames R.	Never	Jun-08	---	No	---	---	Unknown

[1] Stream being treated based on expert judgment

[2] Stream scheduled for treatment pending results of Treatment Evaluation surveys.

Table 18. Status of larval sea lampreys in historically infested lentic areas of Lake Erie, 2009.

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
United States				
Cattaraugus Cr.	Sunset Bay	Jul-09	Jul-09	Never[1]
Conneaut Cr.	Conneaut Harbor	Jul-09	Jul-06	Never[1]
Grand R.	Fairport Harbor	Jul-09	Jun-87	Never

[1] *Low-density larval population monitored with gB surveys.*

Lake Ontario

- Larval assessment surveys were conducted on a total of 69 tributaries (31 Canada, 38 U.S.). The status of larval sea lampreys in historically infested Lake Ontario tributaries and lentic areas is presented in Table 19 and 20.

- Surveys to estimate the abundance of larval sea lampreys were conducted in 11 tributaries (3 Canada, 8 U.S.).

- Surveys to detect the presence of new larval sea lamprey populations were conducted in 24 tributaries (8 Canada, 16 U.S.). One new population was detected in Forest Lawn Creek, NY. This stream was subsequently evaluated for treatment, but its low larval population did not rank for treatment in 2010.

- Post-treatment assessments were conducted in 15 tributaries (10 Canada, 5 U.S.) to determine the effectiveness of lampricide treatments conducted during 2008 and 2009.

- Seabed classification sonar (RoxAnn) was used to map substrate in the Niagara River and Black River Bay, NY. Larval assessment of these areas is planned for 2010.

Table 19. Status of larval sea lampreys in Lake Ontario tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed during 2009.

Tributary	Last Treated	Last Surveyed	Status of larval lamprey population (surveys since last treatment) Residuals present	Recruitment evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Canada							
Welland R.	Never	Jul-06	---	No	---	---	Unknown
Niagara R.	Never	Jun-07	---	Yes	---	---	Unknown
Ancaster Cr.	May-03	Jul-09	No	No	---	---	Unknown
Grindstone Cr.	Never	Jul-09	---	No	---	---	Unknown
Bronte Cr.	Jun-07	Sep-09	No	Yes	---	---	***2010***[1]
Sixteen Mile Cr.	Jun-82	Jul-09	No	No	---	---	Unknown
Credit R.	May-08	May-09	Yes	Yes	---	---	2011
Rouge R.	Oct-07	Aug-08	Yes	No	---	---	2011
Petticoat Cr.	Sep-04	Aug-08	No	No	---	---	Unknown
Duffins Cr.	May-09	Aug-09	No	Yes	---	---	2012
Carruthers Cr.	Sep-76	April-09	No	No	---	---	Unknown
Lynde Cr.	May-09	Aug-09	No	Yes	---	---	2012
Oshawa Cr.	May-09	Aug-09	No	Yes	---	---	2012
Farewell Cr.	Apr-07	Aug-09	Yes	Yes	2,239	1,410	***2010***
Bowmanville Cr.	May-08	Aug-09	No	Yes	---	---	2011
Wilmot Cr.	May-09	Aug-09	No	No	---	---	2012
Graham Cr.	May-96	Aug-09	No	No	---	---	Unknown
Wesleyville Cr.	Oct-02	Aug-08	No	No	---	---	Unknown
Port Britain Cr.	Oct-07	Aug-08	No	Yes	---	---	2011
Gage Cr.	May-71	Aug-09	No	No	---	---	Unknown
Cobourg Br.	Oct-96	Aug-08	No	Yes	---	---	2011
Covert Cr.	Sep-05	Aug-09	No	Yes	24,874	9,278	***2010***
Grafton Cr.	Oct-07	Aug-08	Yes	No	---	---	Unknown
Shelter Valley Cr.	Sep-03	Aug-09	No	Yes	47	47	Unknown
Colborne Cr.	May-09	Aug-09	No	No	---	---	Unknown
Salem Cr.	Apr-09	May-09	Yes	--	---	---	2012
Proctor Cr.	May-09	Aug-09	No	Yes	---	---	2012
Smithfield Cr.	Sep-86	May-09	No	No	---	---	Unknown
Trent R. (Canal System)	Sep-06	Jun-08	Yes	Yes	---	---	Unknown
Mayhew Cr.	April-09	May-09	No	--	---	---	2012
Moira R.	Sep-09	May-09	---	--	---	---	Unknown
Salmon R.	Jun-00	Jun-08	No	Yes	---	---	Unknown
Napanee R.	Never	May-09	---	Yes	---	---	Unknown
United States							
Black R.	Sept-08	Sept-08	Yes	No	---	---	2012
Stony Cr.	Sep-82	Jul-07	No	No	---	---	Unknown
Sandy Cr.	Never	Jul-08	---	No	---	---	Unknown
South Sandy Cr.	Apr-08	Sep-09	Yes	Yes	381	27	2011
Skinner Cr.	Apr-05	Jul-09	No	No	---	---	Unknown

Table 19 *Continued*

Tributary	Last Treated	Last Surveyed	Status of larval lamprey population (surveys since last treatment): Residuals present	Recruitment evident	Estimate of Overall Larval Population	Abundance Estimate of Larvae >100mm	Expected Year of Next Treatment
Lindsey Cr.	Apr-08	Sep-09	Yes	Yes	15,923	295	2011
Blind Cr.	May-76	Sep-07	No	No	---	---	Unknown
Little Sandy Cr.	Apr-08	Sep-09	Yes	Yes	16,046	2,360	***2010***
Deer Cr.	Apr-04	Jul-08	No	No	---	---	Unknown
Salmon R.	May-07	Sep-09	Yes	Yes	---	---	***2010***[1]
Grindstone Cr.	Apr-07	Aug-09	No	Yes	---	---	***2010***[1]
Snake Cr.	Apr-08	Jul-08	No	No	---	---	2011
Sage Cr.	May-78	Sep-07	No	No	---	---	Unknown
Little Salmon R.	Apr-09	Jul-09	Yes	Yes	---	---	2012
Butterfly Cr.	May-72	Jul-08	No	No	---	---	Unknown
Catfish Cr.	Apr-09	April-09	---	--	---	---	2012
Oswego R.							
Black Cr.	May-81	Aug-07	No	No	---	---	Unknown
Big Bay Cr.	Sep-93	April-09	No	No	---	---	Unknown
Scriba Cr.	May-84	Sep-09	No	Yes	625	625	***2010***
Fish Cr.	May-07	Sep-09	Yes	Yes	---	---	***2010***[1]
Carpenter Br.	May-94	April-09	No	No	---	---	Unknown
Putnam Br./ Coldsprings Cr.	May-96	Jul-08	No	No	---	---	Unknown
Hall Br.	Never	Apr-05	---	No	---	---	Unknown
Crane Br.	Never	Jul-06	---	No	---	---	Unknown
Skaneateles Cr.	Never	Jul-05	---	No	---	---	Unknown
Rice Cr.	May-72	Apr-06	No	No	---	---	Unknown
Eight Mile Cr.	Apr-07	Jul-08	No	No	---	---	Unknown
Nine Mile Cr.	Jun-05	Jul-08	No	Yes	---	---	Unknown
Sterling Cr.	April-09	Sep-09	No	Yes	---	---	2012
Blind Sodus Cr.	May-78	April-09	No	No	---	---	Unknown
Red Cr.	May-06	Sep-09	No	Yes	8,240	6,867	***2010***
Wolcott Cr.	May-79	Jul-08	No	No	---	---	Unknown
Sodus Cr.	May-05	Sep-09	No	Yes	3,168	1,358	***2010***
Forest Lawn Cr.	Never	Sep-09	---	Yes	257	257	Unknown
Irondequoit Cr.	Never	April-09	---	No	---	---	Unknown
Larkin Cr.	Never	Jul-09	---	No	---	---	Unknown
Northrup Cr.	Never	Apr-08	---	No	---	---	Unknown
Salmon Cr.	Apr-05	Apr-09	No	Yes	---	---	2011
Sandy Cr.	Apr-09	Sep-09	No	Yes	---	---	2012
Oak Orchard Cr.							
Marsh Cr.	May-08	Jul-09	No	No	---	---	2011
Johnson Cr.	Never	Sep-09	---	Yes	12,526	12,526	***2010***
Third Cr.	May-72	Oct-06	No	No	---	---	Unknown
First Cr.	May-95	Apr-08	No	No	---	---	Unknown

[1]Stream being treated based on expert knowledge.

Table 20. Status of larval sea lampreys in historically infested lentic areas of Lake Ontario during 2009.

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Canada				
Duffins Cr.	Duffins Cr. - lentic	May-06	May-06	Never
Oshawa Cr.	Oshawa Cr. - lentic	Oct–81	Oct–81	Never
Wilmot Cr.	Wilmot Cr. - lentic	Oct–81	Oct-81	Never
United States				
Black R.	Black River Bay	Aug-07	Aug-07	Never

Spawning-Phase Assessment

The long-term effectiveness of the SLMP has been measured by the annual estimation of the lake-wide populations of spawning-phase sea lampreys. Traps and nets are operated to capture migrating spawning-phase sea lampreys during the spring and early summer. Abundance is estimated using a combination of mark recapture and trap efficiency estimates of spawning-phase migrants in streams with traps, and regression model predicted estimates in streams without traps. Lake-wide populations have been estimated since 1986.

Lake Superior

- A total of 4,131 sea lampreys were trapped in 22 tributaries during 2009 (Table 21, Figure 4).
- The estimated population of spawning-phase sea lampreys during 2009 was 26,698 (95% CI; 22,943-32,361) and was within the fish-community objective target range of 38,000±19,000 for the second consecutive year (Figure 5).
- Sea lamprey spawning runs were monitored in the Amnicon, Poplar, Middle, Bad, Firesteel, Misery, and Silver rivers through cooperative agreements with the Great Lakes Indian Fish and Wildlife Commission, in Red Cliff Creek with the Red Cliff Band of Lake Superior Chippewas, in the Brule River with the Wisconsin Department of Natural Resources (WDNR), and in the Miners River with the National Park Service, Pictured Rocks National Lakeshore.
- A total of 459 spawning-phase male sea lampreys were delivered to the sterilization facility from trapping operations on the Bad (313) and Brule (146) rivers.
- A 3-year field-scale management experiment using the mating pheromone was initiated in 10 Great Lakes tributaries, including the Tahquamenon, Betsy, Miners, Rock, and Misery rivers on Lake Superior.

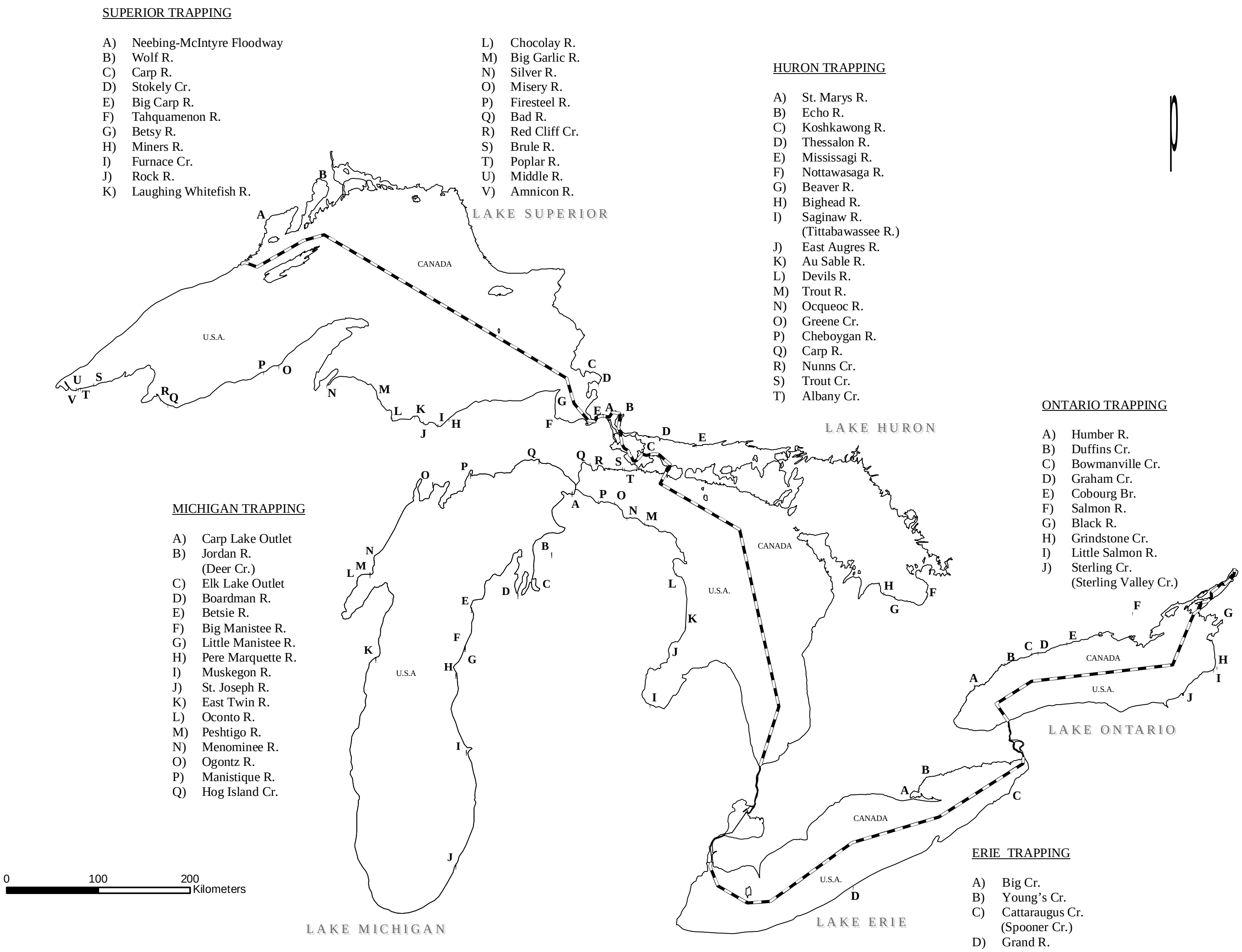

Figure 4. Locations of tributaries where assessment traps were operated during 2009.

Table 21. Stream name, number caught, spawner estimate, trap efficiency, number sampled, percent males, and biological characteristics of spawning-phase sea lampreys captured in assessment traps or nets in tributaries of Lake Superior during 2009 (letter in parentheses corresponds to location of stream in Figure 4).

Tributary	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males	Mean Length (mm)		Mean Weight (g)	
						Males	Females	Males	Females
Canada									
Neebing-McIntyre Floodway - Neebing R. (A)	177	1049	17	0	---	---	---	---	---
Wolf R. (B)	0	---	---	---	---	---	---	---	---
Carp R. (C)	37	105	35	0	---	---	---	---	---
Stokely Cr. (D)	3	---	---	0	---	---	---	---	---
Big Carp R. (E)	10	---	---	0	---	---	---	---	---
Total or Mean (North shore)	**227**	**---**	**---**	**0**	**---**	**---**	**---**	**---**	**---**
United States									
Tahquamenon R. (F)	822	1940	42	199	77	440	438	185	189
Betsy R. (G)	210	420	50	75	68	430	412	177	154
Miners R. (H)	135	368	37	34	59	409	415	173	165
Furnace Bay Cr. (I)	73	207	35	7	57	398	420	173	172
Rock R. (J)	223	514	43	86	62	423	423	162	155
Laughing Whitefish R. (K)	2	---	---	---	---	---	---	---	---
Chocolay R.(L)	119	885	13	8	75	408	405	173	215
Big Garlic R. (M)	103	793	13	12	83	458	474	224	309
Silver R. (N)	88	370	24	12	75	435	384	182	231
Misery R. (O)	102	156	65	45	38	407	396	178	170
Firesteel R. (P)	31	128	24	2	0	---	468	---	236
Bad R. (Q)	1,203	4754	25	46	41	414	432	155	179
Red Cliff Cr. (R)	63	---	---	61	55	429	453	177	208
Brule R. (S)	216	551	39	45	87	425	430	181	207
Poplar R. (T)	0	---	---	---	---	---	---	---	---
Middle R. (U)	9	---	---	---	---	---	---	---	---
Amnicon R. (V)	505	4474	11	10	70	427	459	189	201
Total or Mean (South shore)	**3,904**	**---**	**---**	**642**	**66**	**430**	**427**	**180**	**178**
Total or Mean (for lake)	**4,131**	---	---	**642**	**66**	**430**	**427**	**180**	**178**

[1] The number of sea lampreys from which length and weight measurements were determined.

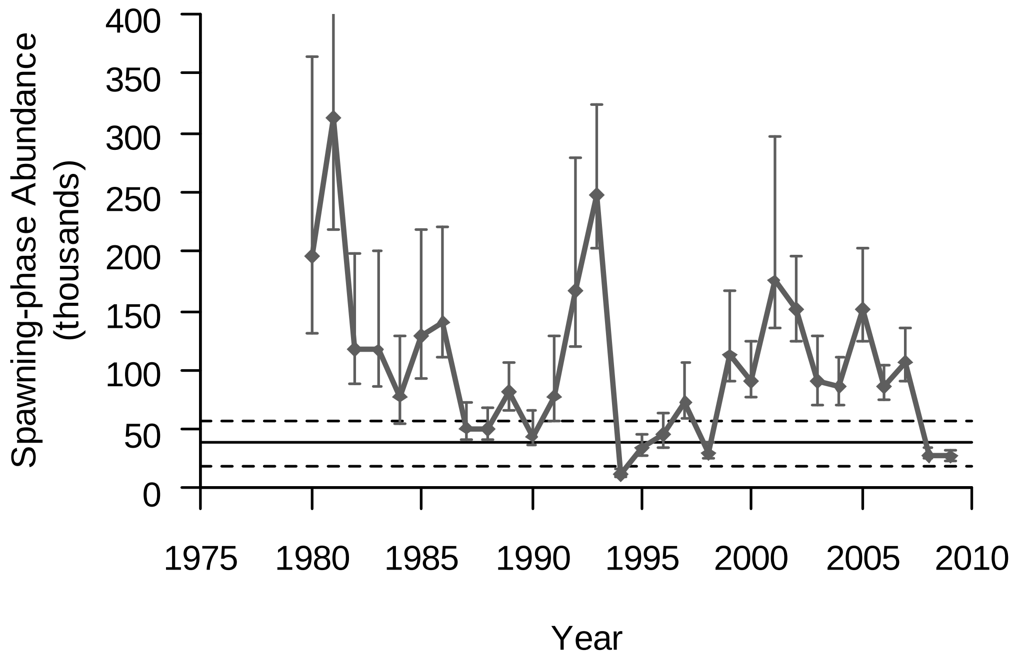

Figure 5. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Superior, 1980 – 2009 with 95% confidence intervals (vertical error bars). Target level is indicated by the solid horizontal line with 95% confidence intervals (horizontal dashed lines).

Lake Michigan

- A total of 19,444 sea lampreys were trapped at 17 sites in 16 tributaries during 2009 (Table 22, Figure 4).

- The estimated population of spawning-phase sea lampreys in Lake Michigan was 59,800 (95% CI; 56,131-64,700), which is within the fish community objective target range of 57,000 ± 13,000 (Figure 6).

- Spawning-phase sea lamprey migrations were monitored in the Boardman and Betsie rivers through a cooperative agreement with the Grand Traverse Band of Ottawa and Chippewa Indians.

- A total of 6,971 spawning-phase male sea lampreys were delivered to the sterilization facility from trapping operations on the Betsie (337), Boardman (105), Carp Lake (303), Manistee (178), Manistique (4,526), Muskegon (294), Peshtigo (881), Pere Marquette (232), and St. Joseph (115) rivers.

- A 3-year field-scale management experiment using the mating pheromone was initiated in 10 Great Lakes tributaries, including the Carp Lake, Betsie, and Manistee rivers.

Table 22. Stream name, number caught, spawner estimate, trap efficiency, number sampled, percent males, and biological characteristics of spawning-phase sea lampreys captured in assessment traps in tributaries of Lake Michigan during 2009 (letter in parentheses corresponds to location of stream in Figure 4).

Stream Name	Number caught	Spawner estimate	Trap efficiency	Number sampled[1]	Percent males	Mean length (mm)		Mean weight (g)	
						Males	Females	Males	Females
Carp Lake Outlet (A)	771	1,342	57	115	46	479	465	227	219
Jordan R.	---	---	---	---	---	---	---	---	---
Deer Cr. (B)	40	71	56	3	0	---	472	---	236
Elk Lake Outlet (C)	7	---	---	1	100	490	---	240	---
Boardman R. (D)	403	1005	40	28	54	449	461	213	222
Betsie R. (E)	1,383	2,567	54	144	48	476	485	241	266
Big Manistee R. (F)	425	2,413	18	7	29	491	497	272	275
Little Manistee R. (G)	53	54	98	15	33	474	505	278	282
Pere Marquette R. (H)	456	925	49	38	32	507	498	284	307
Muskegon R. (I)	976	2,856	34	51	61	497	492	270	287
St. Joseph R. (J)	753	2,861	26	31	16	476	502	248	270
East Twin R. (K)	10	---	---	1	0	---	504	---	261
Oconto R. (L)	79	257	31	17	29	528	502	315	298
Peshtigo R. (M)	2,531	2,671	95	357	53	510	509	267	277
Menominee R. (N)	406	2,253	18	36	72	508	498	255	261
Ogontz R. (O)	22	---	---	---	---	---	---	---	---
Manistique R. (P)	11,061	21,282	52	520	57	487	503	257	269
Hog Island Cr. (Q)	68	193	35	9	78	503	525	310	259
Total or Mean	19,444	---	---	1,373	52	498	497	257	268

[1]The number of sea lampreys from which length and weight measurements were determined.

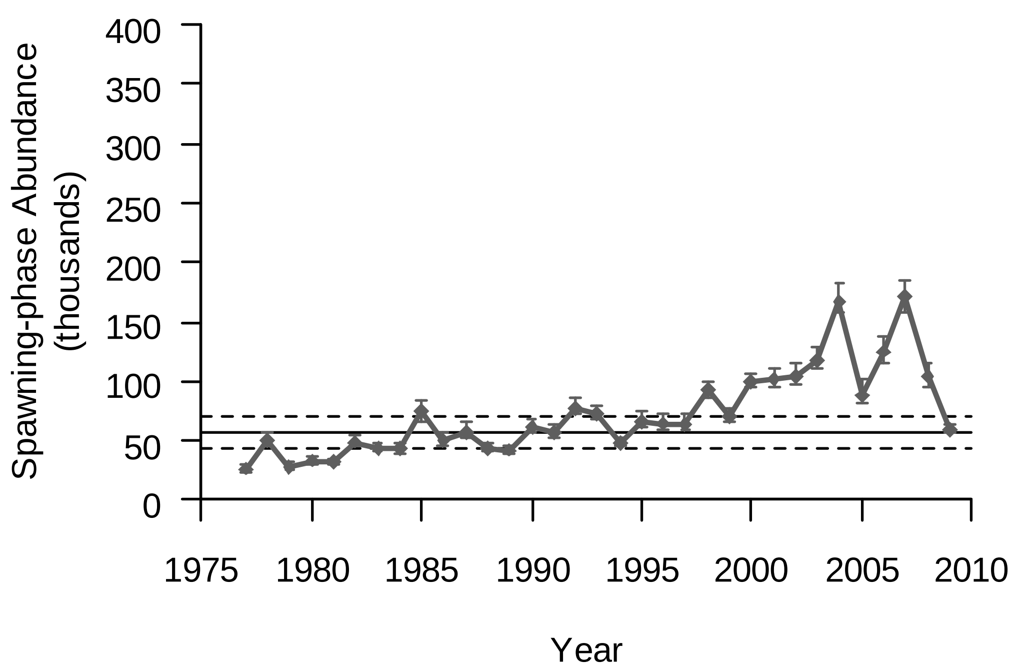

Figure 6. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Michigan during 1977 - 2009 with 95% confidence intervals (vertical error bars). Target level is indicated by the solid horizontal line with 95% confidence intervals (horizontal dashed lines).

Lake Huron

- A total of 27,197 sea lampreys were trapped at 22 sites in 20 tributaries during 2009 (Table 23, Figure 4).

- The estimated population of spawning-phase sea lampreys in Lake Huron for 2009 was 121,653 (95% CI; 108,027 – 142,209), which was greater than the fish-community objective target of 73,000±20,000 (Figure 7).

- A total of 5,630 spawning-phase sea lampreys were captured in traps operated in the St. Marys River at the Great Lakes Power facility in Canada and the USACOE and Edison Sault Electric facilities in the United States. The estimated population in the river was 13,424 sea lampreys and trap efficiency was 42%.

- Spawning runs were monitored in the Carp River, and Albany, Trout, and Nunns creeks through a cooperative agreement with the Chippewa/Ottawa Resource Authority.

- A total of 12,947 spawning-phase male sea lampreys were delivered to the sterilization facility from trapping operations on the Au Sable (70), Cheboygan (6,608), East AuGres (360), Echo (791) Thessalon (1,041), Greene (5), Ocqueoc (1,395), St. Marys (2,597), and Tittabawassee (80) rivers.

- A 3 year field-scale management experiment using the mating pheromone was initiated in 10 Great Lakes tributaries, including the St. Marys and East AuGres rivers on Lake Huron.

- A total of 1,723 parasitic-phase sea lampreys (Main Basin - 1,020, North Channel - 703, Georgian Bay - 0) were collected from Canadian commercial fisheries during 2009.

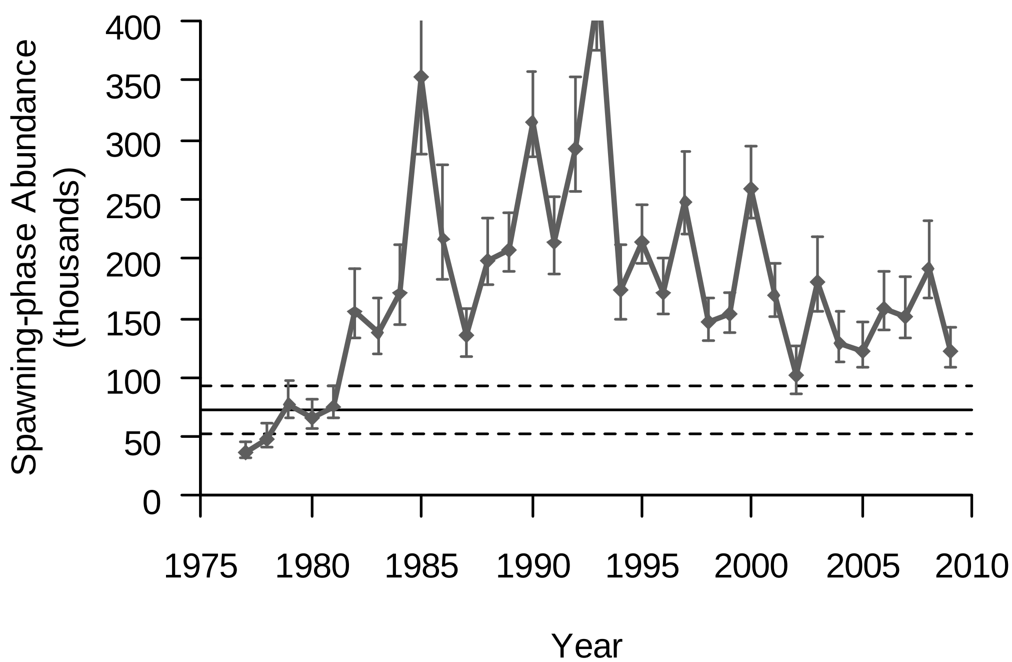

Figure 7. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Huron during 1977 - 2009 with 95% confidence intervals (vertical error bars). Target level is indicated by the solid horizontal line with 95% confidence intervals (horizontal dashed lines).

Table 23. Stream name, number caught, spawner estimate, trap efficiency, number sampled, percent males, and biological characteristics of spawning-phase sea lampreys captured in assessment traps or nets in tributaries of Lake Huron during 2009 (letter in parentheses corresponds to location of stream in Figure 4).

Tributary	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males	Mean Length (mm) Males	Mean Length (mm) Females	Mean Weight (g) Males	Mean Weight (g) Females
Canada									
St. Marys R. (A)	3,831	13,424	42	0	60	---	---	---	---
Echo R. (B)	1,421	4,558	31	0	65	---	---	---	---
Koshkawong R. (C)	1	---	---	0	---	---	---	---	---
Thessalon R. (D)									
Little Thessalon R.	6	---	---	0	33	---	---	---	---
Main at Rydal Bank	2,302	3,345	69	0	59	---	---	---	---
Mississagi R. (E)	1	---	---	0	100	---	---	---	---
Nottawasaga R. (F)									
Pine R.	84	270	31	0	60	---	---	---	---
Beaver R. (G)	1	---	---	0	---	---	---	---	---
Bighead R. (H)	30	156	19	0	37	---	---	---	---
Total or Mean (Canada)	**7,677**	**---**	**---**	**0**	**61**	**---**	**---**	**---**	**---**
United States									
Tittabawassee R. (I)	198	478	41	2	100	520	---	190	---
East Au Gres R. (J)	820	3,158	26	19	63	485	478	260	232
Au Sable R. (K)	312	---	---	---	---	---	---	---	---
Devils R. (L)	37	52	71	22	45	489	469	256	253
Trout R. (M)	7	---	---	1	0	---	472	---	195
Ocqueoc R. (N)	3,560	4,772	75	345	49	456	460	201	209
Greene Cr. (O)	18	---	---	4	25	520	496	242	243
Cheboygan R. (P)	12,518	18,630	67	890	56	481	477	227	228
Carp R. (Q)	20	---	---	---		---	---	---	---
Nunns Cr. (R)	0	---	---	---	---	---	---	---	---
Trout Cr. (S)	61	110	55	12	50	462	468	217	215
Albany Cr. (T)	170	555	31	30	80	438	467	185	228
St. Marys R. (A)	1,799	See Canada	See Canada	27	See Canada	496	479	242	224
Total or Mean (U.S.)	**19,520**	**---**	**---**	**1,352**	**55**	**475**	**472**	**221**	**223**
Total or Mean (for lake)	**27,197**	**---**	**---**	**1,352**	**57**	**475**	**472**	**221**	**223**

[1] The number of sea lampreys from which all length and weight measurements were determined.

Lake Erie

- A total of 4,523 spawning-phase sea lampreys were trapped at 5 sites in 4 tributaries during 2009 (Table 24, Figure 4). Mark-recapture estimates were available for two main tributaries to the lake and one secondary tributary to the lake and the spawner-discharge model was used to estimate the lake-wide spawning-phase population.

- Estimated population of spawning-phase sea lampreys was 35,635 (95% CI; 28,574-46,451) during 2009, which is significantly greater than the fish community objective target range of 3,000±1,000 (Figure 8).

- Nearly 4,000 spawning-phase sea lampreys were scanned for coded wire tags in 2009 and no tags were detected, providing no evidence that sea lampreys tagged during a multi-year study in Lake Huron tributaries migrated to Lake Erie.

Table 24. Stream name, number caught, spawner estimate, trap efficiency, number sampled, percent males, and biological characteristics of spawning-phase sea lampreys captured in assessment traps or nets in tributaries of Lake Erie during 2009 (letter in parentheses corresponds to location of stream in Figure 4).

Tributary	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males	Mean Length (mm)		Mean Weight (g)	
						Males	Females	Males	Females
Canada									
Big Cr. (A)	3,409	13,899	25	0	---	---	---	---	---
Young's Cr. (B)	474	983	48	0	---	---	---	---	---
Total or Mean (Canada)	**3,883**	**---**	**---**	**0**	**---**	**---**	**---**	**---**	**---**
United States									
Cattaraugus Cr. (C)	62	---	---	46	67	482	485	274	274
Spooner Cr.	232	1325	---	0	---	---	---	---	---
Grand R. (D)	346	---	---	0	---	---	---	---	---
Total or Mean (U.S.)	**640**	**---**	**---**	**46**	**67**	**482**	**485**	**274**	**---**
Total or Mean (for lake)	**4,523**	**---**	**---**	**46**	**67**	**482**	**485**	**274**	**274**

[1] The number of sea lampreys from which all length and weight measurements were determined.

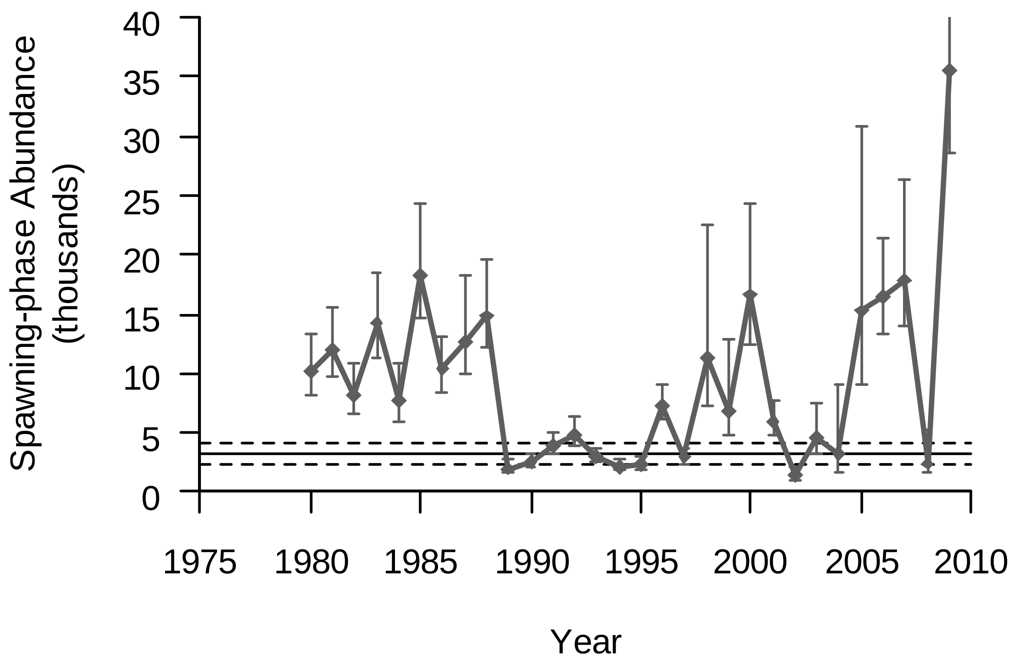

Figure 8. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Erie during 1980 - 2009 with 95% confidence intervals (vertical error bars). Target level is indicated by the solid horizontal line with 95% confidence intervals (horizontal dashed lines).

Lake Ontario

- A total of 8,354 spawning-phase sea lampreys were trapped at 11 sites on 10 tributaries during 2009 (Table 25, Figure 4).

- The estimated population of spawning-phase sea lampreys in Lake Ontario for 2009 was 38,473 (95% CI; 35,080-42,640), which remains greater than the fish community objective target of 31,000±4,000 (Figure 9).

- The Humber River and Duffins Creek traps were jointly operated through a partnership with Toronto Region Conservation Authority: the Cobourg Brook fishway and trap with Ganaraska River Conservation Authority: and the Salmon River trap with the Mohawks of the Bay of Quinte.

- A total of 1,925 spawning-phase male sea lampreys were delivered to the sterilization facility from trapping operations on the Duffins (583) and Humber (1,342) rivers.

Table 25. Stream name, number caught, spawner estimate, trap efficiency, number sampled, percent males and biological characteristics of spawning-phase sea lampreys captured in assessment traps or nets in tributaries of Lake Ontario during 2009 (letter in parentheses corresponds to location of stream in Figure 4).

Tributary	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males	Mean Length (mm)		Mean Weight (g)	
						Males	Females	Males	Females
Canada									
Humber R. (A)	5,427	10,522	52	245	51	495	490	251	270
Duffins Cr. (B)	872	1,929	45	12	25	493	474	257	247
Bowmanville Cr. (C)	425	1,125	38	139	47	492	489	250	247
Graham Cr. (D)	167	480	35	52	42	492	486	234	253
Cobourg Cr. (E)	224	457	49	0	---	---	---	---	---
Salmon R. (F)	3	---	---	1	0	---	430	---	207
Total or Mean (Canada)	**7,118**	**---**	**---**	**449**	**48**	**494**	**488**	**249**	**259**
United States									
Black R. (G)	965	5,924	16	108	56	475	490	240	269
Grindstone Cr. (H)	99	1,568	6	4	0	---	271	---	294
Little Salmon R. (I)	28	---	---	---	---	---	---	---	---
Sterling Cr. (J)	114	1,092	10	10	40	382	295	272	306
Sterling Valley Cr.	30	50	60	3	67	509	545	299	302
Total or Mean (U.S.)	1,236	---	---	125	53	457	471	244	275
Total or Mean (for lake)	**8,354**	**---**	**---**	**574**	**49**	**485**	**485**	**248**	**262**

[1] The number of sea lampreys from which all length and weight measurements were determined.

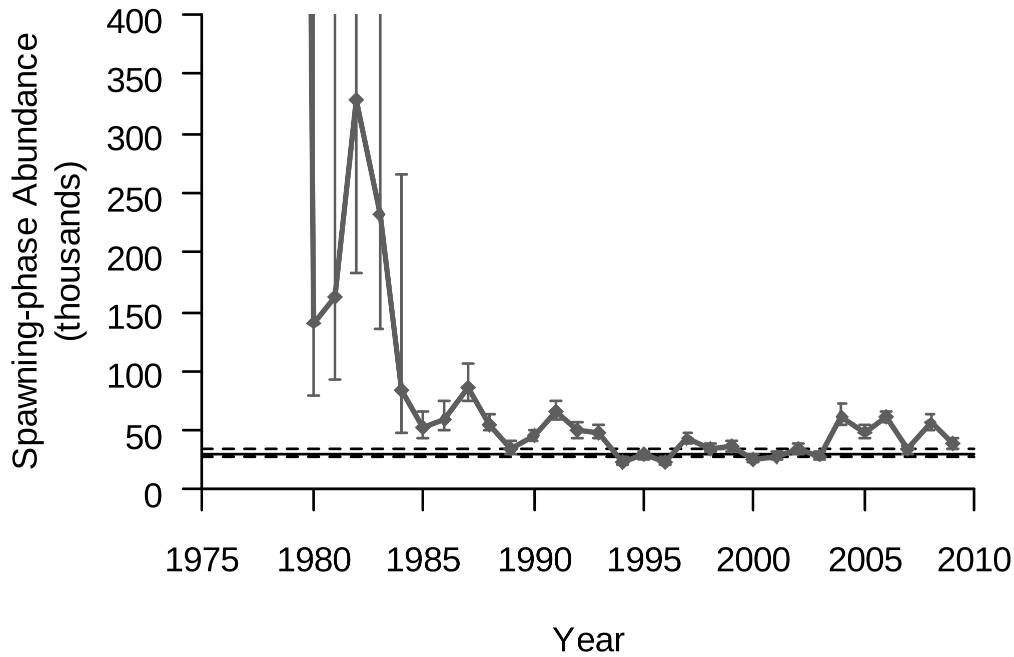

Figure 9. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Ontario during 1980 - 2009 with 95% confidence intervals (vertical error bars). Target level is indicated by the solid horizontal line with 95% confidence intervals (horizontal dashed lines).

<u>Parasitic Phase</u>

Lake Superior

- The Michigan Department of Natural Resources (MDNR) provided data on the frequency of parasitic-phase sea lampreys attached to fish caught by charter boats during 2009.
    - 24 parasitic-phase sea lampreys attached to lake trout were collected from 4 management districts.
    - Parasitic-phase sea lampreys were attached at a rate of 1.1 per 100 lake trout (n = 2,198).

Lake Michigan

- A lake-wide mark-recapture study to estimate metamorphosing-phase populations has been conducted in 3 of the last 4 years.
    - The recapture of spawning-phase sea lampreys that were marked with coded wire tags and released as metamorphosing juveniles during 2007 was completed. Of 756 metamorphosing sea lampreys marked and released, 43 (5.7%) were recaptured as spawning-phase lamprey during 2009. A total of 18,889 spawning-phase sea lampreys were scanned for coded wire tags from 16 sites in 15 tributaries during 2009. The estimated abundance of the 2007 metamorphosing cohort was 324,993 (95% CI, 245,199-433,159; Table 26).

- The MDNR and the WDNR provided data on the frequency of parasitic-phase sea lampreys attached to fish caught by sport charter boats during 2009.

    - A total of 1,269 parasitic-phase sea lampreys were collected from 12 management districts; 256 were attached to lake trout and 1,013 were attached to Chinook salmon.

    - Parasitic-phase sea lampreys were attached at a rate of 1.43 per 100 lake trout (n = 17,919) and 0.88 per 100 Chinook salmon (n = 114,967).

Table 26. Lake-wide population estimates (PE) and 95% confidence intervals (CI) of metamorphosing and spawning-phase sea lampreys in Lake Michigan during 2006-2009. Estimates of metamorphosing sea lampreys are off-set by two years from the spawning-phase estimate to represent the same cohort of sea lampreys at each life stage.

Spawning Year	Estimate of metamorphosing lampreys (thousands)		Estimate of spawning-phase lampreys (thousands)	
	PE	95% CI	PE	95% CI
2006	702	533-1,009	125	116-137
2007	813	607-1,226	171	159-186
2008	---	---	104	95-114
2009	325	245-433	60	56-65

Lake Huron

- The MDNR provided data on the frequency of parasitic-phase sea lampreys attached to fishes caught by sport charter fishers during 2009.

    - 114 parasitic-phase sea lampreys were collected from 4 of 6 management districts; 63 were attached to lake trout and 51 were attached to Chinook salmon.

    - Parasitic-phase sea lampreys were attached at a rate of 1.3 per 100 lake trout (n = 4,846) and 6.3 per 100 Chinook salmon (n = 807).

- A lake-wide mark-recapture study of the metamorphosing life stage of sea lampreys has been conducted to estimate populations 9 of the last 18 years (Table 27).

    - The recapture of spawning-phase sea lampreys that were marked with coded wire tags and released as metamorphosing juveniles during 2007 was completed. Of 667 metamorphosing sea lampreys marked and released, 23 (3.4%) were recaptured as spawning-phase lampreys during 2009. A total of 27,167 spawning-phase sea lampreys were scanned for coded wire tags from 17 tributaries (9 U.S., 7 Canada, 1 Bi-national) during 2009. The estimated number of the 2007 metamorphosing cohort is 756,175 (95% CI, 514,272-1,118,370; Table 26).

Table 27. Lake-wide population estimates (PE) and 95% confidence intervals (CI) of metamorphosing, parasitic, and spawning-phase sea lampreys in Lake Huron during 1992-2009. Estimates of parasitic-phase and metamorphosing sea lampreys are off-set by one and two years respectively from the spawning-phase estimate to represent the same cohort of sea lampreys at each life stage.

Spawning Year	Estimate of metamorphosing lampreys (thousands)		Estimate of parasitic-phase lampreys (thousands)		Estimate of spawning-phase lampreys (thousands)	
	PE	95% CI	PE	95% CI	PE	95% CI
1992	639	492-907	---	---	293	257-353
1993	686	459-1,257	---	---	428	375-511
1994	---	---	515	409-688	173	150-211
1995	---	---	629	518-798	215	195-245
1999	803	505-1,737	1,361	788-3,527	153	138-172
2000	644	513-865	1,759	1,255-2,848	259	235-294
2001	578	491-702	2,302	1,089-14,800	170	151-196
2002	1,000[1]	374-7,813	779	442-2,203	101	86-127
2003	630	443-1,032	1,909	958-8,715	180	155-219
2004	1,100	701-2,301	687	451-1,337	129	112-156
2005	---	---	611	305-2,766	122	109-146
2006	---	---	---	---	158	139-188
2007	---	---	---	---	151	134-185
2008	---	---	---	---	191	167-231
2009	756	514-1,118	---	---	122	108-142

[1] Estimate derived from a single recaptured sea lamprey.

Lake Erie

- Lake-wide marking rate on lake trout >533mm was 19.3 wounds per 100 fish during 2009.
- No data are collected in Lake Erie to determine the frequency of parasitic-phase sea lampreys attached to fish caught by sport charter boats.

Lake Ontario

- The New York Department of Environmental Conservation provided data on the frequency of parasitic-phase sea lampreys attached to fish caught by sport charter boats during 2009.
    - 5,255 parasitic-phase sea lampreys were sampled; the percent composition of salmonine host species to which lampreys were attached was coho salmon (3%), Chinook salmon (73%), rainbow trout (11%), and brown trout (14%).
    - Parasitic-phase sea lampreys were attached at a rate of 1.98 per 100 trout and salmon in the west region, 1.79 in the west central region, 3.30 in the east central region, and 1.73 in the east.

RISK MANAGEMENT

Risk management addresses environmental and non-target issues related to the implementation of the SLMP in the United States. This involves coordination with many state, tribal, and federal agencies, and working with others to minimize risk to non-target organisms.

Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires all U.S. federal agencies to consult with the USFWS Ecological Services (ES) to ensure that actions that are federally funded, authorized, permitted, or otherwise carried out will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats.

Annual Reviews

Endangered species reviews are annually conducted with ES to discuss proposed lampricide applications, assess the potential risk of these applications to federal listed (endangered, threatened, and candidate) species, and develop procedures to protect and avoid disturbance for each listed species.

During 2009, the following ES offices reviewed the effect of the scheduled lampricide applications on endangered species within their jurisdiction. Concurrence with the SLMP-proposed conservation measures and determinations of "no effect" or "not likely to adversely affect" was received by:

- East Lansing Field Office
- Green Bay Field Office
- Ohio Field Office
- Pennsylvania Field Office
- New York Field Office
- Twin Cities Office

Formal Consultations

During 2009, the SLMP requested formal consultation with the appropriate ES office for three activities:

- Carp Lake River - A biological assessment (BA) was submitted to the ES-East Lansing Field Office (ELFO) requesting a biological opinion (BO) on whether a proposed TFM treatment of the Carp Lake River (CLR) during the spring (April/May) of 2009 would jeopardize the endangered Hungerford's crawling water beetle (*Brychius hungerfordi;* HCWB) population. The ELFO provided a BO that stated the treatment was not likely to jeopardize the continued existence of the HCWB and detailed a list of conservation measures to be taken to minimize the effects of the treatment and treatment activities. The CLR was successfully treated during 2009 and surveys that sampled for HCWB during the months following verified that the treatment had no effect on the population.

- Grand River (Ohio) and Rogue River (Michigan) - In anticipation that the snuffbox mussel (*Epioblasma triquetra*) would be proposed for listing during 2009, a BA was submitted to the

ELFO and ES-Ohio Field Office requesting a BO on whether a proposed TFM treatment of the Grand and Rogue Rivers would jeopardize the snuffbox mussel population. Because the snuffbox mussel was not proposed for listing by the time the treatments occurred, a section 7 conference was not required. However, the SLMP followed conservation measures detailed in the BA to protect the mussels and both rivers were successfully treated during 2009.

- Manistee River - An Intra-service Section 7 Biological Evaluation (BE) was drafted to assess the effects of the construction of a proposed permanent sea lamprey trap on the Manistee River to the endangered Indiana Bat (*Myotis sodalis*). The BE concluded that this activity was not likely to adversely effect" the Indiana bat.

Species or Stream-specific Investigations

- Piping plover - The piping plover (*Charadrius melodus*) is a federal-listed endangered species in the Great Lakes. Piping plovers typically nest and feed around the mouths of rivers from May 1 to September 1. To avoid potentially adverse affects to piping plovers, lampricide treatments are currently scheduled after September 1 in U.S. streams near successful nesting areas.

  During 2008, the SLMP and the Upper Midwest Environmental Science Center (UMESC) conducted the study, *Evaluation of TFM and Niclosamide Residues in Sediment, Water, and Invertebrates Following a Lampricide Treatment,* to determine whether the amount of TFM that piping plovers are exposed to is below the "no observable adverse effect level" (NOAEL). If so, the restriction to treat only after September 1 could be lifted, and streams with nesting piping plovers could be scheduled for treatment throughout the field season.

Programmatic Review

Because of the broad scope of the SLMP, consultation under Section 7 of the ESA involves several states, many listed species, and hundreds of streams. In an effort to streamline the consultation process and to add predictability for project planning, a programmatic section 7 review process was initiated. The programmatic review evaluates all SLMP activities, identifies potential impacts to protected species and critical habitats, and specifies conservation measures to eliminate or minimize disturbance.

A draft of the programmatic review was submitted during 2007 to all USFWS Region 3 ES offices in the SLMP action area and is currently under review. Individual ES offices are providing information on additional species that need to be included for their respective jurisdictions, and information on the biology, preferred habitat, geographic location, and any identified critical habitats.

Once completed, the programmatic review is expected to increase efficiency of the consultation process because the effects analysis for most of the SLMP activities will have been completed and reviewed, and can be incorporated by reference in annual and formal consultations. This is expected to reduce the timeframe for completing reviews and consultations for a proposed action.

State-Listed Species

Annual Reviews

Reviews are annually conducted with state agencies to fulfill regulatory agency permit requirements, assess the potential risk to state listed (endangered, threatened, and special concern) species, and develop procedures that protect and avoid disturbance for each listed species.

During 2009, the following state regulatory offices reviewed endangered species within their jurisdiction and issued permits to conduct lampricide applications:

- Indiana Department of Environmental Quality
- Michigan Department of Environmental Quality
- Minnesota Department of Natural Resources
- New York Department of Environmental Conservation
- Ohio Environmental Protection Agency
- Wisconsin Department of Natural Resources
- Pennsylvania Fish and Boat Commission

Species or Stream-specific Investigations

- Lake sturgeon – The lake sturgeon (*Acipenser fulvescens*) is state listed as endangered in Illinois, Indiana, Ohio, and Pennsylvania, threatened in Michigan and New York, and of special concern in Minnesota and Wisconsin. In Canadian waters of the Great Lakes the lake sturgeon is provincially listed as threatened.

  During 2009, there were four state-designated sturgeon streams scheduled for treatment (Oconto, Peshtigo, Manistique, and Manistee Rivers). The USFWS and the states of Michigan and Wisconsin agreed that the treatment of these streams would be conducted after August 1, to minimize the potential effect on age-0 lake sturgeon. No lake sturgeon mortality was observed during non-target assessments conducted following each 2009 treatment.

- Mudpuppy – The mudpuppy (*Necturus maculosus*) is not a state listed species, but it is a species of special interest to the State of Ohio and a species sensitive to TFM. The USFWS coordinated with the two divisions from the Ohio Department of Natural Resources (Division of Wildlife and Division of Natural Areas and Preserves-Scenic Rivers), Lake County Metro Parks, Lake County Soil & Water Conservation District, Ohio EPA, Cleveland Museum of Natural History, and Ohio EPA to collected mudpuppies during the treatment of the Grand River and Conneaut Creek. During the Grand River treatment, 18 live mudpuppies were collected, held in TFM-free oxygenated water, and released following the treatment. No mudpuppies were observed or collected during the treatment of Conneaut Creek.

Field Protocols

While federal and state listed endangered species are considered separately, a single protocol is annually developed for field staff that details conservation measures to be followed where sea lamprey management activities are scheduled. During 2009, the following protocols were implemented to protect and avoid disturbance to federal and state-listed species:

- *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 during 2009.*

- *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 during 2009*.

The protocols provided field personnel with a list of protected federal and state listed species, their known locations, and measures to avoid and protect. No mortality or disturbance was observed during 2009 for the 29 federal and state listed species and the de-listed bald eagle *(Haliaeetus leucocephalus)* identified in the protocols.

National Environmental Policy Act

Title I and section 102 of the National Environmental Policy Act (NEPA) requires U.S. federal agencies to incorporate environmental considerations in their planning and decision making through the development of environmental assessments (EA) that detail the environmental impact of, and alternatives to, major federal actions significantly affecting the environment. During 2009, two EAs were developed:
Barrier Projects

Manistique River – An EA that was initiated by USFWS for the proposed sea lamprey barrier on the Manistique River was transferred to the U.S. Army Corps of Engineers (USACE) who became the administering agency for the project during 2009. The USACE is planning and designing the project under Section 1135 of the Water Resources Development Act.

Trap Projects

Manistee River - A NEPA compliance checklist and project questionnaire was completed for the proposed construction of a permanent sea lamprey trap on the Manistee River, downstream of the coffer dam (weir) located about 46 m below Tippy Dam. It was determined that the project is covered by categorical exclusion described in the Department of Interior Manual (1.4, B3, 516 DM 6 Appendix 1). Categorical exclusions are classes of actions that do not individually or cumulatively have a significant effect on the human environment.

Federal Insecticide, Fungicide, and Rodenticide Act

Reports were prepared to comply with the U.S. EPA June 16, 1998 ruling of Section 6(a)(2) of the Federal Insecticide, Fungicide, and Rodenticide Act (Act). This section of the Act requires pesticide registrants to report unreasonable adverse effects of their products to the EPA. The USFWS is the registrant for lampricides and must report unreasonable adverse effects on humans, domestic animals, fish, wildlife, plants, other non-target organisms, water, and damage to property. Incident reports are required with the observed mortality of a single federally listed endangered, threatened, or candidate species and with observed mortalities of more than 50 individuals of any non-target species or taxa during a lampricide application (Table 28).

Table 28. Summary of 6(a)(2) incidents on non-target organisms during 2009.

Lake	Tributary	Mortality	Freq	Comments
Champlain	Camille R.	Mudpuppy (*Necturus maculosus*)	508	Mortality occurred below application site.
	Missisquoi R.	Northern leopard frog (*Lithobates pipiens*)	531	All adults
Ontario	Sandy Cr.	Stonecat (*Noturus flavus*)	1,186	Large variation in stream pH.
Michigan	Oconto R.	White sucker (*Catostomus commersonnii*)	430	Unexpected drop in pH. High number of YOY.
Erie	Grand R.	Fantail darter (*Etheostoma flabellare*)	64	Mortality occurred below application sites.
		Johnny darter (*Ethestoma nigrum*)	67	
		Central stoneroller (*Campostoma anomalum*)	77	
		Stonecat madtom (*Noturus flavus*)	100	
		Northern hog sucker (*Hypentelium nigricans*)	55	
		Mudpuppy (*Necturus maculosus*)	138	
		Rainbow darter (*Etheostoma caeruleum*)	206	

TASK FORCE REPORTS

Task forces were established to provide expertise, guidance and coordination for the four key program areas of lampricide control, assessment, reproduction reduction, and barriers. The task forces include agents with expertise in specific program areas, researchers and academics, outside experts, Lake Committee representatives, Commission staff, and other experts as needed. The task forces report to the Commission's Sea Lamprey Integration Committee which establishes their terms of reference and works with them to recommend program direction and funding to the Commission.

The following sections report the purpose, membership, and progress on objectives as charged to each task force by the Sea Lamprey Integration Committee.

Lampricide Control Task Force

Purpose:

To improve the efficiency of lampricide control to maximize the number of sea lampreys killed in individual stream and lentic area treatments while minimizing lampricide use, costs, and impacts on stream / lake ecosystems; and to define lampricide control options for near and long-term stream selection and target setting.

2009 Membership:

Paul Sullivan (Chair), Barry Scotland, Brian Stephens, (DFO); Dorance Brege, Darrian Davis, Alex Gonzalez, Dave Johnson, Dennis Lavis, Cheryl Kaye, Ellie Koon, Terry Morse, Jeff Slade (USFWS); Jean Adams, Mike Boogaard, Terry Hubert, Bill Swink, (USGS); Gord McDonald, (U of G); Dale Burkett, Mike Siefkes, (GLFC Secretariat).

Task Force Meetings were held February 14 and September 14-15, 2009.

Progress:

1. ***Annually submit a lampricide treatment plan designed to reduce sea lamprey abundance to target wounding level.*** Lake-specific plans to suppress sea lampreys to target are in progress. Input will be solicited from SLIC task forces and the Lake Technical Committees during their winter meetings in 2010. As well, the CLC and SLIC will review and comment on the drafts at their April 2010 meetings. The Lake Technical Committees and Lake Committees will provide their final review during the summer. Revised drafts will be completed by September 2010 and presented to SLIC and the CLC at their fall 2010 meetings. The GLFC will review the final drafts for approval at their Interim Meeting in December, 2010.
2. ***Evaluate and prioritize options to optimize kill of sea lampreys and use of TFM.*** Beginning in 2006, tactics have been employed to optimise treatment efficacy, including: increasing the duration of primary lampricide applications, increasing concentrations, and elevating the use of secondary applications to reduce escapement during treatment. These tactics were applied to 80 treatments in 2009. With the change from QAS to Ranking Surveys, the agents permanently transferred effort from Larval Assessment to Control.
3. ***Annually select streams and lentic areas for lampricide control from the ESTR ranked list.*** This process resulted in the selection and treatment of 93 streams, 9 lentic areas and 138 ha in

the St. Mary's River in 2009. Included in this list were 9 tributaries that were treated for the second time in two years as part of the Lake Erie Whole Lake Treatment Strategy. In 2009, surveys of another Lake Erie tributary, South Otter Creek, revealed the existence of multiple year classes of sea lamprey larvae and this stream was treated as well. South Otter will be treated again in 2010 to complete this experiment.

In FY 2010, a total of 114 Great Lakes streams and 21 lentic areas are slated for treatment. This includes treatment of 37 Lake Huron streams and 866 ha in the St. Marys River as implementation of Year 1 of a two year North Channel Lake Huron Large Scale Treatment Strategy.

4. ***Develop annual border-blind treatment schedule that maximizes efficiency.*** The control agents have implemented tactics in recent years to maximize scheduling efficiency. In 2009, this included the treatment of 6 streams based on geographic efficiency and the utilization of US and Canadian treatment crews to treat the highly dendritic and complex Manistee River. In 2010, 11 geographical efficiency treatments will be conducted, a joint USFWS-DFO treatment of the St. Marys River is planned, and DFO will assist USFWS in treating the Betsy and Tahquamenon rivers in Michigan.

5. ***Evaluate the effects on the environment of all proposed treatment options.*** The sea lamprey control agents have designated staff to review federal, provincial, and state listed species and identify any potential conflicts with the lampricide control program. LCTF Meeting Agendas routinely include discussion of issues related to non-target impacts of treatments.

   The lake sturgeon has been listed as a "Threatened" under Ontario's Endangered Species Act in Canadian waters of the Great Lakes. This status confers protection from harm under the Act. DFO will enter into discussion with OMNR to ensure that sea lamprey control activities are conducted in compliance with provincial legislation. Currently, lake sturgeon have no status under the federal Species at Risk Act in Canada.

   USFWS-Ecological Services (ES) are preparing a Biological Assessment (BA) on lampricide treatment impacts on Piping Plover, a federally listed species. In 2009, staff from USFWS-Marquette Biological Station and USGS-Upper Midwest Environmental Sciences Center (UMESC) conducted research on dietary exposure risk and provided the results to USFWS-ES for consideration under the BA. If the BA concludes that lampricide is "Not likely to adversely affect" this species, current timing restrictions of treatments of tributaries adjacent to nesting habitat may be lifted.

   In situ cage studies are planned in 2010 to assess lampricide toxicity to y-o-y lake sturgeon, stonecats, and juvenile mudpuppies. In addition, USGS-UMESC is planning laboratory research to study lampricide toxicity to various life stages of the Snuffbox Mussel.

6. ***Annually refine estimates of staff effort, lampricide amount and total costs for inclusion in the ESTR model.*** In 2009, treatment supervisors at each of the field stations refined these estimates to aid in development of the 2010 Stream Treatment Ranking List.

7. ***Annually update Standard Operating Procedures.*** A sub-group of the LCTF met in December 2009 to update SOPs. Revisions will be incorporated into field manuals prior to the commencement of the 2010 field season.

8. ***Annually develop estimates of costs for effort and lampricide for upcoming fiscal year.*** The LCTF developed a budget for FY2010, which was submitted to PIWG and approved by the GLFC at the 2009 Interim Meeting. New DFO positions totalling 8 full-time equivalents (FTE's) were included in the program's base effort for 2010, bringing the compliment of lampricide control staff to 72, divided among 5 crews (3 USFWS, 2 DFO). Lampricide purchases and effort were approved to deliver the FY2010 control program, including the North Channel, Lake Huron Large Scale Treatment Strategy.
Lampricide purchases are based on recent usage patterns, and in 2009, the Commission continued to build lampricide inventories to meet the ongoing requirements of a more aggressive lampricide control program. During 2009, the agents took delivery of:

TFM (liquid, kg A.I.)	75,710
TFM (bar)	0
Bayluscide 3.2% (granular, kg product)	45,360
Bayluscide 70% (wettable powder, kg product)	0
Bayluscide 20% (emulsifiable concentrate, litres)	0
Bayluscide Technical Material (kg product)	3,000

Purchases for 2010 include:

TFM (liquid, kg A.I.)	66,747
TFM (bar)	2,274
Bayluscide 3.2% (granular, kg product)	193,371
Bayluscide 70% (wettable powder, kg product)	57
Bayluscide 20% (emulsifiable concentrate, litres)	500
Bayluscide Technical Material (kg product)	4,000

9. ***Assist in the development and refinement of the lampricide control research theme paper.*** The lampricide control white paper was published in 2007 (available on GLFC website). Published studies on mode of action of TFM and seasonal variation in TFM toxicity have been added as appendices.

10. ***Working with internal and external researchers, develop proposals and participate in field research of studies consistent with the lampricide control research theme paper.*** Collaborative research will be conducted between DFO, USFWS and USGS on lampricide dissipation studies, in addition to the lampricide toxicity studies identified under Item 5.

11. ***Annually review research proposals for relevance to the lampricide control research theme paper.*** The LCTF reviews research pre-proposals and proposals relevant to lampricide control during its winter meeting.

Assessment Task Force

Purpose

The purpose of the Assessment Task Force (ATF) is to rank streams and lentic areas for sea lamprey control options, and to optimize the evaluation of the success of the sea lamprey control program.

2009 Membership

Mike Steeves (Chair), Rod McDonald, Fraser Neave, Paul Sullivan, Brian Stephens, Andrew Treble (DFO); Jessica Barber, Michael Fodale, Jeffrey Slade (USFWS); Jean Adams, Roger Bergstedt, Nicholas Johnson (USGS); Shawn Sitar (Michigan DNR); Michael Jones (Michigan State University); Dale Burkett, Mike Siefkes (GLFC Secretariat).

The task force met during February and September 2009. The larval assessment workgroup met in January 2009. The ATF continues to work closely with all of the other Sea Lamprey Integration Committee task forces.

Progress

1. ***Rank streams and lentic areas for lampricide control.***
   In cooperation with the Secretariat and an Integrated Management of Sea Lamprey contractor, the ATF used larval sea lamprey abundance indices and treatment costs generated by the Empirical Stream Treatment Ranking model (ESTR) to prioritize for treatment all streams expected to contain pre-metamorphic larval sea lampreys in 2010. Included in this ranking were the St. Marys River and lentic areas off the mouths of producing streams in lakes Superior and Huron.

   Nine sea lamprey producing tributaries to Lake Erie were treated in 2008 and ten were treated in 2009. South Otter Creek, which was not treated in 2008, will be treated in 2010 to complete the back-to-back treatment tactic on Lake Erie.

2. ***Rank streams for selection for sea lamprey barriers.***
   ATF continues to work with the Barrier Task Force and the Secretariat on the prioritization of streams for construction of lamprey barriers. Larval production estimates, quantity of habitat, and treatment effectiveness are being incorporated into the process.

3. ***Refine and implement recommendations of the larval assessment review of 2002.***
   The Task Force continues to implement recommendations of the review panel. Activities in 2009 included ranking streams for treatment using "expert judgment" and examining potential differences in larval lamprey density and size structure in deep- and shallow-water habitats.

4. ***Refine parameters of the ESTR model for sea lamprey population biology and habitat, effort and costs, and control effectiveness.***
   Model refinement is an ongoing process. Updated models of growth and metamorphosis are being evaluated for inclusion in the ESTR model. In 2008 the model was adapted to provide indices of larval sea lamprey abundance as well as estimates of metamorphosed

sea lamprey production. The indices of larval abundance were used to prioritize streams for lampricide application in 2009.

5. ***Optimize assessments of abundance of sea lampreys to derive the best long-term measure(s) of sea lamprey control success.***
   There is an effort among the control agents, lake technical committees, and the Sea Lamprey Integration Committee to incorporate information on initial and terminal host abundance, wounding rates, and geographic location to improve our understanding of the effects of sea lamprey management at both the stream and lake level. This will enable the control agents to better direct control efforts and optimize control activities.

6. ***Refine and implement recommendations of the adult assessment review of 1997.***
   Following the recommendations of the adult assessment review panel:

   A. Annual estimates of lake-wide spawner abundance are made for each lake.
   B. Rationalization of which streams to trap is on-going using a value-added approach that includes input from the Barrier Task Force (BTF) and Reproduction Reduction Task Force (RRTF).
   C. Increased assessments of the size of spawning runs in more large rivers as well as spawning runs in Georgian Bay tributaries continue to be worked on by the ATF, BTF, and RRTF.

7. ***Develop annual border-blind schedules that maximize efficiency.***
   Cross-border larval assessment schedules are the norm for work on lakes Erie and Ontario. Cost efficiencies continue to be realized as the Canadian agent completes all larval assessment work on the St. Marys River. Cost-benefit analyses are being completed on other aspects of the assessment programs in an attempt to improve efficiencies through cross-border cooperation.

8. ***Update standard operating protocols (SOP), as required.***
   Larval and adult assessment SOPs are reviewed annually and updated from time to time as changes are made.

9. ***Develop estimates of costs for larval and adult assessment programs.***
   Assessment cost estimates are developed annually for submission to the Program Integration Working Group prior to its fall budget meeting.

10. ***Assist in the development of research proposals and participate in field research studies consistent with the assessment research theme paper.***
    Members of the ATF are often part of the team of investigators on research pre-proposals, and are involved in the coordination and completion of research projects in the field. In 2009, this included the following new or ongoing projects:

Johnson, N. (Initiated by Swink, W.)	Determine the contribution of transformers from lentic areas to sea lamprey populations in lakes Huron and Michigan.	2007
Siefkes, M.	Using a fishwheel to capture sea lampreys.	2007

Bergstedt, R.	Determining pathways of migratory adult sea lampreys in large rivers using three-dimensional acoustic telemetry	2008
Neave, F.	An investigation of a potential morphotype trigger in two *Ichthyomyzon* species.	2007
McLaughlin, R.	Movement pathways and behaviour of sea lamprey around traps in the St. Marys River	2008
Wilberg, M.	Improving sea lamprey control through use of historical data to inform selection of sites for lampricide treatment.	2009

11. ***Review research proposals and prioritize task force research needs that are consistent with the assessment research theme paper.***
The assessment theme paper has been published in the Journal of Great Lakes Research. The task force continues to review the theme paper for relevancy to current and future needs, and up-to-date versions are also published online at www.glfc.org. The ATF uses the theme paper as a benchmark to evaluate pre-proposals submitted to the Commission's Sea Lamprey Research Board. This evaluation is then passed on to the Sea Lamprey Research Board for consideration during their deliberation process.

Reproduction Reduction Task Force

The task force was established in 2003 and combined the former sterile-male-release technique task force and the pheromone and trapping task force.

Purpose

Coordinate and optimize the pheromone, sterile-male release, and trapping strategies in an integrated program of sea lamprey control.

Supporting Great Lakes Fishery Commission Strategic Vision Milestones:

- *Achieve economic-injury levels:* Suppress sea lamprey populations to economic-injury levels (maximize net benefits of sea lamprey and fishery management) by the year 2005.

- *Control the St. Marys River lamprey population:* Suppress sea lamprey populations in the St. Marys River to a level that allows rehabilitation of lake trout in northern Lake Huron.

- *Use alternative control technologies:* Accomplish at least 50% of sea lamprey suppression with alternative technologies while reducing TFM use by 20% through use of at least one new alternative-control method, increased use of current methods such as sterile-male release, trapping, and barrier deployment.

2009 Membership

Michael Twohey (Chair), Lisa Walter, and Jessica Barber (USFWS); Rod McDonald and Mike Steeves (DFO); Jane Rivera and Roger Bergstedt (USGS); Weiming Li and Michael Wagner, (Michigan State University); Rob McLaughlin and Gordon McDonald, (University of Guelph); Ellen Marsden, (University of Vermont); Michael Siefkes and Dale Burkett (GLFC Secretariat).

Progress

1. **Identify application strategies and solicit field evaluations of the most promising strategies.** Task force members collaborated to further develop strategies for field implementation of pheromone control techniques. A field test of the utility of 3kPZS in enhancing trap captures at traditional barrier integrated traps was implemented in U.S. streams in 2009 and will expand in 2010 to include additional streams in Canada. Further, early application of pheromones in two Lake Superior tributaries will test the effect of drawing more lampreys into streams, and spermiated males will bait one St. Marys River trap to determine its effect on captures. The task force also addressed the potential utility of repellents in an integrated program and proposals were submitted.

   Evaluation of the sterilization program:

– A review of quality assurance in the sterile male program indicated that the industrial process is successfully sterilizing males, the sterilized males compete for mates as expected, and viable offspring have been reduced at near theoretical levels.
– Evaluation of effects on larval year classes in the St. Marys River and parasites contributed to Lake Huron are difficult to determine independent of other control actions. The task force began to design studies for smaller systems that may demonstrate the effect.

– A two-year research project to evaluate genetic damage in treated lampreys for quality assurance was initiated.
– A field trial of sterilized females continued in the third year of a 4 year study.

Planning, evaluation, and implementation of trapping strategies:
– A Great Lakes Restoration Initiative (GLRI) proposal in cooperation with power producers in the St. Marys River was pursued to allow novel evaluations intended to advance alternative controls, manipulate flows in the major power canals and at the compensating gates to evaluate new trapping opportunities, facilitate diver efforts to remove lampreys, access nests for sampling, and evaluate trapping opportunities.
– Plans continued to design and construct a permanent trap in the Manistee River.
– Rotary screw traps were successfully tested in two streams to capture downstream migrating juvenile sea lampreys during 2009. Agents plan to use the technique on streams that have been deferred for treatment or would otherwise produce a substantial number of parasites during 2010.
– The task force continued to consider elements of "fishing-up" as a viable component of control strategies where sea lamprey numbers have been greatly reduced.
– A draft tactical plan for trapping was produced and submitted for review.
– Tube traps were tested for use in unique environments.

2. **Evaluate the role of trapping as an alternate control technique.** A study by Young on the effect of stock size on recruitment of sea lampreys in Lake Huron suggested that a near doubling of lamprey trap catch (from 19% to 42%) would "fish-up" the population and reduce recruitment sufficiently to meet fish community objectives if current lampricide control efforts were to continue. Similarly, a recent publication by Velez-Espino et al. (2008) supported the concept that reductions in stock size lead to reduced parasites in the lakes. The task force continued to consider elements of "fishing-up" as a viable component of control strategies where sea lamprey numbers have been greatly reduced. Assessment of larval populations in the St. Marys River, simulation modeling by Jones et al., and economic effects investigated in Jones' decision analysis project all indicate that trapping is an integral element of the integrated control strategy in the St. Marys River, and that the strategy is effectively reducing production of larvae.

Trapping in the St. Marys River:
– Recent analysis indicated water elevation is closely correlated with trap efficiency. Level-loggers have been placed in the river to further evaluate this effect.
– A new attractant water trap was completed at the Brookfield hydro plant and operated in 2009 that captured 453 lampreys. Refinements in 2010 are expected to increase captures.
– Retention devices were evaluated on Canadian traps, and behaviour near traps was observed with video and PIT tags.
– Discussions have been underway with a board of the International Joint Commission to allow water allocation for sea lamprey management, including some manipulations to evaluate lamprey movement and effect on traps.

Research to advance the technology of trapping and to understand lamprey behaviours:
– Hydro-acoustic studies of lamprey movements and behaviour continued in the St. Marys and Mississagi rivers and data to develop movement rules are being evaluated.
– Studies of effectiveness of portable traps were completed.
– A proposal to evaluate a large fishwheel (on loan from USGS) is scheduled to begin in 2010.

- Plans were formulated for use and evaluation of new advanced hydroacoustic arrays and DIDSON sonar in 2010.

3. **Evaluate results of laboratory and field research and revise application strategies accordingly.** Results of field studies since 2007 suggest new hypotheses on how sea lamprey pheromones work. Migratory responses in sea lampreys to pheromones may occur in two distinct phases: 1) settlement at river mouths in response to PADS/PSDS/PS at the end of the lake to river transition; and 2) use of 3kPZS in stream selection during the river portion of the migration. A cooperative field study (Johnson et al.) tests the utility of using 3kPZS in a large suite of streams to manipulate migratory behaviour and improve the efficacy of traps associated with barriers. Further, the Li lab is continuing to evaluate additional pheromone components. Methods to analyze 3kPZS in stream water have been developed. The Wagner lab is evaluating settlement behaviour, the role of compounds associated with migration, and evaluation of reverse intercept trapping near barriers using 3kPZS.

   The task force continued efforts to review application of the SMRT in collaboration with Jones who has assented to update decision analysis modeling with recent data to better understand appropriate targets for sterile males and suppression in the St. Marys River. Quality assurance metrics were reviewed and all elements, including bisazir purity and dose delivery, appear normal. The task force has begun to develop an alternative application and evaluation proposal for the sterile-male-release technique to begin in smaller streams in 2012.

   Efforts continue to control the risk of transferring disease and invasive species. The task force worked with the Fish Health Committee and lake committees and established effective protocols for screening and moving sea lampreys from Lake Ontario to the upper Great Lakes. No diseases have been confirmed that would curtail releases. A research project titled "*Real options analysis of Lake Ontario sterile sea lamprey transfers*" (Tsao *et al*. completion report due in 2010) is evaluating the risks and benefits of these transfers. A secure water supply was installed at Hammond Bay for the transport of lampreys. The task force toured the FWS LaCrosse Fish Health Center in September.

   Video has been used to evaluate lamprey behaviour near trap funnels. Initial observations suggest that many lampreys do not enter on first contact. Design of trap entry and retention devices is a task force priority.

4. **Mediate a collaborative link between control agencies and research institutions to use the best available resources and facilitate the transition from laboratory to field.** Pheromone field experiments continued with investigators from MSU and both control agents. The control agent's expertise in trapping has been integral to the field studies. Good Laboratory Practices training has been provided by the Upper Mississippi Environmental Sciences Center (UMESC) and they continue to coordinate registration issues. Extraction of larval (migratory) pheromone continues at Hammond Bay with support from both control agents. This approach is providing a strong interdisciplinary team and building critical expertise for future implementation of a pheromone control strategy.

   The task force is collaborating with agents, and internal and external researchers to advance strategies for suppression of reproduction. Agents, PERM scientists, and outside experts are collaborating on movement studies and understanding of lamprey behaviour near traps. The task force continues to monitor studies of population dynamics that are integral to success of alternative controls. The Hammond Bay Biological Station is continuing to provide support for SMRT related field activities. The task force chair and several members of the task force are members of the Sea Lamprey Research Board.

5. **Identify chemical-biochemical registration requirements, coordinate registration research, and facilitate the registration process with appropriate agency personnel.** All permits for planned field applications were acquired. A new permit application will be needed for the state of Michigan after 2010. Appropriate records of field evaluations are being kept. UMESC is working with pheromone researchers to address the need for EUP's for various mixtures of pheromone components. A plan for joint registration under NAFTA has been accepted and if pursued, pheromones would be simultaneously labelled in the U.S. and Canada under one harmonized label.

6. **Develop annual border-blind schedules that maximize efficiency.** The U.S. and Canadian agents have been working on both sides of the border to facilitate effective trapping, processing, and transport of sea lampreys. The task force used effective protocols for screening and moving sea lampreys from the lower to upper Great Lakes using facilities on both sides of the boarder.

7. **Update annual standard operating protocols (SOP).** Field operations continue to be conducted under updated protocols. Standard operating procedures for critical sterilization activities are annually updated and incorporated into a manual of standard operating procedures. The task force developed procedures and schedules for trap operation on the St. Marys River and procedures are detailed in the agents' annual work plans. Pheromone field trials are conducted under peer reviewed study plans.

8. **Develop annual estimates of costs for effort for upcoming fiscal year.** Budgets were proposed for trapping, sterilization, and pheromone development. The task force continued to develop costs and timelines for strategic development and implementation of pheromone strategies.

9. **Assist internal and external researchers to develop proposals and participate in field research consistent with pheromone, sterility, and trapping for control research theme papers.** Task force members were involved in development of research priorities, served as investigators on some studies, and supported these studies in many ways. The task force worked to identify new strategies to target lampreys that elude traps. Recent research is bringing new understanding to the challenge of capturing high proportions of lampreys, working in difficult environments, and understanding the effect of trapping as a management technique. Projects just completed or underway address issues of inter-stream movements of sea lampreys, pathways of migratory sea lampreys in large rivers, movement pathways and behaviour near traps in the St. Marys River, improving effectiveness of portable traps, behaviour and swim performance of sea lampreys, movement rules sea lampreys use to navigate complex flows, and recruitment dynamics of Great Lakes sea lamprey. New applications of technology are being planned to improve trapping efficiencies. Ongoing projects included evaluation of tube traps, downstream trapping, nest destruction, and a large fish wheel. DIDSON cameras and hydro acoustics are planned for use to advance understanding of sea lamprey behaviour. Further work will be coordinated with Jones to analyze critical uncertainties associated with alternative controls, particularly the SMRT, and use updated models to forecast the consequences of a range of management options.

Task force members were engaged in development of research proposals for SMRT, pheromones, and population dynamics. The task force continued to refine a research strategy to support implementation of a pheromone control technique. Control agents, internal research and external research collaborated on pheromone field trials. A cooperative field study (Li lab, Wagner lab, control agents), formulated with task force members will continue in 2010 to test the utility of using 3kPZS at barrier integrated traps to manipulate migratory behaviour and improve efficacy of traps associated with barriers. Efficacy of sterilization, Q/A, and potential for sterile female release continued to be investigated with help from agents, internal research, and external research. The task force continued to consider recommendations of the SMRT Expert Review Panel in formulating research plans, including a field trial of sterilized females.

10. **Review pheromone, sterility, and trapping for control research proposals for relevance to pheromone, sterility, and trapping for control research theme papers.** Pre-proposals were circulated to task force members and comments were carried to the Sea Lamprey Research Board by the chair and other task force members who attend the research meeting. Research priorities are up to date.

Barrier Task Force

Purpose

The task force was established during April 1991 to coordinate efforts of DFO, USFWS and USACOE on the construction, operation, and maintenance of sea lamprey barriers.

Supporting Great Lakes Fishery Commission Strategic Vision Milestones:

- Achieve economic injury levels: Suppress sea lamprey populations to economic-injury levels (maximize net benefits of sea lamprey and fishery management) by the year 2005.

- Use alternative control technologies: Accomplish at least 50% of sea lamprey suppression with alternative technologies while reducing TFM use by 20% through
    - Increased use of current methods such as sterile-male-release, trapping, and barrier deployment.

To contribute toward this milestone, the barrier program focused on three priorities:

1) Operate and maintain existing commission structures;
2) Cooperate with partners to ensure sea lampreys are blocked at de facto barrier sites;
3) Construct new structures in streams where they:
    a) Provide control where other options are not possible or effective,
    b) Provide a cost-effective alternative to lampricide control,
    c) Improve cost-effective control in conjunction with pheromone-based control methods, trapping, sterile male release, and lampricide treatments,
    d) Are compatible with a system's watershed plan.

2009 Membership

Members were Jessica Barber (Chair), Kasia Mullett, Cheryl Kaye, Rob Elliott (USFWS); Paul Sullivan, Tonia Van Kempen (DFO); Jim Galloway (USACOE); Sharon Hanshue (Michigan DNR); Nick Johnson (USGS); Rob McLaughlin (University of Guelph); Dale Burkett and Mike Siefkes (GLFC Secretariat).

Progress

1. ***Coordinate operation, maintenance and construction of sea lamprey barriers.***

   Operation **-** During 2009, 10 barriers were operated (Canada – Big Carp and Little Carp rivers, Big and Wesleyville creeks and Cobourg Brook; U.S. – Pere Marquette and Ocqueoc rivers, and Albany, Furnace and Greene creeks). The barriers operated each year are those barriers that have adjustable components that need to be set/removed/adjusted at the beginning/end of the sea lamprey migration periods or that have permanent traps or fishways associated with them that require regular servicing. Spring pre-migration inspections were conducted in 13 U.S. streams.

Maintenance **–** During 2009, safety and maintenance inspections were conducted at 18 U.S. sea lamprey barrier sites and monthly or bi-monthly inspections took place at all DFO barrier sites. The results of inspections led to immediate minor repairs or engineered inspections and remediation plans for major repairs. Affected structures, sites, and access routes included 13 streams in Canada (Big, Clear, Little Otter, Venison, Young's, Cobourg, Duffins, Grafton, Graham, and Wesleyville creeks, and Big Carp, Credit, and Salmon rivers. Water level loggers were set and downloaded for performance monitoring and planning purposes in 15 U.S. streams. The Jordan River electrical barrier was removed in cooperation with other partners and led by the Green Bay National Fish and Wildlife Conservation Office.

Construction **–** Planning continued on five barrier projects (USFWS- Manistique and Marengo rivers and Trail Creek; DFO – Still River, Orwell Brook, and Normandale Creek). Two barrier projects were terminated (DFO - Chagrin River and Red Cliff Creek). Feasibility investigations were initiated for two barrier projects (USFWS– Grand River; DFO - Rouge River).

2. ***Ensure that structures important to sea lamprey management block spawning-phase sea lampreys.***
   During 2009, U.S. agent staff consulted and provided mitigation recommendations on fish passage or dam/perched culvert removal projects for the Milwaukee, Kalamazoo, Baldwin (Pere Marquette River), Black (Cheboygan River), Black (Alcona River), and Bad (Shiawasee River) rivers, and Menge, Silver (Ahnapee River), Duck, Thompson, Hodges (Cheboygan River), Van Hellon, (Cheboygan River), Silver (Ocqueoc River), and Potato (Shiawasee River) creeks. Additional investigations and sea lamprey blocking recommendations were considered for the Days and White rivers. DFO coordination to ensure sea lampreys remain blocked at existing structures continued regarding the Black Sturgeon River Dam and Denny's Dam in the Saugeen River.

3. ***Develop and annually update a GIS database of structures that block adult sea lampreys*.**
   The USFWS has completed the inventory of nearly 1,800 barrier structures on Great Lake tributaries. The DFO assessment crews inspect barrier structures while conducting larval surveys and all removals must go through the DFO Habitat Management Office. Any further work on the database has been deferred in lieu of higher priority items until the USFWS and DFO fill vacancies in the barrier program (USFWS – barrier planning biologist; DFO – barrier coordinator).

4. ***Develop and annually update standard operating protocols*.** Several of the protocols in the Barrier Life Cycle and Operational Protocols document are in need of revision. A schedule to complete these revisions will be developed during 2010.

5. ***Develop annual border-blind schedules and budget*.** A five year plan (2010-2014) was developed for barrier projects. The list included the rebuild of barriers in Normandale Creek, and Still, Manistique, Grand, Saugeen, and Black Sturgeon rivers, and construction of new barriers in Trail and Big Otter creeks, Orwell Brook, and Rouge, Whitefish, Root, Pine, Bighead, and Marengo rivers. Proposals and associated remediation projects are also being considered for the Days and White rivers.

6. ***Review barrier research proposals for relevance to barrier and trapping research theme paper.*** The task force continued to work with researchers via the task force and to develop proposals consistent with identified needs and the barrier research theme paper. Research

proposal summaries were reviewed, ranked by priority and submitted to the Great Lakes Fishery Commission Secretariat and Research Priorities Workgroup.

7. ***Collaborate with researchers to develop proposals and execute field research consistent with the barrier and trapping research theme paper.*** Passing non-jumping fish while effectively blocking sea lamprey migration continues to be an important research need of the task force. Using the Black Sturgeon River dam removal proposal as a case study, researchers and task force representatives are involved in addressing this concern. Current research projects underway address spawning-phase sea lamprey movement in the St. Marys and Mississagi rivers, both of which will be important in understanding lamprey movements and the implications for barriers.

OUTREACH

The USFWS and DFO are involved in outreach activities to inform the public of the benefits and operations of the SLMP. These efforts educate the public about sea lampreys and the devastating effect they have on Great Lakes fishes. The main tool used during outreach events is a large display with graphics, a computer interface, and an aquarium that houses live larval and adult sea lampreys for visitors to experience the sea lamprey first-hand. During 2009, this display was in attendance at the several large capacity events (Table 28).

Table 28. Dates and locations of public outreach performed by agents of the sea lamprey control program in 2009.

Date	Location	Venue	Lead Agency
January 16th – 25th	Cleveland, OH	Cleveland Boat & Waterfront Lifestyle Expo	DFO
Feb. 28th – March 1st	Valparaiso, IN	Spring Fever Outdoor Show	DFO
March 5th- 7th	Green Bay, WI	Northeast Wisconsin Sport Fishing Show	DFO
March 12th – 16th	Toronto, ON	Toronto Sportsmen's Show	DFO
March 19th – 23rd	Grand Rapids, MI	Ultimate Sport Show	DFO
June 6th	Buffalo, NY	Fish & Wildlife Festival – Lower Great Lakes	USFWS
June 30th	Sault Ste Marie, MI	USA Sault Ste Marie Lock Celebration	USFWS
August 1st	Minneapolis, MN	State Fish Art Expo	USFWS
August 17th – 23rd	Escanaba, MI	UP State Fair	USFWS
October 18th	Ottawa, ON	National Science & Technology Day	DFO

PERMANENT EMPLOYEES OF THE SEA LAMPREY MANAGEMENT PROGRAM

DEPARTMENT OF FISHERIES AND OCEANS CANADA

Sea Lamprey Control Centre – Sault Ste. Marie, Ontario Canada

Paul Sullivan, Division Manager

Section Head, Control: vacant

Biologists, Control:
- Brian Stephens: Control Supervisor
- Barry Scotland: Assistant Control Supervisor
- Tonia Van Kempen: Environmental Supervisor

Technicians, Control:

Charlie Boudreau	Chris Sierzputowski
Peter Grey	Jamie Smith
Adam Loubert	Randy Stewart
Jerome Keen	Jamie Storozuk
Mike MacKenna	John Tibbles
Shawn Robertson	Sarah Woods

Administrative Support:
- Lisa Vine: Finance and Administrative Officer
- Christine Reid: Receptionist
- Melanie McCaig: Accounts Clerk
- John Graham: Informatics:

Section Head, Assessment: Mike Steeves

Biologists, Assessment:
- Rod McDonald: Adult Supervisor
- Andrew Treble: Larval Supervisor (Upper Lakes)
- Fraser Neave: Larval Supervisor (Lower Lakes)

Technicians, Assessment:

Gale Bravener	Sean Morrison
Paul Kyostia	Sean Nickle
Sarah Larden	Jeff Rantamaki
Michael McAulay	Kevin Tallon
Richard Middaugh	Thomas Voigt

Barriers:
- Joe Hodgson: Barrier Technician
- Barrier Coordinator: Vacant

Maintenance:
- Brian Greene: Supervisor
- Chad Hill: Assistant

UNITED STATE FISH AND WILDLIFE SERVICE

Robert Adair, Sea Lamprey Management Program Manager and Field Supervisor

Ludington Biological Station – Ludington Michigan

Dennis Lavis, Station Supervisor

Lampricide Control Fish Biologists:
- Alex Gonzalez, Treatment Supervisor
- Ellie Koon, Treatment Supervisor
- Tim Sullivan
- Kathy Hahka
- Rebecca Gannon

Lead Physical Science Technician: Vacant

Physical Science Technicians:

Kevin Butterfield	Jeffrey Sartor

Biological Science Technicians:

Jason Krebill (CS)	Brian Bartos (CS)
Bobbie Halchishak (CS)	Jenna Tews (CS)
Margie Shaffer (CS)	

Larval Assessment Fish Biologists:
- Jeff Slade, Larval Assessment Supervisor
- Lynn Kanieski

Biological Science Technicians:
- Lois Mishler
- Gary Haiss (CS)
- John Stegmeier (CS)
- Matt Lipps
- Timothy Granger (CS)
- Brandon Kemp (CS)

Maintenance Worker: David Keffer

Administrative Support:
- Joe Tyron
- Danya Sanders

Marquette Biological Station – Marquette Michigan

Katherine Mullett, Station Supervisor

Larval Unit Supervisor: Michael Fodale

Fish Biologists:

Dorance Brege, Treatment Supervisor
Darrian Davis, Treatment Supervisor
Joseph Genovese, Larval Assessment Supervisor
Lori Criger
Shawn Nowicki

Chemist: Vacant

Lead Physical Science Technician: Robert Wootke

Physical Science Technicians:

Michael St.Ours
Kelley Stanley

Biological Science Technicians:

Kyle Krysiak
Mary Wilson
Susan Becker (CS)
Michael Blohm (CS)
James Criger (CS)
Janet McConnell (CS)
Justin Oster (CS)
Thomas Elliott (CS)
Bruce Smith (CS)
Robert Wollney (CS)
Rachael Guth (CS)
Chris Gagnon (CS)
Jacob Cunha (CS)
Daniel Suhonen (CS)

Maintenance Worker: Stephan Dagenais

Administrative Support:

Larry Carmack, Supervisor
Robert Kahl
Deborah Larson

Adult Unit Supervisor : Michael Twohey

Fish Biologists:

Jessica Barber, Adult Assessment Supervisor
Lisa Walter, Sterile Male Supervisor
Cheryl Kaye, Risk Management Supervisor
Mary Henson
Gregory Klingler

Biological Science Technicians:

Gregg Baldwin
Daniel Kochanski
Deborah Winkler
Dennis Smith
Nikolas Rewald
Kevin Letson (CS)
Chad Andreson (CS)
Sara Ruiter (CS)
Bruce Eldridge (CS)
Lawrence Terlicki (CS)
Jason Van Effen (CS)

Administrative Support:

Tracy Demeny, Administrative Officer
Pauline Hogan
Alana Kiple (CS)
Terri Todd
Barbara Poirier