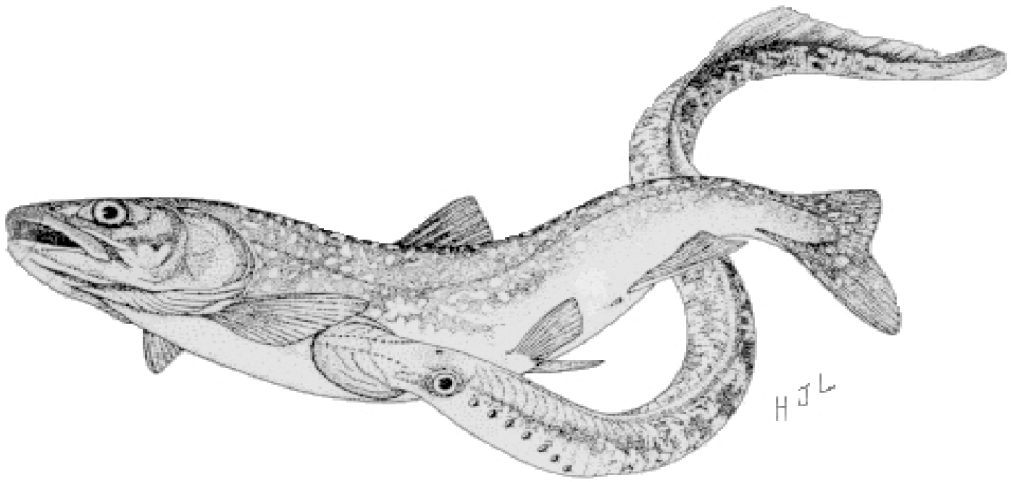
INTEGRATED MANAGEMENT OF SEA LAMPREYS IN THE GREAT LAKES 2008

ANNUAL REPORT TO THE

GREAT LAKES FISHERY COMMISSION



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EXECUTIVE SUMMARY

This report summarizes activities in the integrated management of sea lampreys conducted by the United States Fish and Wildlife Service (Service) and Department of Fisheries and Oceans Canada (Department) in the Great Lakes during 2008. Lampricide treatments were conducted on 100 tributaries. Larval assessment crews surveyed 338 Great Lakes tributaries and 55 lentic areas to assess control effectiveness, plan future TFM treatments, and establish production capacity of streams. Assessment traps were operated in 73 tributaries across the Great Lakes to estimate the spawning-phase population in each Great Lake.

We evaluate adult sea lamprey populations relative to fish-community objectives for each of the lakes. In Lake Superior, sea lamprey abundance (27,760) was within target levels of 36,000 ± 18,000. In Lake Michigan, sea lamprey abundance (104,823) was above target levels of 62,000 ± 12,000; however numbers decreased significantly from 2007. In Lake Huron, sea lamprey abundance (190,346) was significantly greater than the 2007 abundance estimate and was above target levels of 73,000 ± 20,000. In Lake Erie, spawning abundance (2,377) was within target levels of 4,000 ± 2,000 for the first time since 2002. In Lake Ontario, spawning abundance was estimated to be 55,448, which is above target levels of 31,000 ± 7,000 and significantly higher than the estimate for 2007.

INTRODUCTION

Sea lampreys (*Petromyzon marinus*) are 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 threaten efforts to restore and rehabilitate the fish community. Sea lampreys attach to large bodied fish and extract blood and lymph fluids. It's estimated that about half of sea lamprey attacks on fish result in the death of the fish and up to 16 kg (35 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 (Commission) and implemented by two control agents: the U.S. Fish and Wildlife Service (Service) and the Department of Fisheries and Oceans Canada (Department). The program is a critical component of fisheries management in the Great Lakes because it facilitates the rehabilitation of important fish stocks by significantly reducing the mortality of Great Lakes fish caused by the feeding of parasitic sea lampreys.

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 targets for the SLMP that, if achieved, would enable establishment and maintenance of self-sustaining stocks of lake trout and other salmonines by minimizing the impact of sea lampreys 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 Commission in 2008 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 target numbers for sea lampreys that will meet their fish community objectives. In each lake, 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 were calculated for each lake except Lake Ontario from the estimated abundance of sea lampreys over a five-year period when marking rates were closest to five marks per A1-3 marks per 100 lake trout >533 mm. A target and range of sea lamprey abundance were calculated for Lake Ontario from the estimated abundance of sea lampreys over a five-year period when marking rates were closest to two marks per A1-3 marks per 100 lake trout >431 mm.

The performance of the SLMP is annually evaluated by contrasting the abundance of adult sea lampreys as well as the lake trout marking rate against the targets. The lake-wide abundance of sea lampreys is estimated by the control agents as a combination of mark-recapture estimates of spawning-phase migrants in streams with traps, and regression model-predicted numbers in streams without traps. The marking rate is collected by the agencies that comprise the lake committees and their technical committees.

In this section, we report on the performance of the SLMP in 2008 for each of the lakes relative to the sea lamprey abundance and lake trout marking targets.

Lake Superior

The Lake Superior Committee established the following goal for sea lamprey management in its 2003 fish-community objectives:

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

The target number and range of sea lamprey abundance for Lake Superior was calculated from the average number 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). Marking rates of less than five marks per 100 fish were found to result in a tolerable annual rate of mortality of less than 5%, based on a relationship between marking rates and the probability of surviving a sea lamprey attack. The calculated target abundance in Lake Superior was 36,000 ± 18,000 sea lampreys**.**

Sea lamprey abundance in Lake Superior was estimated to be 27,760 (95% CI: 23,050-32,872), and was within the target range during 2008. Lake-wide estimates of spawning-phase lamprey numbers increased above the target range during 1999 and have remained above targets until this year. The lake trout marking rate is greater than the target of five marks per 100 fish and has trended upward since 1994. The lake trout marking rate is currently highest in the northwest and southwest portions of the lake, but the marking rate declined this year in Minnesota waters.

The causes of the increase in sea lamprey numbers during the late 1990s are unknown. The sea lamprey control agents responded to the increase in abundance by surveying all known and potential sources of sea lampreys during 2004-2006. Treatment effort has been increased and all of these sources have been treated during the past four years. Enhanced treatment strategies to improve the efficacy of lampricide treatments were used in 29 of 32 treatments this year. These strategies included: targeting lampricide concentrations greater than minimum lethal concentrations (MLC); extending lampricide treatment blocks by one or two hours; conducting secondary applications of lampricide to treat backwaters, springs, and small feeder streams.

Lake Michigan

The Lake Michigan Committee established the following goal for sea lamprey management in its 1995 fish-community objectives:

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

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

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.

Establish self-sustaining lake trout populations.

The target number and range of sea lamprey abundance for Lake Michigan was calculated from the average number 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). Marking rates of less than five per 100 fish were found to result in a tolerable annual rate of mortality of less than 5%, based on a relationship between marking rates and the probability of surviving a sea lamprey attack. The calculated target abundance in Lake Michigan was 62,000 ± 12,000 sea lampreys.

During 2008, sea lamprey numbers were greater than the fish-community objective target for Lake Michigan. Sea lamprey abundance was estimated to be 104,823 (96,764-116,642, 95% confidence interval) during 2008, a significant decrease from 2007 but continuing to exceed the fish-community objectives. Sea lamprey abundance was less than or within the target range prior to the 2000 spawning year, but has been greater than targets since that time. Sea lamprey marking rates have been greater than target levels since 1995, but decreased during 2008 compared to 2007. Marking rates may be affected both by the declining abundance of large lake trout and increased abundance of sea lampreys.

The increasing trend in sea lamprey abundance since 2000 led the Commission to increase assessment and treatment effort in Lake Michigan. The causes of the increase may be due to reduced lampricide control effort, increased production 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 been targeted at all potential sources of sea lampreys in the lake.

During 2001, treatment effort increased in Lake Michigan and significantly more annual control effort was directed to the lake during 2001-2008 than during the previous six years. The Manistique River which has a recent larval population established upstream of a deteriorated barrier, was treated in 2003, 2004 and 2007, and is scheduled to be treated again in 2009. Plans for a new barrier in the Manistique River to replace the deteriorated structure are underway. During 2005, the states and tribes of Michigan and Wisconsin agreed to increased TFM concentrations in select sturgeon streams to maximize treatment effectiveness; however treatments of streams with sturgeon reproduction are still scheduled later during the year when young sturgeons are less vulnerable. The control agents implemented options to improve treatment effectiveness on some streams during 2006 to 2008 including applying longer duration lampricide blocks, using higher concentrations, increasing secondary applications of lampricides to backwaters and small tributaries and scheduling of stream treatments during optimal times of the year to increase the likelihood of flow conditions being more conducive to successful lampricide application.

Lake Huron

The Lake Huron Committee established the following specific goal for sea lamprey management in its 1995 fish-community objectives:

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.

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

The population of spawning phase sea lampreys during 2008 was estimated to be 190,346 (95% CI: 165,303-224,632) and exceeds the recommended abundance target. The population estimate significantly increased from 2007. Sea lamprey abundance in Lake Huron has been greater than target levels throughout the last 20 years. During the 1990s there were more sea lampreys in Lake Huron than in all the other Great Lakes combined. Since 2001, the population estimates have been significantly lower than estimates during the previous 10 years. Marking rates on lake trout have declined to a greater degree during the same period.

The abundance of sea lampreys in Lake Huron during the 1980s and 1990s was attributed to production from the St. Marys River, the large connecting channel with Lake Superior. The population of larval sea lampreys in the river was estimated at 5.2 million during the mid 1990s and was considered large enough to be producing the majority of sea lampreys feeding in the lake. The discharge of the St. Marys River precludes treatment with liquid TFM. During 1997, an innovative control program was implemented in the river that integrated spot treatments with Bayluscide 3.2% Granular Sea Lamprey Larvicide (granular Bayluscide) and the alternative control methods of trapping and sterile male release. During 1998-2001 the first full round of approximately 850 ha of spot treatments was completed and extended over the entire infested area of the river. This integrated program continued through 2008 with spot treatments of the most densely populated areas (highest ranking plots averaging about 140 ha per year), increased efforts to capture migrating adults, and continued release of sterilized males. These actions have contributed to the decline in sea lamprey numbers and marking rates observed since 2001. Enhanced treatment strategies to improve the efficacy of lampricide treatments were used in 19 of 24 treatments this year. These strategies included: targeting lampricide concentrations greater than minimum lethal concentration (MLC); extending lampricide treatment blocks by one or two hours; conducting secondary applications of lampricide to treat backwaters, springs, and small feeder streams.

Lake Erie

The Lake Erie Committee does not include a specific sea lamprey objective in its 2003 fish-community objectives, although it does state 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 number and range of sea lampreys for Lake Erie were calculated from the average number of sea lampreys 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). Marking rates of less than five marks per 100 fish were found to result in a tolerable annual rate of mortality of less than 5%, based on a relationship between marking rates and the probability of surviving a sea lamprey attack. The calculated target abundance in Lake Erie was 4,000 ± 2,000 sea lampreys.

Sea lamprey abundance in Lake Erie was estimated to be 2,377 (95% CI: 1,576-4,554), which was within target levels. Marking rates also decreased from 16 to 13.1 marks per 100 fish from the fall of 2006 to the fall of 2007.

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 numbers 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 reduced treatment efficacy resulting from changes in procedures to reduce lampricide use and protect non-target organisms. Efforts to address these problems began in 1999 when concerted control effort was applied to the major sea lamprey producing streams in Lake Erie, resulting in suppression to target levels for four years. During the period from 2005 to 2007, spawning-phase numbers rebounded, once again exceeding pre-control levels. In response to the observed increases, a whole-lake treatment strategy was adopted whereby all infested tributaries to Lake Erie would be treated in two consecutive years. Assessments of potential new sea lamprey producing streams and connecting channels, and evaluations of larvae that have survived treatments remain a priority. Enhanced treatment strategies to improve the efficacy of lampricide treatments were used in six of nine treatments this year. These strategies included: targeting lampricide concentrations greater than minimum lethal concentration (MLC); extending lampricide treatment blocks by one or two hours; conducting secondary applications of lampricide to treat backwaters, springs and small feeder streams.

Lake Ontario

The Lake Ontario Committee established the following goal for sea lamprey management in its 1988 fish-community objectives:

Limit the size of the sea lamprey population to a level that will not cause mortality in excess of 90,000 lake trout annually.

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

The target number of sea lampreys for Lake Ontario was first calculated using the same marking statistics as the other lakes (A1-3 marks). The target and range were revised during 2006 exclusively using A1 marks because these fresh wounds were 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 number 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 >533mm). The calculated target abundance in Lake Ontario was 31,000 ± 7,000 sea lampreys.

Sea lamprey abundance in Lake Ontario was estimated to be 55,448 (95% CI: 50,214-62,249) and is greater than the target abundance. The spawning population increased to greater than target numbers. However, sea lamprey population estimates were at or less than the target range for 9 of the 10 years prior to 2004. Marking rates on lake trout were near the target rate since 1997, increased to 3.9 A1 marks per 100 fish during 2005, and decreased to 3.5 A1 marks per 100 fish during 2006. The difference may be a function of changes in the predator-prey ratio in Lake Ontario.

All streams considered regular sea lamprey producers are treated every three to four years. During 2001, the Commission increased stream treatment effort compared to levels in the latter 1990s to improve suppression in all lakes. Enhanced treatment strategies to improve the efficacy of lampricide treatments were used in all nine treatments this year. These strategies included: targeting lampricide concentrations greater than minimum lethal concentration (MLC); extending lampricide treatment blocks by one or two hours; conducting secondary applications of lampricide to treat backwaters, springs and small feeder streams.

LAMPRICIDE CONTROL

Tributaries harboring larval sea lampreys are treated periodically with lampricides to eliminate or reduce larval populations before they recruit to the lake and begin the parasitic life stage. Service and Department treatment units administer and monitor doses of the lampricide TFM, sometimes augmented with Bayluscide (70% Wettable Powder or 20% Emulsifiable Concentrate) to scheduled tributaries and 3.2% Granular Sea Lamprey Larvicide (granular Bayluscide) to scheduled lentic areas. Specialized equipment and techniques are employed to provide concentrations of lampricides that eliminate about 95% of the sea lamprey larvae and minimize the risk to non-target organisms. In this section, we summarize lampricide applications conducted in 2008 (Table 1), history of lampricide treatments in each of the Great Lakes, and highlights of the 2008 treatments.

The Lampricide Control Task Force was established by the Commission 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 2008 is presented in the Task Force Reports section.

Table 1. Summary of lampricide applications in tributaries of the Great Lakes, 2008.

Lake	Number of Streams	Discharge (m^3/s)	TFM[1] (kg)	Bayluscide[1] (kg)	Distance (km)
Superior	32	169.4	14,178	232.7	720.8
Michigan	26	69.1	14,722.5	219.4	816.6
Huron	24	144.8	14,966.9	925.9	539.9
Erie	9	53.3	10,372.1	1.3	418.9
Ontario	9	75.8	7,560.1	70.7	146.7
Total	**100**	**512.4**	**61,799.6**	**1450.0**	**2,642.9**

[1]Lampricide quantities are in kg of active ingredients

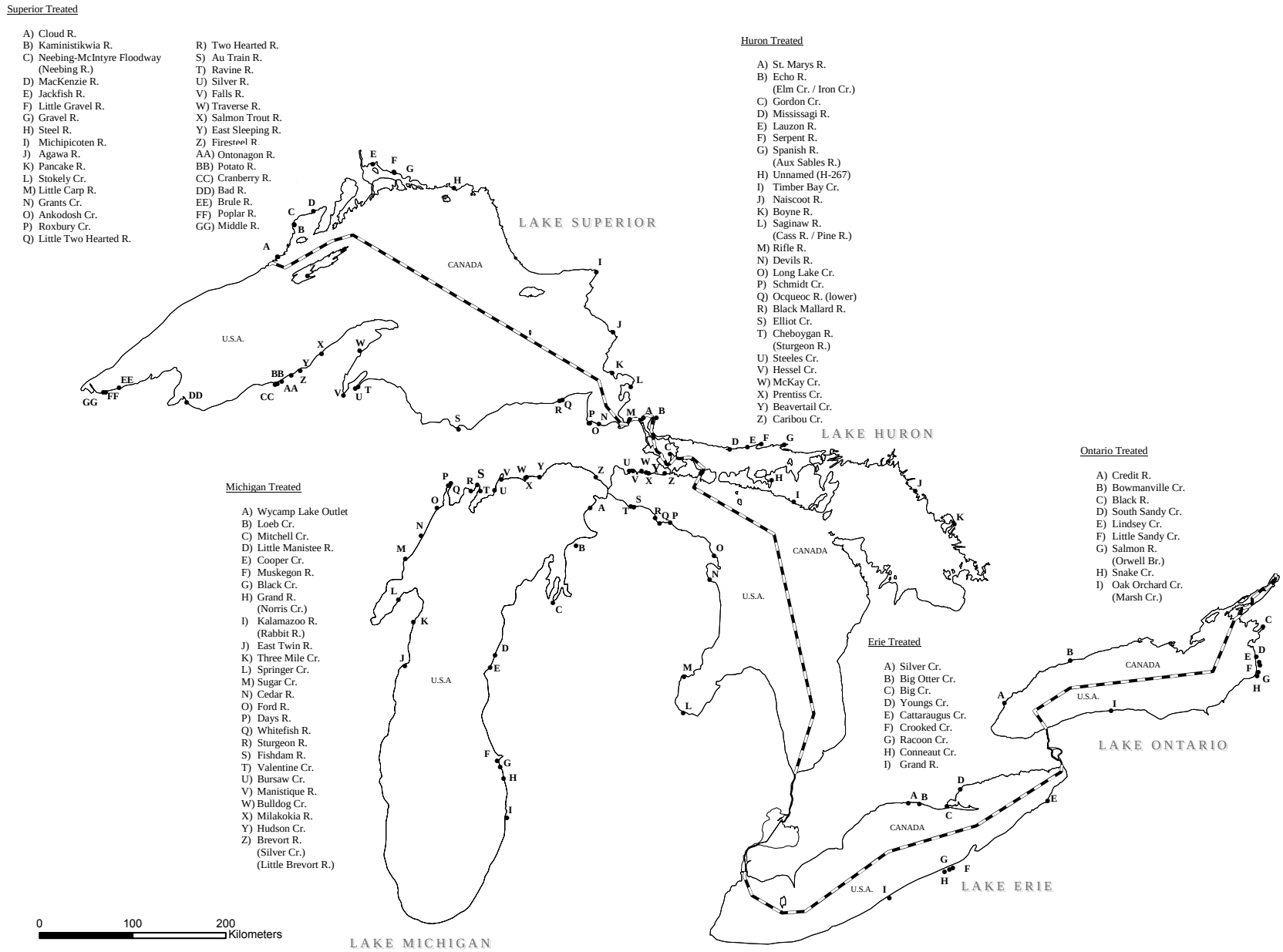

Figure 1. Location of tributaries treated with lampricide in 2008.

Lake Superior

Lake Superior has 1,566 tributaries (833 Canada, 733 U.S.). One hundred forty-nine tributaries (55 Canada, 94 U.S.) have historical records of larval sea lamprey production. Of these, 91 tributaries (35 Canada, 56 U.S.) have been treated with lampricides at least once during 1999-2008. Forty-nine tributaries (18 Canada, 31 U.S.) are treated on a regular cycle.

The following statements highlight the lampricide control program for Lake Superior during 2008. Table 2 provides details on the application of lampricides to Lake Superior tributaries and lentic areas treated during 2008 and Figure 1 shows the locations of these tributaries.

- Lampricide treatments were completed in 32 tributaries (12 Canada, 20 U.S.) and lentic areas of the Kaministiquia, MacKenzie, Falls, and Ravine Rivers. Lentic applications on the latter three streams were conducted in conjunction with the TFM treatment of the streams.

- Lampricide treatments of the Cloud and Jackfish Rivers were completed following deferral of these systems in 2007. The Bad River system was successfully treated during 2008, after being only partially completed during 2007. During 2008 over 493,400 m^3 of water were unexpectedly released into the upper end of the Marengo River, a major tributary of the Bad River, when a beaver dam was breached. This large volume of water overran and diluted the TFM block, changed the treatment strategy for the lower Marengo River, and resulted in retreatment of some of the upper Marengo River.

- Treatment of the Brule River was compromised by heavy rainfall. Residual larvae were found after the treatment and the stream has been rescheduled for treatment during 2009. Treatment of the East Branch of the Two Hearted River was also compromised by heavy rain showers.

- Treatments of the Potato, Cranberry, and East Sleeping Rivers were hampered by low discharge, all requiring a strategy of several blocks of lampricide and additional application sites in order to be effective. The Traverse River was treated with very low discharge, requiring numerous applications of lampricide and walking the stream to apply lampricide to beaver dams and backwaters by hand. Low stream discharge prevented a complete treatment of the Agawa River which had already been deferred from the 2007 field season. The decision was made to treat the lower reach of the river which harbored the majority of the larval sea lamprey population. Larval assessment personnel will re-evaluate the upper distribution of larval sea lampreys and treatment effectiveness during 2009.

Table 2. Details on the application of lampricides to tributaries and lentic areas of Lake Superior, 2008 (letter in parentheses corresponds to location of stream in Fig. 1).

Tributary	Date	Discharge (m^3/s)	TFM (kg)[1,2]	Bayluscide (kg)[1,3]	Distance Treated (km)
Canada					
Cloud R. (A)	Jul 16	0.5	44.1	0	7.5
Kaministiquia R. (B)	Jul 15	---	---	62.7[3]	---
Neebing McIntyre Fl. (C)					
Neebing R.	Jul 15	1.5	203.0	0.1	5.5
MacKenzie R. (D)	Jul 18	2.1	118.9	29.1[3]	1.1
Jackfish R. (E)	Jul 12	9.5	665.7	0.1	10.9
Little Gravel R. (F)	Jul 9	0.7	32.8	0	5.6
Gravel R. (G)	Jul 10	19.2	1033.5	14.9	14.0
Steel R. (H)	Jul 23	32.0	1973.9	27.4	10.4
Michipicoten R. (I)	Aug 16	43.3	2323.8	25.0	19.7
Agawa R. (J)	Oct 2	0.1	45.3	0.1	1.4
Pancake R. (K)	Jun 17	2.7	110.6	0	9.4
Stokely Cr. (L)	Jun 19	0.5	26.6	0	2.3
Little Carp R. (M)	May 13	0.3	13.1	0	7.3
Total (Canada)		**112.4**	**6,591.3**	**159.4**	**95.1**
United States					
Grants Cr. (N)	Jun 27	0.1	5.0	0	1.0
Ankodosh Cr. (O)	Jun 30	0.3	46.6	0	4.8
Roxbury Cr. (P)	Jun 28	0.6	24.4	0	3.5
L. Two Hearted R. (Q)	Jun 29	0.9	67.7	0	22.5
Two Hearted R. (R)	Jun 28	5.4	731.9	0	90.2
AuTrain R. (S)	Jul 11	2.6	610.4	0	18.5
Ravine R. (T)	Aug 23	0.1	33.1	27.6[3]	8.1
Silver R. (U)	Aug 22	0.4	75.8	0	7.2
Falls R. (V)	Aug 21	0.5	105.8	45.7[3]	0.8
Traverse R. (W)	Jul 24	0.3	68.1	0	16.1
Salmon Trout R. (X)	Jul 25	0.8	80.2	0	1.6
East Sleeping R. (Y)	Jul 10	0.2	142.9	0	20.9
Firesteel R. (Z)	Jul 11	0.8	413.5	0	1.5
Ontonagon R. (AA)	Oct 17	12.5	1907.5	0	193.2
Potato R. (BB)	Jun 12	0.1	116.1	0	24.2
Cranberry R. (CC)	Jun 13	0.1	72.9	0	24.2
Bad R. (DD)	Oct 02	9.9	1973.0	0	146.5
Brule R. (EE)	May 2	12.7	636.8	0	10.3
Poplar R. (FF)	May 7	2.3	196.3	0	22.5
Middle R. (GG)	May 6	6.4	278.7	0	8.1
Total (United States)		**57.0**	**7,586.7**	**73.3**	**625.7**
Total for lake	**169.4**		**14,178.0**	**232.7**	**720.8**

[1] Lampricide quantities are reported in kg of active ingredient.
[2] Includes a total of 192.3 TFM bars (40.1 kg active ingredient) applied in 15 streams.
[3] Includes granular Bayluscide applied to lentic areas.

Lake Michigan

Lake Michigan has 511 tributaries. One hundred twenty-one tributaries have historical records of larval sea lamprey production, and of these, 75 tributaries have been treated with lampricides at least once during 1999-2008. Thirty-three tributaries are treated on a regular cycle.

Enhanced treatment strategies to improve the efficacy of lampricide treatments were added to 19 of 26 treatments this year. These strategies included targeting lampricide concentrations that are greater than minimum lethal concentration (MLC); extending lampricide treatment blocks by one or two hours; conducting secondary applications of lampricide to treat backwaters, springs, and small feeder streams.

The following statements highlight the lampricide control program for Lake Michigan during 2008. Table 3 provides details on the application of lampricides to tributaries treated during 2008 and Fig. 1 shows the locations of the tributaries.

- Lampricide treatments were completed in 25 tributaries and lentic areas of the Manistique and Cedar Rivers.

- Low water was a pervasive problem during 2008. Three Mile Creek was treated by walking the length of the stream and spreading TFM by hand. Treatments of the Sturgeon River (Delta County) and Days River had to be split into separate sections. The East Twin River could not be treated during the scheduled period, but was completed during late October when large numbers of dying salmon were present and stream levels were still low. Stream discharge in the Carp Lake River was deemed too low to treat, although a Biological Opinion evaluating potential effects on the endangered Hungerford's crawling water beetle would have allowed treatment under prescribed conditions.

- The Rabbit River, tributary to the Kalamazoo River, was last treated 27 years ago. When SLMP personnel arrived to conduct the treatment, the area was under severe drought conditions and many farmers were irrigating from the river. As a result, treatment of the lower segment below the junction of Burnips Creek was not pursued. Treatment collections indicated that there was a low density of sea lampreys in the stream.

- The Oconto River was not treated due to extreme pH fluctuations. It is scheduled for treatment during 2009.

- Huntspur Creek, tributary to the Milakokia River, was treated successfully. Lack of access prevented treatment of this upper tributary during 2007.

- Cooper Creek (Mason County) was treated for the first time. Black Creek (Muskegon County) was treated for the first time in 38 years.

Table 3. Details on the application of lampricides to tributaries and lentic areas of Lake Michigan, 2008 (letter in parentheses corresponds to location of stream in Fig. 1).

Tributary	Date	Discharge (m^3/s)	TFM (kg)[1,2]	Bayluscide (kg)[1,3]	Distance Treated (km)
Sugar Cr. (M)	May 15	0.1	11.4	0	0.8
Wycamp Lake Outlet (A)	May 15	1.0	207	0	2.3
Ford R. (O)	May 16	10.6	1992.5	12.9	209.3
Springer Cr. (L)	May 17	0.1	10.1	0	2.7
Whitefish R. (Q)	May 29	8.5	1897.9	7.5	109.5
Valentine Cr. (T)	Jul 25	0.1	7.2	0	4.5
Bulldog Cr. (W)	Jul 26	0.4	36.5	0	2.6
Cooper Cr. (E)	Jul 26	0.1	15.3	0	3.2
Hudson Cr. (Y)	Jul 27	0.1	7.2	0	3.2
Little Manistee R. (D)	Jul 27	7.1	2036.0	10.2[3]	93.4
Bursaw Cr. (U)	Jul 28	0.1	21.4	0	4.8
Fishdam R. (S)	Aug 7	0.5	133.7	0	30.6
Manistique R. (V)	Aug 8	--	0	78.4[3]	--
Muskegon R. (F)	Aug 8	34.0	6244.7	56.0	107.5
Black Cr. (G)	Aug 21	0.7	202.7	0	20.9
Grand R. (H)					
Norris Cr.	Aug 23	0.1	49.0	0	16.4
Kalamazoo R. (I)					
Rabbit R.	Aug 23	2.3	643.2	0	54.7
Milakokia R. (X)					
Huntspur Cr.	Sep 3	0.1	12.2	0	2.6
Three Mile Cr. (K)	Sep 4	0.1	13.9	0	4.8
Brevort R. (Z)					
Silver Cr.	Sep 4	0.1	26.4	0	5.6
Little Brevort R.	Sep 6	0.6	106.2	0	13.7
Sturgeon R. (R)	Sep 4	1.4	685.3	0	103.8
Cedar R. (N)	Sep 17	--	0	54.4[3]	--
Mitchell Cr. (C)	Oct 2	0.3	77.7	0	3.2
Loeb Cr. (B)	Oct 2	0.1	9.9	0	1.6
Days R. (P)	Oct 17	0.1	88.6	0	6.8
East Twin R. (J)	Oct 28	0.5	186.5	0	8.1
Total for Lake	**69.1**		**14,722.5**	**219.4**	**816.6**

[1]Lampricide quantities are reported in kg of active ingredient.
[2]Includes 339 TFM bars (70.7 kg active ingredient) applied in 12 streams.
[3]Includes Bayluscide 3.2% Granular Sea Lamprey Larvicide applied in spot treatments or to lentic areas.

Lake Huron

Lake Huron has 1,761 tributaries (1,334 Canada, 427 U.S.). One hundred seventeen tributaries (56 Canada, 61 U.S.) have historical records of larval sea lamprey production. Of these, 72 tributaries (37 Canada, 35 U.S.) have been treated with lampricide at least once during 1999-2008. Forty-five tributaries (21 Canada, 24 U.S.) are treated on a regular cycle.

The following statements highlight the lampricide control program for Lake Huron during 2008. Table 4 provides details on the application of lampricides to tributaries and lentic areas treated during 2008 and Fig. 1 shows the locations of the tributaries.

- Lampricide treatments were completed in 26 tributaries (10 Canada, 16 U.S.), and lentic areas of Lauzon Creek and St. Marys River.

- A total of 143 ha (64 Canada, 79 U.S.) of the St. Marys River was treated with granular Bayluscide. Included in this area was 27 ha at the downstream margin of Sugar Island, which assessment crews mapped and evaluated using Bayluscide surveys and RoxAnn sonar.

- The lampricide treatment of Timber Bay Creek was completed following deferral of the system during 2007.

- Treatment of the upper Black Mallard River was deferred due to low stream discharge and is rescheduled for treatment in 2009.

- Tributaries to the Echo River (Elm and Iron Creeks) were treated in sections due to beaver impoundments and extremely low discharge.

- Treatment of the Sauble River was postponed in June, and again in October, due to excessive discharge. The Sauble River were rescheduled for treatment during 2009.

- The Cass River mainstream was treated for the first time above the Frankenmuth Dam. Goodings Creek and Scott Drain, both tributaries to the Cass River, were also treated for the first time.

- A combined crew of the Department and Service personnel successfully treated the Rifle River. Extensive secondary treatment efforts enhanced overall effectiveness. A new strategy was employed by adding two additional boost sites using Bayluscide 20% Emulsifiable Concentrate (liquid niclosamide). This strategy ensured that a lethal dose of lampricides was maintained to the mouth of the Rifle River.

- A study was conducted by the Department's Great Lakes Laboratory for Fisheries and Aquatic Sciences (GLLFAS) in partnership with the Sea Lamprey Control Center (SLCC) to examine lampricide toxicity to larval lake sturgeon *in situ* on the Mississagi River. The project compared the effects of the "lake sturgeon protocol" (TFM concentration limited to 1.2 X MLC) and the normal treatment protocol (TFM concentration limited to 1.5 X MLC) on caged larval sturgeon. Caged sturgeons were also placed in an untreated tributary to the Spanish River. Survival was 94% under both treatment scenarios, as well as in the control.

Table 4. Details on the application of lampricides to tributaries and lentic areas of Lake Huron, 2008 (letter in parentheses corresponds to location of stream in Fig. 1).

Tributary	Date	Discharge (m^3/s)	TFM (kg)[1,2]	Bayluscide (kg)[1,3]	Distance Treated (km)
Canada					
St. Marys R. (A)	Jun 23	---	---	356.5[3]	---
Echo R. (B)					
Elm Cr.	Oct 7	0.1	23.0	0	3.1
Iron Cr.	Oct 22	0.1	11.8	0	4.1
Gordon Cr. (C)	May 15	0.1	3.3	0	1.5
Mississagi R. (D)	Aug 27	66.1	3992.5	54.5	48.6
Lauzon Cr. (E)	Aug 29	---	---	29.1[3]	---
Serpent R. (F)	Jun 22	16.7	451.3	0	7.6
Spanish R. (G)					
Aux Sables R.	Jun 20	17.8	456.4	0	2.3
H-267 (H)	Jun 17	0.1	21.7	0	1.8
Timber Bay Cr. (I)	Jun 18	0.2	31.1	0	3.2
Naiscoot R. (J)	Jun 3	6.1	191.0	0	17.8
Boyne R. (K)	Jun 3	1.2	33.7	0	1.9
Total (Canada)		**108.5**	**5,215.8**	**440.1**	**91.9**
United States					
Saginaw R. (L)					
Cass R.	Jun 13	6.7	2975.1	0	111.1
Pine R.	Jun 29	6.9	1026.8	15.1	36.1
Rifle R. (M)	Sep 19	7.4	2632.8	14.8	194.8
Devils R. (N)	May 3	2.3	460.0	0	20.1
Long Lake Cr. (O)	May 2	2.5	479.7	0	4.8
Schmidt Cr. (P)	May 16	0.3	144.9	0	6.4
Ocqueoc R. (lower) (Q)	Oct 6	1.4	361.7	0	4.5
Black Mallard R.(lower) (R)	May 29	0.5	68.5	0	2.7
Elliot Cr. (S)	Oct 6	0.2	40.3	0	3.2
Cheboygan R. (T)					
Sturgeon R.	Jul 15	5.4	981.6	11.9	40.3
Steeles Cr. (U)	Jun 16	0.2	32.3	0	1.9
Hessel Cr. (V)	May 2	0.1	34.9	0	0.8
McKay Cr. (W)	May 5	0.6	141.7	0	8.1
Prentiss Cr. (X)	May 4	0.6	172.2	0	4.8
Beavertail Cr. (Y)	Jun 14	1.1	190.4	0	7.6
Caribou Cr. (Z)	May 2	0.1	8.2	0	0.8
St. Marys R. (A)	Jun 24	---	---	444.0[3]	---
Total (United States)		**36.3**	**9,751.1**	**485.8**	**448.0**
Total (for lake)		**144.8**	**14,966.9**	**925.9**	**539.9**

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

[2] Includes a total of 251 TFM bars (52.4 kg active ingredient) applied in 8 streams.

[3] Includes Bayluscide 3.2% Granular Sea Lamprey Larvicide 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, 10 tributaries (4 Canada, 6 U.S.) have been treated with lampricides at least once during 1999-2008. Seven tributaries (2 Canada, 5 U.S.) are treated on a regular cycle. In addition, larval production has been documented in the two U.S. tributaries of the St. Clair River and two tributaries to Lake St. Clair (1 Canada, 1 U.S.), none of which have been treated during 1999-2008. Production of larvae in these tributaries, with the exception of the St. Clair River, has been minor and intermittent.

The following statements highlight the lampricide control program for Lake Erie during 2008. Table 5 provides details on the application of lampricides to tributaries treated during 2008 and Fig. 1 shows the locations of the tributaries.

- Lampricide treatments were completed in all 9 infested tributaries (4 Canada, 5 U.S.) consistent with implementation of an experimental whole lake stategy designed to suppress and maintain abundance at or below the lake-wide target of 4,000 adult sea lampreys. All streams are scheduled to be re-treated in the fall of 2009 to eliminate larvae that survived 2008 treatments and new recruits from the 2009 spawning run.

- Cattaraugus Creek was treated previously during 2007. At that time, treatment of Clear Creek, a major tributary heavily infested with sea lampreys, was hampered by low flow and the presence of numerous beaver impoundments. Clear Creek was treated effectively in early April, 2008, when flow was high. The Cattaraugus Creek mainstream was treated later during a separate effort. The segment below the junction of Clear Creek received a sub-lethal dose of lampricide as a result of heavy rain.

- Treatments of Conneaut Creek and the Grand River were challenged by nearly flood stage waters just prior to treatment. The treatment of Conneaut Creek included about three linear miles of river upstream of Conneautville, Pennsylvania that had been left untreated recently in order to protect native lampreys. An additional two-mile infested reach is scheduled for treatment during 2009.

- Silver Creek, which historically has harbored a low density population of sea lamprey larvae, was treated for the first time during 2008.

- Treatment of Big Creek included application of lampricide to Venison Creek due to the presence of larvae upstream of the sea lamprey barrier on that tributary.

Table 5. Details on the application of lampricides to tributaries and lentic areas of Lake Erie, 2008 (letter in parentheses corresponds to location of stream in Fig. 1).

Tributary	Date	Discharge (m^3/s)	TFM[1] (kg)	Bayluscide[1] (kg)	Distance Treated (km)
Canada					
Silver Cr. (A)	May 31	0.4	105.9	0	5.1
Big Otter Cr. (B)	May 27	4.2	1523.5	1.3	74.3
Big Cr. (C)	May 29	7.7	2060.3	0	94.6
Young's Cr. (D)	May 26	0.8	178.6	0	0.4
Total (Canada)		**13.1**	**3,868.3**	**1.3**	**174.4**
United States					
Cattaraugus Cr. (E)	May 30	7.9	4145.4	0	90.0
Crooked Cr. (F)	Apr 4	9.9	563.4	0	10.5
Racoon Cr. (G)	Apr 3	0.3	44.2	0	2.4
Conneaut Cr. (H)	Apr 6	6.5	673.8	0	104.6
Grand R. (I)	Apr 10	15.6	1077.0	0	37.0
Total (United States)		**40.2**	**6,503.8**	**0**	**244.5**
Total (for lake)		**53.3**	**10,372.1**	**1.3**	**418.9**

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

Lake Ontario

Lake Ontario has 659 tributaries (405 Canada, 254 U.S.). Sixty-five tributaries (31 Canada, 34 U.S.) have historical records of larval sea lamprey production, and of these, 39 tributaries (20 Canada, 19 U.S.) have been treated with lampricides at least once during 1999-2008. Twenty-nine tributaries (13 Canada, 16 U.S.) are treated on a regular cycle**.**

The following statements highlight the lampricide control program for Lake Ontario during 2008. Table 6 provides details on the application of lampricides to tributaries treated during 2008 and Fig. 1 shows the locations of the tributaries.

- Lampricide treatments were completed in nine tributaries (2 Canada, 7 U.S.).
- During the treatment of Little Sandy Creek, non-target mortality of an estimated 1,500 walleye was observed and consisted primarily of spent spawning phase males. A 6(a)2 report was filed with the Environmental Protection Agency (EPA).
- The proposed treatment of Sandy Creek was deferred due to low flow and water chemistry concerns. The stream has been rescheduled to be treated during 2009.
- The lampricide treatment of Marsh Creek was completed following deferral of the system during 2007.

- Orwell Brook was treated for a second consecutive year due to concerns regarding residual populations in beaver impoundment areas. The stream is being treated annually until the proposed sea lamprey barrier is in place. Construction of the barrier is planned during 2009.

Table 6. Details on the application of lampricides to tributaries of Lake Ontario, 2008 (letter in parentheses corresponds to location of stream in Fig. 1).

Tributary	Date	Discharge (m^3/s)	TFM (kg)[1,2]	Bayluscide (kg)[1]	Distance Treated (km)
Canada					
Credit R. (A)	May 23	8.8	1816.0	19.8	41.0
Bowmanville Cr. (B)	May 23	1.6	537.3	0	21.7
Total (Canada)		**10.4**	**2,353.3**	**19.8**	**62.7**
United States					
Black R. (C)	Sep 7	49.1	3941.9	50.9	9.3
South Sandy Cr. (D)	Apr 24	5.7	426.2	0	12.0
Lindsey Cr. (E)	Apr 20	1.1	130.7	0	21.1
Little Sandy Cr. (F)	Apr 17	5.1	248.3	0	13.5
Salmon R. (G)					
Orwell Br.	Apr 28	3.6	276.0	0	12.1
Snake Cr. (H)	Apr 16	0.4	40.7	0	5.6
Oak Orchard Cr. (I)					
Marsh Cr.	Aug 10	0.4	143.0	0	10.4
Total (United States)		**65.4**	**5,206.8**	**50.9**	**84.0**
Total (for lake)		**75.8**	**7,560.1**	**70.7**	**146.7**

[1] Lampricide quantities are reported in kg of active ingredient.
[2] Includes a total of 12 TFM bars (2.5 kg active ingredient) applied in 4 streams.

ALTERNATIVE CONTROL

The Commission has embarked on a program to develop alternatives to the lampricide control program in order 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 from productive habitat. Activities of the currently operational programs of sterile-male-release (including trapping for control) and barriers are summarized in this section. New applications of alternative control including sterile-female release and use of lamprey pheromones continue to be pursued with researchers.

Sterile-Male-Release Technique

Research on the use of a sterile-male-release technique (SMRT) in sea lamprey management began during 1971. The SMRT was experimentally implemented in Lake Superior tributaries and the St. Marys River during 1991-1996, and efforts were refocused for exclusive use in the St. Marys River after 1996. Presently, the St. Marys River is the only place where trapping for control and sterile-male release are being implemented as an explicit control strategy.

Male sea lampreys are captured during their spawning migrations in 25 tributaries to Lakes Superior, Michigan, Huron, and Ontario for use in the SMRT. Captured males are transported to the sterilization facility at the U.S. Geological Survey-Hammond Bay Biological Station. Sea lampreys are sterilized with the chemosterilant bisazir 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 showed that the number of eggs hatched in nests had been reduced in areas where sterile males were released. Traps provide additional suppression in a river with sterilized males by reducing the number of male competitors, and by removing female reproductive potential.

The SMRT Task Force was established in 1984 to refine the long-term strategy for application of the SMRT and to coordinate a large-scale research program in Lake Superior and the St. Marys River. The Reproduction Reduction Task Force 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 Task Force Reports section.

Highlights of the sterile-male-release program and trapping for control activities during 2008 are presented in Table 7 and include the following:

- A total of 26,115 spawning-phase male sea lampreys were delivered to the sterilization facility during 2008 from trapping operations on the Bad and Brule Rivers (618), Betsie River (125), Boardman River (31), Carp Lake Outlet (1,485), Manistee River (285), Manistique River (4,616), Muskegon River (204), Peshtigo River (1,212), Pere Marquette River (93), St. Joseph River (189), Au Sable River (85), Cheboygan River (6,262), East AuGres River (126), Echo/Thessalon River (3,261), Greene Creek (127), Koshkawong River (107), Ocqueoc River (1,603), St. Marys River (4,025), Tittabawassee River (15), Trout River (8), Duffins Creek (338), and Humber River (1,300).

- A total of 22,072 sterilized male sea lampreys were released in the St Marys River during May – July 2008. The estimated resident population of spawning-phase sea lampreys in the St Marys River was 17,513. The male population estimate was 11,272. Assessment traps removed 6,515 sea lampreys, of which 4,572 were males and resulted in an estimated reduction of males of 41% through trapping. The ratio of sterile to resident male sea lampreys remaining in the St. Marys River was estimated at 3.3:1 (22,072 sterile:6,700 estimated resident after trapping).

- The release of sterile males combined with the removal of lampreys by traps, reduced the theoretical number of effective fertile females in the St. Marys River from about 6,241 to 875 during 2008. The combined reduction was estimated at 86%, which was also the average during 1997-2008. Prior to the enhanced program (1991-1996), the theoretical reduction in reproduction averaged 58%.

- No direct observations of sea lamprey spawning in the St. Marys River rapids were made in 2008. However, multiple nests were observed and egg viability averaged 41.9% in the eight nests that were able to provide a final sample of at least 100 eggs. Average egg viability (weighted by nests per year) during 1997-2008 was 30%.

- Sterilized males were artificially spawned with normal females in the laboratory to confirm effectiveness of the industrial process. Larvae were produced in 13 of 19 matings and only a single larva survived until the end of the 21-day rearing period.

- To test the effect of sterile-female release, 4,121 females were sterilized and released into the Trout River in Presque Isle, Michigan. The study began in 2007, but larvae that had survived a lampricide treatment that preceded the study were found in the river. The river was treated again, requiring that the study began anew in 2008. Spawning activity was observed in the river with 80 nests identified. Of these nests, eggs were sampled from 56 nests. Observations of sea lampreys on nests included 63 sterile females, 4 normal females, and 17 normal males. Viability of eggs in nests is still being evaluated.

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 1991-2008.

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	32,141	2.9:1	81	1,517
2008	17,513	64	41	22,072	3.3:1	86	875

[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 was established by the Commission during April 1991 to coordinate efforts of the Service, Department, and U.S. Army Corps of Engineers (Corps) 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 Task Force Reports section.

Lake Superior

Operation and Maintenance at Exisitng Sea Lamprey Barriers

- Presently, there are 10 purpose built sea lamprey barriers on Lake Superior (Fig. 2).

- Routine maintenance, spring start-up, and safety inspections were performed on 12 barriers (6 Canada, 6 U.S.).

- Repairs or improvements were conducted on five barriers (3 Canada, 2 U.S.):

    - Wolf River – A new upstream portage was constructed to comply with the Navigable Waters Act.

    - Big Carp River – The control panel was updated and upstream and downstream back-up sensors were installed to improve operation of the inflatable crest barrier.

    - Little Carp River – The access road to the barrier was repaired.

    - Middle River – Deteriorating stop logs were replaced with concrete and a new barrier lip was installed by Wisconsin Department of Natural Resources.

    - Miners River – Upstream wing walls were extended and repairs were completed on the footing and the barrier lip.

Ensure Blockage to Sea Lamprey Migration at Other Barriers Sites

- 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 2008, 101 barriers were inventoried in the Lake Superior basin.

- Black Sturgeon River - The Black Sturgeon Dam serves a vital sea lamprey control function, protecting more than 1,500 km of watershed from larval sea lamprey infestation. However, it has been identified as an impediment to walleye rehabilitation in Black Bay in an Ontario Ministry of Natural Resources (Ministry) report. During 2008, scientists and managers from Department, Ministry, Commission, University of Guelph, and stakeholders from local sport and commercial fisheries attended a workshop in Thunder Bay, Ontario to discuss issues related to the Black Sturgeon Dam and options for meeting fisheries management objectives. A consensus between the agencies has not been reached but dialogue will continue. Department and the Commission remain convinced that removal of the Black Sturgeon Dam, or any alternative that would increase risk to the fish community of Lake Superior, are not acceptable options.

- Consultations with partner agencies regarding ensured blockage at barriers were conducted on four U.S. tributaries (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
Bad R.	Billy Cr.	Ashland NFWCO[1]	Culvert replacement	Concur	Within historical sea lamprey distribution
Bad R.	Montreal Cr.	Ashland NFWCO	Culvert replacement	Concur	Within historical sea lamprey distribution
Bad R.	Troutmere Cr.	Ashland NFWCO	Culvert replacement	Concur	Small negative stream
Salmon Trout R.		Redridge Study Dams Group	Redridge Dam removal	Do not concur	Infestation risk

[1] NFWCO is defined as a National Fish and Wildlife Conservation Office.

Construction

- Construction projects were initiated, ongoing, or completed on two Canadian tributaries:

    - Gimlet Creek (Pancake River) – Reconstruction was completed during spring 2008. New barrier features removable stop-logs and a sea lamprey trap.

    - Whitefish River (Kaministiquia R.) - Installed level loggers at a potential future barrier site.

Lake Michigan

Operation and Maintenance at Exisitng Sea Lamprey Barriers

- Presently, there are five purpose built sea lamprey barriers on Lake Michigan (Fig. 2).

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

- Operation of an electrical barrier was conducted at one U.S. barrier:

    - Pere Marquette River - The electric barrier was operated from March 6 through August 1. The fishway was operated seven days per week from March 6 through June 20 and during weekdays from June 21 through August 1. The fishway was shut down from June 13 through June 18 due to high water to prevent passage of sea lampreys through the fishway. The fishway passed 4,520 steelhead, 17,935 suckers, 53 brown trout, and 66 Chinook salmon.

- Repairs or improvements were conducted on one barrier in the U.S.:

    - Carp Lake River – The intake baffle was replaced with a 12" valve for ease of operation and to eliminate risk of escapement.

Ensured Blockage to Sea Lamprey Migration at Other Barriers Sites

- 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 2008, 106 barriers were inventoried in the Lake Michigan basin.

- Consultations with partner agencies regarding ensured blockage at barriers were conducted on 16 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	SLC Position	Comments
Milwaukee R.		Green Bay NFWCO[1]	Theinville Dam Removal	Concur	Very little potential
Manistee R.	Wheeler Cr.	Green Bay NFWCO	Culvert replacement	Concur	Upstream of sea lamprey barrier
Manistee R.	Manton Cr.	Green Bay NFWCO	Culvert replacement	Concur	Upstream of sea lamprey barrier
Manistee R.	Silver Cr.	Green Bay NFWCO	Culvert replacement	Concur	Upstream of sea lamprey barrier
Manistee R.	Buttermilk Cr.	Green Bay NFWCO	Culvert replacement	Concur	Upstream of sea lamprey barrier
Jordan R.	Green R.	Green Bay NFWCO	Culvert replacement	Concur	Low risk of infestation
St. Joseph R.	Blue Cr.	Green Bay NFWCO	Culvert replacement	Concur	Within historic sea lamprey distribution.
St. Joseph R.	Paw Paw R.	Green Bay NFWCO	Watervliet Dam removal	Concur	Within historic sea lamprey distribution.
Pere Marquette R.	Tank Cr.	Green Bay NFWCO	Dam removal	Concur	Low risk of infestation.
Grand R.	Bark Cr.	Green Bay NFWCO	Culvert replacement	Concur	Low risk of infestation
Grand R.	Castle Cr.	Green Bay NFWCO	Culvert replacement	Concur	Low risk of infestation
Grand R.	Thornapple R.	Green Bay NFWCO	Dam Removal	Concur	Upstream of distribution; several dams below
Kalamazoo R.	Rabbit R.	Green Bay NFWCO	Hamilton Dam Removal	Do not Concur	Infestation risk; positive upstream
Millecoquins R.	McAlpine Cr.	Green Bay NFWCO	Dam Removal	Concur	Within historic sea lamprey distribution
Muskegon R.	Ruddimen Cr.	USFWS - East Lansing	Dam removal	Concur	Not a lamprey barrier
Boardman R.		Boardman R. Dams Implementation Team	Union Street	Do not concur	High risk of infestation.

[1] NFWCO is defined as a National Fish and Wildlife Conservation Office**.**

Construction

Construction projects were initiated, ongoing, or completed on two U.S. tributaries.

- Manistique River – Telemetry and dye studies were conducted to investigate potential routes of sea lamprey escapement at the Manistique Papers Dam. Preliminary hydrology

- Trail Creek – Project is in final stages of planning and the U.S. Army Corps of Engineers drafted a Project Partner Agreement. Construction is planned for 2010.

Lake Huron

Operation and Maintenance at Exisitng Sea Lamprey Barriers

- Presently, there are 13 purpose built sea lamprey barriers on Lake Huron (Fig. 2).
- Routine maintenance, spring start-up, and safety inspections were performed on 12 barriers (5 Canada, 7 U.S.).
- Operation of an electrical barrier was conducted at one U.S. barrier:
    - Ocqueoc River - The electrical component of the combination low-head/electrical barrier was operated from March 9 through August 7. The electrical field operated without incident between March 14 and June 7, activating eight times when rising water levels caused the effective barrier height to drop below 18 inches.
- No repairs or improvements were conducted on barriers in Canada or the U.S.

Ensure Blockage to Sea Lamprey Migration at Other Barriers Sites

- 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 2008, 137 barriers were inventoried in the Lake Huron basin.
- Saugeen River - Rehabilitation of Denny's Dam was originally planned to commence in 2009 but has been delayed by administrative and permitting requirements. It is anticipated that these issues will be resolved, and repairs will begin in 2010. The project will be jointly funded by the Commission and Ministry.
- Consultations with partner agencies regarding ensured blockage at barriers were conducted on four 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	SLC Position	Comments
Cheboygan R.	Maple R.	Alpena NFWCO[1]	Culvert replacement	Concur	Upstream of sea lamprey barrier
Cheboygan R.	Montague Cr.	Alpena NFWCO	Culvert replacement	Concur	Very low risk of infestation
Thunderbay R.	Little Wolf Cr.	Alpena NFWCO	Culvert replacement	Concur	Upstream of sea lamprey barrier
Tawas Lake Outlet	Silver Cr.	Alpena NFWCO	Fish passage Roman Dam	Contingent	Fishway must not pass lampreys

[1] NFWCO is defined as a National Fish and Wildlife Conservation Office.

Construction

Construction projects were initiated, ongoing, or completed on two Canadian tributaries

- Still River - Reconstruction of a barrier at the site was anticipated in 2008, however complications resulted from the sale of the land where the barrier is located. Subsequent negotiations of a new lease agreement delayed tendering of construction until October 2009. The lowest bid exceeded the Commission-approved budget for the project, and Department plans to re-tender the contract in time for reconstruction in 2009. Subsequently, Ontario Ministry of Transport inspected a bridge on the only access road to the site and reduced the load limit from 20 to 5 metric tons. Until the bridge is repaired and brought up to standard, re-construction of the barrier will be delayed. Work during 2009 will be limited to installation of a fence along the road to the site as agreed to in the lease agreement.

Lake Erie

Operation and Maintenance at Existing Sea Lamprey Barriers

- Presently, there are seven purpose built sea lamprey barriers on Lake Erie (Fig. 2).
- Routine maintenance, spring start-up, and safety inspections were performed on seven barriers in Canada.
- Repairs or improvements were conducted on three barriers in Canada:
    - Big Creek - Updated the control panel, installed upstream and downstream back-up sensors, and repaired an air supply line on the inflatable barrier in fall 2008. Repairs were made to erosion damage along the downstream west bank.
    - Little Otter Creek - Repaired washout around trap, installed new hinges on trap lid, and repaired bank.
    - Young's Creek - Installed broken rock along the toe of barrier to prevent undermining.

Ensure Blockage to Sea Lamprey Migration at Other Barriers Sites

- 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 2008, 192 barriers were inventoried in the Lake Erie basin.

- Consultations with partner agencies regarding ensured blockage at barriers were conducted on four U.S tributaries (Table 11).

Table 11. Status of concurrence requests for barrier removals, replacements, or fish passage projects in Lake Erie tributaries.

Mainstream	Tributary	Lead Agency	Project	SLC Position	Comments
Huron R.	Mill Cr.	Alpena NFWCO[1]	Dam removal	Concur	Upstream barrier, negative stream
Clinton R.		Alpena NFWCO	Cascade Dam removal	Concur	Not a lamprey Barrier
Clinton R.		Alpena NFWCO	Wolcott Dam removal	Concur	Not a lamprey Barrier
Conneaut R.	Little Conneaut Cr.	Alpena NFWCO	Fish passage/Dam removal	Contingent	Fishway must block lampreys

[1] NFWCO is defined as a National Fish and Wildlife Conservation Office.

Construction

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

    - Normandale Creek - A high water event breached a dam at the Ministry's Normandale Fish Hatchery, sending a wave of water downstream that destroyed three road bridges and the low-head sea lamprey barrier. Department arranged for the removal and disposal of barrier materials in partnership with the Ministry and the Department is in the process of developing engineering drawings and specifications for a new structure. Once the Ministry and Department-Fish Habitat Management approve the project, construction will be tendered and re-construction will take place during 2009.

    - Chagrin River - The construction of a new sea lamprey barrier is being investigated in the Chagrin River. Surveys were conducted during 2008 to determine sea lamprey abundance and estimate spawning and larval habitat in the river.

Lake Ontario

Operation and Maintenance at Existing Sea Lamprey Barriers

- Presently, there are eight purpose built sea lamprey barriers on Lake Ontario (Fig. 2).
- Routine maintenance, spring start-up, and safety inspections were performed on 10 barriers in Canada.
- Repairs or improvements were conducted on three barriers in Canada:
    - Duffins Creek - Large stone was used to repair deterioration in the tailrace, caused by the failure of gabion baskets that had been installed in an earlier repair.
    - Wesleyville Creek - Aluminum stop logs were stolen from the barrier sometime in May 2008, even though access to the site is controlled by Ontario Power Generation. New stop logs will be installed with a locking mechanism before the 2009 spawning run.
    - Graham Creek - A fallen tree was removed and rip rap was applied across the upstream side of the barrier to prevent undermining. The upstream face was examined using an underwater camera.

Ensure Blockage to Sea Lamprey Migration at Other Barriers Sites

- 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 2008, 86 barriers were inventoried in the Lake Ontario basin.
- Consultations with partner agencies regarding ensured blockage at barriers were conducted on two U.S. tributaries (Table 12).

Table 12. Status of concurrence requests for barrier removals, replacements, or fish passage projects in Lake Ontario tributaries.

Mainstream	Tributary	Lead Agency	Project	SLC Position	Comments
Oswego R.	Onondaga Cr.	NYDEC[1]	Fishpassage/ remove dams	Contingent	Site visit and surveys needed.
Nine Mile Cr.		NYDEC	Remove Amboy Dam	Contingent	Site visit and surveys needed.

[1] DEC refers to the Department of Environmental Conservation.

Construction

- Construction projects were initiated, ongoing, or completed on two Canadian tributaries.

    - Orwell Brook - Planning continued in 2008 for the construction of a seasonally operated low-head sea lamprey barrier on Orwell Brook, a tributary to the Salmon River near Altmar, New York. Department and NYDEC staff met with a landowner to discuss the construction of a barrier on his property. Department staff subsequently identified a preferred location for the barrier, conducted a cross-sectional survey and measured discharge. A lease agreement is being reviewed by the Commission and pre-construction surveys and construction are scheduled during 2009.

    - Rouge River - The Toronto and Region Conservation Authority (TRCA) is in the process of completing a Watershed 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. SLCC personnel will investigate whether a suitable site exists downstream of the confluence of the Rouge and its major tributary, Little Rouge River, and meet with TRCA staff to discuss options.

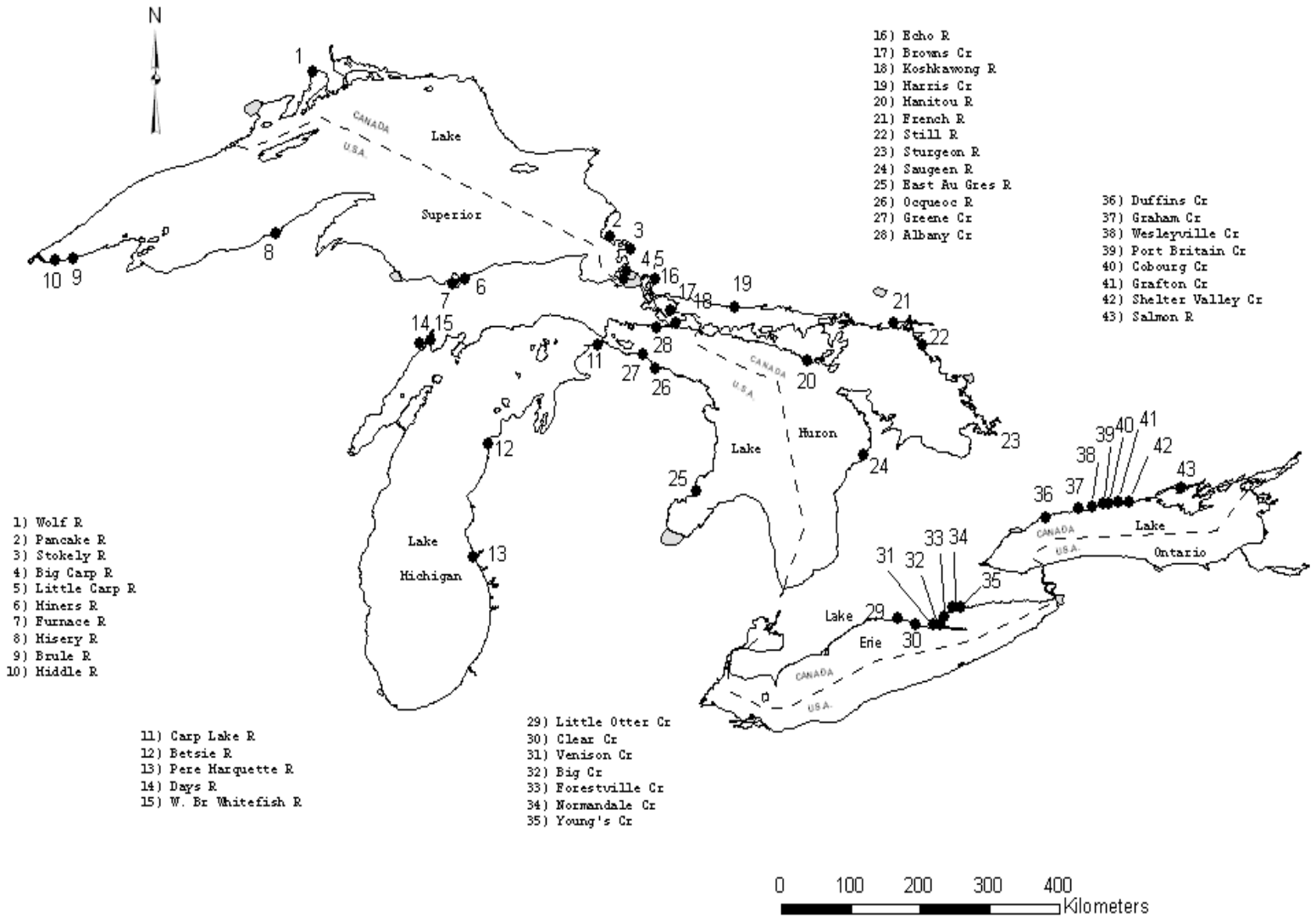

Figure 2. Locations of tributaries with barriers specifically built to block sea lampreys.

ASSESSMENT

The SLMP has two assessment components based on the life-history of sea lampreys:

- The larval-phase component assesses the relative abundance and distribution of larval sea lampreys in streams and lentic zones with known sea lamprey populations. These data are used to predict the streams and lentic zones most likely to produce juvenile or parasitic lampreys in the next year. These projections are used to establish the priorities for the lampricide treatment program for next year.

- The spawning-phase component annually assesses the stock size of the spawning lampreys in each of the lakes. Because spawning lampreys represent the lampreys that have evaded the SLMP, the time series of spawning-phase abundance is used to evaluate the success of the program. In this section, we summarize the results of the 2008 data from these two components.

A report on the progress of the Assessment Task Force is presented in the Task Force Reports section.

Larval Assessment

Tributaries to the Great Lakes are systematically assessed for abundance and distribution of larval sea lampreys. The methodology used to rank streams for lampricide treatment changed during 2008 from more rigorous and precise quantitative assessment surveys (QAS) to more rapid, less labor-intensive ranking surveys (RS). RS provides an index of abundance of sea lamprey larvae ≥100mm and is used to prioritize streams for lampricide treatment. The effort saved from this change was used to conduct additional lampricide treatments. Additional surveys are used to define the distribution of sea lampreys within a stream and to establish the sites for lampricide application. Lentic areas are monitored for numbers and geographic distribution of larvae.

Tributaries considered for lampricide treatment during 2009 were assessed during 2008 to estimate the density and size structure of larval sea lamprey populations. Assessments were conducted with backpack electrofishers in waters <0.8 m deep. A specialized deepwater electrofisher is used exclusively on the St. Marys River to obtain information on the larval sea lamprey population. Waters ≥0.8 m in depth were surveyed with granular Bayluscide. Survey plots were randomly selected in each tributary, catches of larvae were adjusted for gear efficiency, and lamprey lengths were standardized to the end of the growing season. The number of large lampreys 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 2009 based on an estimated cost per kill of large sea lampreys.

Lake Superior

- Larval assessment surveys were conducted on a total of 86 tributaries (32 Canada, 54 U.S.) and offshore of 17 tributaries (9 Canada, 8 U.S.). The status of larval sea lamprey populations in historically infested Lake Superior tributaries and lentic areas is presented in Tables 13 and 14.

- Surveys to estimate the abundance of larval sea lampreys were conducted in 18 tributaries (7 Canada, 11 U.S.) and offshore of 10 tributaries (9 Canada, 1 U.S.)

- Surveys to detect the presence of new larval sea lamprey populations were conducted in 14 tributaries (11 Canada, 3 U.S.). Larval populations were found in the West Sleeping River (U.S.) and the Little Cypress River (Canada) for the first time.

- Post-treatment assessments were conducted in 44 tributaries (20 Canada, 24 U.S.) to determine the effectiveness of lampricide treatments conducted during 2007 and 2008.

- RoxAnn seabed classification sonar was used to map 468 ha of substrate offshore from the mouths of the Goulais, Wolf, and Black Sturgeon Rivers, and within the St. Marys River. This information will be used to evaluate the potential and geographic extent of larval habitat and further delineate lentic populations in these areas.

Table 13. Status of larval sea lampreys in Lake Superior tributaries with a history of sea lamprey production and estimates of abundance from tributaries surveyed during 2008.

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	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	Jun-07	No	No	---	---	Unknown
Goulais R.	Jul-05	Sep-08	Yes	Yes	---	---	2009[1]
Bostons Cr.	Never	Jul-05	---	No	---	---	Unknown
Horseshoe Cr.	Never	Jul-05	---	No	---	---	Unknown
Haviland Cr.	Never	Jul-06	---	Yes	---	---	Unknown
Stokely Cr.	Jun-08	Jul-08	No	---	---	---	Unknown
Tier Cr.	Never	Jul-05	---	No	---	---	Unknown
Harmony R.	Jun-90	Sep-08	No	Yes	3,080	536	2009
Sawmill Cr.	Jun-68	Jul-05	No	No	---	---	Unknown
Jones Landing Cr.	Never	Jun-08	---	No	---	---	Unknown
Tiny Cr.	Never	Jul-05	---	No	---	---	Unknown
Chippewa R.	Oct-04	Sep-08	Yes	Yes	7,607	423	2010
Unger Cr.	Never	Sep-08	---	Yes	---	---	Unknown
Batchawana R.	Sep-07	Oct-08	Yes	Yes	---	---	2011
Digby Cr.	Never	Oct-08	---	Yes	---	---	Unknown
Carp R.	Nov-06	Oct-08	Yes	Yes	19,856	1,823	2009[1]
Pancake R.	Jun-08	Sep-08	Yes	---	---	---	2012
Westman Cr.	Never	Aug-07	---	No	---	---	Unknown
Agawa R.	Oct-08	Aug-08	---	Yes	---	---	Unknown
Sand R.	Sep-71	Jun-06	No	No	---	---	Unknown
Baldhead R.	Never	Jun-06	---	No	---	---	Unknown
Gargantua R.	Aug-04	Aug-08	Yes	Yes	---	---	2009[1]
Michipicoten R.	Aug-08	Sep-08	Yes	---	---	---	2012
Dog R.	Aug-63	Jul-02	No	No	---	---	Unknown
White R.	Aug-05	Aug-07	No	Yes	---	---	2010
Pic R.	Jul-06	Aug-08	No	Yes	---	---	2012
Little Pic R.	Sep-94	Jul-06	No	Yes	---	---	Unknown
Prairie R.	Jul-94	Aug-07	No	No	---	---	Unknown
Steel R.	Jul-08	Aug-08	No	---	---	---	2012
Pays Plat R.	Jul-07	Jul-08	Yes	Yes	---	---	2011
Little Pays Plat Cr.	Jul-07	Jul-07	No	No	---	---	Unknown
Gravel R.	Jul-08	Aug-08	Yes	---	---	---	2011
Little Gravel R.	Jul-08	Aug-08	Yes	---	---	---	2011
Cypress R.	Never	Aug-08	---	Yes	---	---	Unknown
Jackpine R.	Jul-07	Jul-08	Yes	Yes	---	---	2011
Jackfish R.	Never	Jul-05	---	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			
Nipigon R.							
Upper Nipigon R.	Aug-03	Aug-08	Yes	Yes	---	---	2009[1]
Lower Nipigon R.	Aug-06	Aug-08	Yes	No	---	---	Unknown
Cash Cr.	Aug-03	Aug-08	No	Yes	7,844	1,569	2009
Polly Cr.	Jul-87	Jul-04	No	No	---	---	Unknown
Stillwater Cr.	Aug-05	Aug-08	Yes	Yes	1,395	465	2009
Big Trout Cr.	Never	Aug-08	---	Yes	28,169	3,689	2009
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	Aug-05	No	No	---	---	Unknown
Wolf R.	Jul-07	Aug-08	Yes	Yes	---	---	2010
Coldwater Cr.	Jul-07	Aug-08	Yes	Yes	---	---	2010
Pearl R.	Aug-04	Aug-08	Yes	Yes	14,843	1,002	2009
Blende Cr.	Aug-64	Aug-05	No	No	---	---	Unknown
MacKenzie R.	Jul-08	Aug-08	No	Yes	---	---	Unknown
Neebing-McIntyre Floodway							
McIntyre R.	Jul-07	Aug-08	No	No	---	---	Unknown
Neebing R.	Jul-08	Aug-08	Yes	No	---	---	Unknown
Kaministiquia R.	Aug-06	Sep-08	Yes	Yes	---	---	2010
Cloud R.	Jul-08	Aug-08	No	---	---	---	Unknown
Pine R.	Jul-73	Aug-05	No	No	---	---	Unknown
Pigeon R.	Jul-07	Jul-07	No	No	---	---	Unknown
United States							
Waiska R.	Jul-07	Sep-08	No	No	---	---	Unknown
Sec. 11 SW Trib.	Never	Jul-08	---	Yes	---	---	Unknown
Pendills Cr.	Sep-88	Jun-06	No	Yes	---	---	Unknown
Grants Cr.	Jun-08	Jul-08	No	No	---	---	Unknown
Naomikong Cr.	Jul-63	Jul-07	No	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	Jul-08	Yes	Yes	---	---	2010
Betsy R.	Oct-06	Jul-07	No	No	---	---	Unknown
Three Mile Cr.	Jun-62	Jul-08	No	No	---	---	Unknown
Little Two Hearted R.	Jun-08	Sep-08	No	No	---	---	2012
Two Hearted R.	Jun-08	Sep-08	Yes	Yes	---	---	2012
Dead Sucker R.	Jul-75	Jun-06	No	No	---	---	Unknown
Sucker R. (Alger Co.)	Sep-06	Aug-08	Yes	Yes	67,688	1,191	2010
Chipmunk Cr.	Sep-62	Jul-04	No	No	---	---	Unknown
Carpenter Cr.	Aug-05	Aug-08	Yes	Yes	162	162	2010
Sable Cr.	Sep-89	Aug-08	No	Yes	---	---	Unknown
Hurricane R.	Never	Aug-08	---	Yes	---	---	Unknown
Sullivans Cr.	Jul-04	Aug-08	No	Yes	4,339	67	2010
Seven Mile Cr.	Jul-67	Jul-06	No	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			
Beaver Lake Cr.							
Lowney Cr.	Jul-06	Aug-07	No	No	---	---	Unknown
Mosquito R.	Jun-73	Aug-08	No	No	---	---	Unknown
Miners R. (barrier downstream)	Aug-07	Sep-08	Yes	Yes	20,316	11,983	2009
Munising Falls Cr.	Sep-64	Jun-05	No	No	---	---	Unknown
Anna R.	Sep-65	Jun-06	Yes	Yes	---	---	Unknown
Furnace Cr.	Jul-07	Sep-08	Yes	No	---	---	Unknown
Five Mile Cr.	Jul-07	Oct-08	No	No	---	---	Unknown
Au Train R. (upper)	Jul-08	Oct-08	Yes	Yes	---	---	Unknown
Au Train R. (Buck Bay Cr.)	Jul-08	Oct-08	No	No	---	---	Unknown
Au Train R. (lower)	Aug-97	Jul-08	No	Yes	---	---	Unknown
Rock R.	Jul-02	Jun-05	No	No	---	---	Unknown
Deer Lake Cr.	Aug-70	Jun-06	No	No	---	---	Unknown
Laughing Whitefish R.	Jul-05	Oct-08	Yes	Yes	8,569	2,016	2009
Sand R.	Jul-85	Jun-05	No	No	---	---	Unknown
Chocolay R.	Jul-06	Oct-08	Yes	Yes	851,585	22,081	2009
Carp R.	Jun-06	Oct-08	Yes	Yes	57,856	9,768	2009
Dead R.	Jul-06	Jul-07	No	No	---	---	Unknown
Harlow Cr.	Jun-07	Aug-07	No	No	---	---	Unknown
Little Garlic R.	Jun-06	May-08	Yes	Yes	62,805	5,068	2009
Garlic R. (entire)	Jul-06	Jul-08	Yes	Yes	35,897	30,153	2009
Iron R.	Jun-05	Oct-08	No	Yes	---	---	2009[1]
Salmon Trout R. (Marquette Co.)	Jul-05	Oct-08	Yes	Yes	---	---	2009[1]
Pine R.	Jul-04	Oct-08	No	Yes	---	---	Unknown
Huron R.	Sep-06	Oct-06	Yes	No	---	---	2010
Ravine R.	Aug-08	Jul-08	---	---	---	---	2009[1]
Slate R.	Sep-85	Jul-08	No	Yes	---	---	2009[1]
Silver R.	Aug-08	Sep-07	---	---	---	---	2009[1]
Falls R.	Aug-08	Jul-08	---	---	---	---	2009[1]
Six Mile Cr.	May-63	Jul-08	No	Yes	---	---	Unknown
Sturgeon R.	Oct-06	Aug-07	Yes	Yes	---	---	2010
Pilgrim R.	Aug-62	Sep-04	---	No	---	---	Unknown
Trap Rock R.	Aug-05	Jul-08	Yes	Yes	230,321	34,502	2009
McCallum Cr.	Aug-63	Sep-05	No	No	---	---	Unknown
Traverse R.	Jul-08	Sep-08	Yes	Yes	---	---	2009[1]
Little Gratiot R.	Aug-72	Jun-08	No	No	---	---	Unknown
Eliza Cr.	Jul-07	Aug-07	No	No	---	---	Unknown
Gratiot R.	Jun-06	Jun-08	No	Yes	---	---	Unknown
Smiths Cr.	May-64	Jun-07	No	No	---	---	Unknown
Boston-Lily Cr.	Aug-62	Jun-07	No	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			
Salmon Trout R. (Houghton Co.)	Jul-08	Sep-08	No	No	---	---	Unknown
Mud Lake Outlet	Oct-73	Sep-05	No	No	---	---	Unknown
Graveraet R.	Aug-63	Jun-06	No	No	---	---	Unknown
Elm R.	Jul-07	Sep-07	No	No	---	---	Unknown
Misery R. (barrier downstream)	Aug-07	Sep-07	No	No	---	---	2011
Misery R. (barrier upstream)	Sep-00	Sep-08	No	Yes	---	---	Unknown
East Sleeping R.	Jul-08	Oct-08	No	No	---	---	2012
Firesteel R.	Never	Oct-08	---	Yes	---	---	2009[1]
Ontonagon R.	Jul-08	Sep-08	No	No	---	---	2012
Potato R.	Oct-08	Sep-08	---	---	---	---	2012
Floodwood R.	Jun-08	Sep-08	No	No	---	---	2012
Cranberry R.	Never	Jun-07	---	No	---	---	Unknown
Little Iron R.	Jun-08	Sep-08	No	Yes	---	---	2012
Union R.	Sep-75	Jul-08	No	No	---	---	Unknown
Black R.	May-64	Oct-08	No	No	---	---	Unknown
Montreal R.	Aug-88	Sep-92	No	No	---	---	Unknown
Washington Cr.	Jul-75	Aug-07	No	No	---	---	Unknown
Bad R.	Jun-80	Sep-04	No	No	---	---	Unknown
Fish Cr.- Eileen Twp.	Oct-08	Sep-08	---	---	---	---	2011
Red Cliff Cr.	Sep-07	Aug-08	Yes	Yes	---	---	Unknown
Raspberry R.	Sep-07	Aug-08	No	No	---	---	Unknown
Sand R.	Jun-63	Aug-08	No	No	---	---	Unknown
Cranberry R.	Aug-07	Aug-08	No	No	---	---	Unknown
Iron R. (barrier downstream)	Never	Jun-06	---	No	---	---	Unknown
Iron R. (barrier upstream)	Aug-07	Aug-08	No	No	---	---	Unknown
Reefer Cr.	Oct-64	Aug-08	No	No	---	---	Unknown
Fish Cr. – Orienta Twp.	Oct-64	Aug-08	No	No	---	---	Unknown
Brule R.	May-08	Aug-08	Yes	Yes	---	---	2009[1]
Poplar R.	May-08	Aug-08	No	No	---	---	Unknown
Middle R. (barrier downstream)	Sep-07	Aug-08	Yes	Yes	---	---	2011
Amnicon R.	Aug-07	Aug-08	Yes	Yes	---	---	2009[1]
Nemadji R. (entire)	Jun-06	Sep-08	Yes	Yes	286,649	38,646	2009
St. Louis R.	Sep-87	Sep-07	No	Yes	---	---	Unknown
Sucker R. (St. Louis Co.)	Never	Jul-06	---	No	---	---	Unknown
Gooseberry R.	Aug-76	Jul-06	No	No	---	---	Unknown
Splitrock R.	Aug-76	Jul-06	No	No	---	---	Unknown
Poplar R.	Jul-77	Jul-06	No	No	---	---	Unknown
Arrowhead R.	Sep-83	Jul-06	No	Yes	---	---	2009[1]

[1] *Stream being treated based on expert judgment*

Table 14. Status of larval sea lampreys in historically infested lentic areas of Lake Superior, 2008.

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Canada				
Goulais R.	Goulais Bay	Jul-08	Jul-08	Aug-85
Haviland Cr.	Haviland Bay	Jul-06	Jul-06	Never
Stokely Cr.	Haviland Bay	Jul-06	Jul-06	Aug-07
Harmony R.	Batchawana Bay	Jul-06	Jul-06	Aug-87
Chippewa R.	Batchawana Bay	Sep-08	Sep-08	Aug-07[1]
Batchawana R.	Batchawana Bay	Aug-07	Aug-07	Oct-07
Carp R.	Batchawana Bay	Jul-06	Jul-06	Aug-07
Pays Plat R.	Pays Plat Bay	Sep-07	---	Never
Gravel R.	Mountain Bay	Aug-08	Aug-08	Aug-06[1]
Little Gravel R.	Mountain Bay	Aug-08	Aug-08	Aug-06
Little Cypress R.	Cypress Bay	Aug-78	Aug-78	Never
Cypress R.	Cypress Bay	Aug-08	Aug-08	Jul-07[1]
Jackpine R.	Nipigon Bay	Jul-02	Jul-89	Never
Jackfish R.	Nipigon Bay	Jul-07	Aug-05	Never
Nipigon R.	Lake Helen	Jul-08	Jul-08	Jul-07
Nipigon R.	Nipigon Bay	Jul-03	Jul-03	Aug-05
Nipigon R.	Polly Lake	Aug-05	Jul-90	Jul-87
Black Sturgeon R.	Black Bay	Jul-04	Jul-04	Never
Wolf R.	Black Bay	Aug-08	Aug-08	Never
MacKenzie R.	MacKenzie Bay	Aug-08	Jul-07	Jul-07
Current R.	Thunder Bay	Aug-05	Aug-05	Never
Neebing-McIntyre Floodway	Thunder Bay	Aug-05	Jul-90	Never
Kaministiquia R. (lower)	Thunder Bay	Sep-08	Sep-08	Jul-08[1]
Pigeon R.	Pigeon Bay	Jul-07	Jul-07	Never
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]
Galloway Cr.	Tahquamenon Bay	Jul-07	Jul-88	Never
Sucker R.	Grand Marais Harbor	Aug-04	Aug-90	Never
Beaver Lake Outlet	Beaver Lake (Lowney Cr.offshore)	Jul-06	Jul-06	Never[2]
Carpenter Cr.	West Bay	Aug-08	Aug-08	Never[2]
Anna R.	Munising Bay	Aug-06	Aug-06	Never[2]
Miners R.	Miners Lake	Sep-08	Sep-08	Aug-07[1]
Furnace Cr.	Furnace Bay	Aug-07	Aug-07	Never[2]
	Furnace Lake (Hanson Cr. - offshore)	Aug-01	Sep-79	Never
	Furnace Lake (Gongeau Cr.- offshore)	Aug-01	Sep-79	Never
Dead R.	Presque Isle Harbor	Sep-08	Sep-08	Never[1]
Harlow Cr.	Harlow Lake (Bismark Cr.- offshore)	Jun-08	Jun-08	Never[2]
Little Garlic R.	Little Garlic R.	Sep-05	Jul-86	Never

Table 14 continued.

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Garlic R.	Garlic R.	Sep-05	Sep-05	Never[2]
	Saux Head Lake	Aug-07	Aug-07	Never[2]
Ravine R.	Huron Bay	Jul-06	Jul-06	Aug-08[1]
Slate R.	Huron Bay	Jul-08	Jul-08	Never[2]
Silver R.	Huron Bay	Jul-07	Jul-07	Never[2]
Falls R.	Huron Bay	Jul-08	Jul-08	Aug-08[1]
Trap Rock R.	Torch Lake	Sep-07	Sep-07	Never[2]
Eliza Cr.	Eagle Harbor	Jul-03	Sep-78	Never
Black R.	Black River Harbor	Sep-06	Sep-05	May-06
Fish Cr. (Eileen Twp.)	Chequamegon Bay	Aug-06	Aug-06	Never[2]
Red Cliff Cr.	Buffalo Bay	Jul-05	Jun-97	Never

[1] *Scheduled for treatment during 2009.*
[2] *Low-density larval population monitored with granular Bayluscide surveys.*

Lake Michigan

- Larval assessment surveys were conducted in 76 tributaries and offshore of 28 tributaries. The status of larval sea lamprey populations in historically infested Lake Michigan tributaries and lentic areas is presented in Tables 15 and 16.

- Surveys to estimate the abundance of larval sea lampreys were conducted in 27 tributaries.

- Surveys to detect the presence of new larval sea lamprey populations were conducted in 10 tributaries. No new populations were discovered.

- Post-treatment assessments were conducted in 27 tributaries to determine the effectiveness of lampricide treatments during 2007 and 2008.

Table 15. Status of larval sea lampreys in Lake Michigan tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed during 2008.

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			
Brevort R.							
Lower	Oct-06	Jul-08	No	No	---	---	2011
Little Brevort R.	Sep-08	Oct-08	Yes	No	---	---	2012
Silver Cr.	Sep-08	Oct-08	Yes	No	---	---	2012
Paquin Cr.	Oct-87	Oct-07	---	Yes	---	---	Unknown
Davenport Cr.	Aug-63	May-07	---	Yes	---	---	Unknown
Hog Island Cr.	Jul-07	Sep-08	---	No	---	---	2009[1]
Sucker R.	Jun-61	May-07	No	No	---	---	Unknown
Black R.	Jun-06	Sep-08	Yes	Yes	---	---	2009[1]
Mile Cr.	Sep-72	Oct-07	---	Yes	---	---	Unknown
Millecoquins R.							
Lower	Jul-95	Aug-08	---	Yes	8,180	0	2010
Upper	Jun-07	Jun-08	No	No	---	---	2011
McAlpine Cr.	Jun-07	Jun-08	No	Yes	---	---	2011
Furlong Cr.	Jun-07	Jun-08	No	Yes	---	---	2011
Cold Cr.	May-00	Jun-08	---	Yes	9,368	551	2009
Rock R.	May-06	Aug-08	No	Yes	464	0	2010
Crow R.	May-06	Aug-08	No	Yes	2,993	599	2009
Cataract R.	Aug-04	Oct-08	No	Yes	1,602	0	2010
Pt. Patterson Cr.	Sep-83	May-06	---	No	---	---	Unknown
Hudson Cr.	Jul-08	Oct-08	Yes	Yes	---	---	2011
Swan Cr.	Jul-92	May-07	No	No	---	---	Unknown
Seiners Cr.	May-84	May-07	No	No	---	---	Unknown
Milakokia R.	Oct-07	Sep-08	No	Yes	---	---	2011
Huntspur Cr.	Sep-08	Jun-08	---	---	---	---	2011
Bulldog Cr.	Jul-08	Sep-08	Yes	No	---	---	2011
Gulliver Lake Outlet	Oct-07	May-08	No	No	---	---	2011
Marblehead Cr.	May-05	Aug-08	No	Yes	162	0	2012
Manistique R.							
Above Dam	Sep-07	Aug-08	Yes	Yes	93,581	36,807	2009
Below Dam	Sep-07	Aug-08	Yes	Yes	---	---	2009
Estuary	Sep-07	Aug-08	Yes	Yes	12,152	2,150	2009
Southtown Cr.	Jun-77	Jul-07	---	Yes	---	---	Unknown
Thompson Cr.	Never	Jul-07	---	Yes	---	---	Unknown
Johnson Cr.	Aug-81	Sep-08	---	Yes	49	7	Unknown
Deadhorse Cr.	Jul-04	Sep-08	No	Yes	5,430	3,620	2009
Gierke Cr.	Never	May-07	---	Yes	---	---	Unknown
Bursaw Cr.	Jul-04	Sep-08	Yes	No	---	---	2012
Parent Cr.	Jun-91	Sep-08	---	No	---	---	Unknown
Poodle Pete Cr.	Aug-01	Aug-08	No	Yes	150	33	2011
Valentine Cr.	Jul-08	Sep-08	No	No	---	---	2012
Little Fishdam R.	May-01	May-07	No	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			
Big Fishdam R.	Aug-08	Oct-08	No	Yes	---	---	2012
Sturgeon R.	Sep-08	Sep-08	Yes	No	---	---	2012
Ogontz R.	May-07	Oct-07	No	Yes	---	---	2011
Squaw Cr.	Aug-00	May-07	No	No	---	---	Unknown
Hock Cr.	May-81	Sep-06	---	No	---	---	Unknown
Whitefish R.	Jun-08	Aug-08	Yes	Yes	---	---	2012
Rapid R.	May-06	Oct-08	Yes	Yes	---	---	2009[1]
Tacoosh R.	May-07	Oct-08	Yes	No	---	---	2011
Days R.							
Below barrier	Oct-08	Aug-08	Yes	No	---	---	2009[1]
Above barrier	Sep-82	Aug-08	---	Yes	---	---	2009[1]
Portage Cr.	Sep-05	Aug-08	Yes	Yes	7,863	1,880	2009
Ford R.	May-08	Aug-08	Yes	Yes	---	---	2011
Sunnybrook Cr.	May-71	May-05	---	No	---	---	Unknown
Bark R.	May-07	Sep-08	No	No	---	---	2012
Cedar R.	May-07	Oct-07	Yes	Yes	---	---	2010
Sugar Cr.	May-08	Aug-08	No	No	---	---	Unknown
Arthur Bay Cr.	Apr-70	May-05	---	No	---	---	Unknown
Rochereau Cr.	Apr-63	May-07	---	No	---	---	Unknown
Johnson Cr.	Apr-63	May-07	---	Yes	---	---	Unknown
Bailey Cr.	Aug-07	Sep-08	Yes	No	574	562	2009
Beattie Cr.	Aug-07	Sep-08	Yes	Yes	2,172	766	2009
Springer Cr.	May-08	Aug-08	Yes	Yes	---	---	2012
Menominee R.	Jun-07	Jul-08	Yes	Yes	---	---	2011
Little R.	Aug-87	Aug-08	---	No	---	---	Unknown
Peshtigo R.	Oct-06	Jul-08	Yes	Yes	---	---	2009[1]
Oconto R.	Jul-05	Jun-08	Yes	Yes	---	---	2009[1]
Pensaukee R.	Nov-77	Aug-06	---	No	---	---	Unknown
Suamico R.	Never	Sep-05	---	No	---	---	Unknown
Ephraim Cr.	Apr-63	May-07	---	No	---	---	Unknown
Hibbards Cr.	May-07	Sep-07	No	No	---	---	2011
Whitefish Bay Cr.	May-87	Oct-07	---	Yes	---	---	Unknown
Lilly Bay Cr.	Apr-63	May-07	---	No	---	---	Unknown
Bear Cr.	May-75	May-07	---	No	---	---	Unknown
Door Co. 23 Cr.	May-07	May-07	---	---	---	---	Unknown
Ahnapee R.	Apr-64	Aug-08	---	No	---	---	Unknown
Three Mile Cr.	Sep-08	Jun-08	---	---	---	---	2012
Kewaunee R.							
Below Barrier	May-75	Aug-08	---	No	---	---	Unknown
Above Barrier	May-75	Aug-08	---	Yes	---	---	Unknown
Casco Cr.	May-07	Aug-08	No	No	---	---	Unknown
Scarboro Cr.	May-75	Aug-08	---	Yes	---	---	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			
East Twin R.	Oct-08	Aug-07	---	---	---	---	2012
Fischer Cr.	May-87	Aug-08	---	No	---	---	Unknown
Carp Lake R.	Oct-04	Sep-08	Yes	Yes	---	---	2009[1]
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
Horton Cr.	Oct-04	Jul-08	No	Yes	---	---	2009[1]
Boyne R.	May-06	Jul-08	No	Yes	---	---	2010
Porter Cr.	Oct-04	Jul-08	No	Yes	---	---	2009[1]
Jordan R.	Sep-07	Oct-07	Yes	---	---	---	2011
Monroe Cr.	Sep-07	Oct-07	No	No	---	---	Unknown
Loeb Cr.	Oct-08	Sep-08	---	---	---	---	Unknown
McGeach Cr.	Oct-99	Jun-08	No	No	---	---	Unknown
Elk Lake Outlet	Sep-04	Jul-08	No	Yes	0	0	Unknown
Yuba Cr.	May-06	Jun-06	No	---	---	---	Unknown
Acme Cr.	Aug-63	Jun-06	---	No	---	---	Unknown
Mitchell Cr.	Oct-08	Oct-08	No	---	---	---	2012
Boardman R.	May-06	Jul-08	Yes	Yes	15,779	4,993	2009
Leo Cr.	Never	May-07	---	No	---	---	Unknown
Goodharbor Cr.	Jul-07	Aug-07	No	---	---	---	Unknown
Crystal R.	Oct-72	Sep-08	---	No	---	---	Unknown
Platte R. (upper)	Aug-07	Sep-08	Yes	Yes	23,224	5,161	2009
Platte R. (middle)	Aug-07	Oct-07	No	---	---	---	2011
Platte R. (lower)	Aug-07	Oct-07	No	---	---	---	2011
Betsie R.	Sep-06	May-08	No	No	---	---	2010
Bowen Cr.	Never	Oct-08	---	Yes	1,903	815	2009
Big Manistee R.	Aug-06	Sep-08	Yes	Yes	1,539,953	31,354	2009
Bear Cr.	Aug-06	Sep-08	Yes	Yes	1,448,171	42,468	2009
L. Manistee R.	Jul-08	Sep-08	Yes	Yes	---	---	2011
Gurney Cr.	Jul-05	Sep-08	Yes	Yes	1,271	1,040	2009
Cooper Cr.	Jul-08	Sep-08	No	---	---	---	Unknown
Lincoln R.	Jul-06	Sep-06	Yes	---	---	---	2010
Pere Marquette R.	Aug-06	Sep-08	Yes	Yes	1,407,358	47,442	2009
Bass Lake Outlet	Aug-78	Jun-08	---	No	---	---	Unknown
Pentwater R. (North Br.)	Jun-07	Oct-07	No	Yes	---	---	2010
Lambricks Cr.	Sep-84	Jun-08	---	No	---	---	Unknown
Stony Cr.	Jul-87	Sep-08	---	Yes	5,585	621	Unknown
Flower Cr.	Sep-81	Jun-08	---	Yes	---	---	Unknown
White R. (below barrier)	Aug-07	Sep-07	Yes	---	---	---	2010
White R. (above barrier)	Aug-01	Sep-08	---	Yes	504,242	110,171	2009
Duck Cr.	Jul-84	Jun-06	---	No	---	---	Unknown
Muskegon R.	Aug-08	Jul-07	Yes	---	---	---	2011
Brooks Cr.	Aug-05	Sep-07	No	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			
Cedar Cr.	Aug-05	Jul-07	No	No	---	---	Unknown
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-07	---	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	Jun-07	No	Yes	---	---	Unknown
Crockery Cr.	Oct-08	Jun-07	Yes	Yes	220,407	34,801	2009
Bass R.	Aug-04	Jul-07	No	No	---	---	Unknown
Rouge R.	Never	Sep-08	---	Yes	4,275	0	2009[1]
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	Oct-08	No	Yes	---	---	Unknown
Sand Cr.	Aug-04	Oct-08	Yes	No	622	124	2010
Mann Cr.	Jun-07	Jul-07	No	No	---	---	Unknown
Rabbit R.	Aug-08	Jul-08	---	---	---	---	Unknown
Swan Cr.	Jul-77	Aug-06	No	Yes	---	---	Unknown
Allegan 3 Cr.	Sep-65	Jul-07	---	No	---	---	Unknown
Allegan 4 Cr.	Oct-78	Jun-06	---	Yes	---	---	Unknown
Allegan 5 Cr.	Never	Jul-07	---	No	---	---	Unknown
Black R.	Oct-07	Sep-07	---	---	---	---	Unknown
Brandywine Cr.	Oct-85	Jun-06	---	Yes	---	---	Unknown
Rogers Cr.	May-98	Jun-06	---	No	---	---	Unknown
St. Joseph R.	Never	Oct-08	---	No	---	---	Unknown
Lemon Cr.	Oct-65	Sep-07	---	No	---	---	Unknown
Pipestone Cr.	Aug-03	Jun-06	No	No	---	---	Unknown
Meadow Dr.	Oct-65	Sep-07	---	No	---	---	Unknown
Hickory Cr.	Oct-65	Sep-07	No	Yes	---	---	Unknown
Paw Paw R.	May-05	Oct-08	Yes	Yes	---	---	2009[1]
Blue Cr.	May-01	Oct-08	No	No	---	---	2009[1]
Mill Cr.	May-05	Oct-08	No	Yes	---	---	2009[1]
Brandywine Cr.	May-05	Oct-08	No	Yes	---	---	2009[1]
Brush Cr.	May-05	Oct-08	No	Yes	---	---	2009[1]
Galien R. (N. Br.)	Oct-07	Oct-08	No	No	---	---	2011
E. Br. & Dowling Cr.	Oct-07	Oct-08	No	No	---	---	2011

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			
S. Br. & Galina Cr.	Oct-05	Oct-08	Yes	Yes	3,308	1,654	2009
Spring Cr.	Oct-05	Oct-08	No	Yes	3,609	802	2009
S. Br. Spring Cr.	Oct-05	Oct-08	Yes	Yes	2,669	381	2009
State Cr.	May-86	Jul-07	---	No	---	---	Unknown
Trail Cr.	Jul-06	Jul-07	No	No	---	---	Unknown
Donns Cr.	May-66	Jun-06	---	No	---	---	Unknown
Burns Ditch	Jul-99	Jul-08	No	No	---	---	Unknown

[1] *Stream being treated based on expert judgment.*

Table 16. Status of larval sea lampreys in historically infested lentic areas of Lake Michigan, 2008.

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-06	Aug-06	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)	Jun-08	Jun-08	Never[1]
Milakokia R.	Seul Choix Bay	Sep-07	Aug-80	Never
Manistique R.	Manistique R. (Offshore)	Jul-07	Jul-07	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-08	Aug-08	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	Aug-07	Aug-07	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-08	Sep-08	Never[1]
Bear R.	Little Traverse Bay	Jun-08	Jun-08	May-07
Horton Cr.	Horton Bay (Lake Charlevoix)	Jul-08	Jul-08	Never[1]
Boyne R.	Boyne Harbor (Lake Charlevoix)	Jul-08	Jul-08	May-06
Porter Cr.	Lake Charlevoix	Jul-08	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-08	Jun-08	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 Bayluscide 3.2% Granular Sea Lamprey Larvicide surveys.

Lake Huron

- Larval assessment surveys were conducted in 65 tributaries (38 Canada, 27 U.S.) and offshore of 9 tributaries (2 Canada, 7 U.S.). The status of larval sea lamprey populations in historically infested Lake Huron tributaries and lentic areas is presented in Tables 17 and 18.

- Surveys to estimate the abundance of larval sea lampreys were conducted in 12 tributaries (4 Canada, 8 U.S.) and offshore of one Canadian tributary.

- Surveys to detect the presence of new larval sea lamprey populations were conducted in 18 tributaries (15 Canada, 3 U.S.). No new populations were discovered.

- Post-treatment assessments were conducted in 26 tributaries (10 Canada, 16 U.S.) to determine the effectiveness of lampricide treatments during 2007 and 2008.

- Monitoring of larval sea lampreys in the St. Marys River continued during 2008. Approximately 950 geo-referenced sites were sampled using deepwater electrofishing gear. Surveys were conducted according to a stratified, systematic, adaptive cluster sampling design. The larval sea lamprey population in the St. Marys River is estimated to be 1.5 million (95%; confidence limits (0.8.-2.2 million)). This is a 71% reduction from estimated abundance prior to the integrated control effort which began during 1999.

- The downstream distribution of larval sea lampreys in the St. Marys River was investigated during 2008 using granular Bayluscide. Seventy-one 500 m^2 plots were surveyed using granular Bayluscide outside the limits of annual deepwater electrofishing assessment locations. A small larval sea lamprey population was documented in Munuscong Bay and a larger population was documented on the southwest tip of Sugar Island. RoxAnn seabed classification sonar was used to map substrate and further delineate a small population near Sugar Island, which was subsequently treated with granular Bayluscide.

- In addition to the work on the St. Marys River (48 ha), RoxAnn was used to evaluate a total of 109 ha of lentic substrate off of the mouths of Lauzon River, Manitou River, and Blue Jay Creek.

- Department and Service personnel conducted a gear comparison study on the St. Marys River. The study compared larval density estimates derived from the deepwater electrofisher (DWEF) with those derived from granular Bayluscide. Results of the comparison study will be used to determine if estimates from the two different methodologies can be compared, and to further evaluate the cost and precision of each methodology. St. Marys River treatment plots are currently ranked based on DWEF surveys, whereas other non-wadable stream reaches and lentic areas are generally ranked with granular Bayluscide.

Table 17. Status of larval sea lampreys in Lake Huron tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed during 2008.

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							
Root R.							
Main	Oct-05	Oct-08	Yes	Yes	---	---	2009[1]
West Root	Oct-05	Aug-08	Yes	No	---	---	2009[1]
Garden R.	Jun-06	Oct-08	Yes	Yes	---	---	2009[1]
Echo R.							
Upper	Oct-99	Aug-07	---	No	---	---	Unknown
Lower	Oct-99	Oct-07	---	Yes	---	---	Unknown
Bar & Iron Cr.	Oct-08	Sep-08	---	---	---	---	Unknown
Bar R.	Oct-01	Sep-08	No	Yes	34,117	11,941	2009
Sucker Cr.	May-05	Aug-07	No	No	---	---	Unknown
Two Tree R.	Oct-01	Sep-08	No	Yes	53,862	38,153	2009
Richardson Cr.	May-04	Aug-07	Yes	No	---	---	Unknown
Watson Cr.	May-06	Sep-08	Yes	No	---	---	2009[1]
Gordon Cr.	May-08	Sep-08	No	Yes	---	---	Unknown
Browns Cr.	Oct-03	Sep-08	Yes	Yes	242	121	2010
Koshkawong R.	Jun-06	Aug-07	Yes	Yes	---	---	2010
No Name	Aug-75	Jun-08	No	Yes	---	---	Unknown
No Name	Sep-75	Jul-08	No	Yes	---	---	Unknown
MacBeth Cr.	Jun-67	Aug-05	No	No	---	---	Unknown
Thessalon R.							
Upper	Oct-07	Sep-08	Yes	Yes	---	---	2011
Lower	Jun-05	Sep-08	Yes	Yes	---	---	2009[1]
Livingstone Cr.	Jun-00	Aug-07	No	Yes	---	---	Unknown
Mississagi R.							
Main	Aug-08	Oct-08	Yes	---	---	---	2011
Pickerel Cr.	Jun-08	Jun-07	---	No	---	---	2011
Blind R.	May-84	Jun-07	No	No	---	---	Unknown
Lauzon R.	Jun-07	Jun-07	No	No	---	---	Unknown
Spragge Cr.	Oct-95	Jun-06	No	No	---	---	Unknown
No Name	Jun-06	Jun-07	Yes	Yes	---	---	2010
Serpent R.							
Main	Jun-08	Jun-07	---	---	---	---	Unknown
Grassy Cr.	Jun-06	Oct-08	Yes	Yes	---	---	2010
Spanish R.	Sep-02	Oct-08	Yes	Yes	47,470	23,735	2009
Aux Sables R.	Jun-08	Jun-07	---	---	---	---	2009[1]
Kagawong R.	Aug-67	Jun-06	No	No	---	---	Unknown
Unnamed	Jun-08	Jun-08	Yes	---	---	---	Unknown
Silver Cr.	Jul-04	Aug-07	No	No	---	---	Unknown
Sand Cr.	Oct-01	Jun-04	No	Yes	---	---	Unknown
Mindemoya R.	Jun-06	Aug-07	Yes	Yes	---	---	2010
Timber Bay Cr.	Jun-08	Jun-08	No	---	---	---	2011

Table 17 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			
Manitou R.	Oct-07	Jun-08	Yes	No	---	---	2011
Blue Jay Cr.	Oct-07	Jun-08	No	No	---	---	2011
Kaboni Cr.	Oct-78	Jun-06	No	No	---	---	Unknown
Chikanishing R.	Jun-03	Jun-07	No	No	---	---	2011
French R. System							
O.V. Channel	Jun-06	Sep-07	No	No	---	---	Unknown
Wanapitei R.	Jul-05	Jun-08	No	Yes	---	---	2010[1]
Key R. (Nesbit Cr.)	Sep-72	Jun-07	No	No	---	---	Unknown
Still R.	Jun-96	Jun-07	No	Yes	---	---	Unknown
Magnetawan R.	Jun-06	Jun-07	No	Yes	---	---	2011
Naiscoot R.	Jun-08	Jun-08	No	---	---	---	2012
Shebeshekong R.	Never	May-08	---	Yes	---	---	Unknown
Boyne R.	Jun-08	Oct-08	No	Yes	---	---	2011
Musquash R.	Sep-05	May-07	No	No	---	---	Unknown
McDonald Cr.	Never	Jun-99	---	No	---	---	Unknown
Simcoe/Severn System	Never	Jun-06	---	Yes	---	---	Unknown
Coldwater R.	Never	Sep-07	---	No	---	---	Unknown
Sturgeon R.	Jun-07	Sep-07	No	Yes	---	---	2011
Hog Cr.	Sep-78	Sep-07	No	No	---	---	Unknown
Lafontaine Cr.	Jun-68	May-07	No	No	---	---	Unknown
Nottawasaga R.							
Main	May-02	Oct-08	No	No	---	---	Unknown
Boyne Cr.	May-02	Oct-08	No	Yes	---	---	Unknown
Bear Cr.	May-02	Oct-08	Yes	Yes	---	---	2009[1]
Pine R.	Jun-05	Oct-08	Yes	Yes	---	---	2009[1]
Pretty R.	May-72	Jun-06	No	No	---	---	Unknown
Silver Cr.	Sep-82	Jun-04	No	No	---	---	Unknown
Bighead R.	Oct-07	Sep-07	---	---	---	---	2010
Bothwells Cr.	Jun-79	Jun-06	No	No	---	---	Unknown
Sydenham R.	Jun-72	May-04	No	No	---	---	Unknown
Sauble R.	Jun-04	May-07	Yes	Yes	---	---	2009[1]
Saugeen R.	Jun-71	Oct-07	No	No	---	---	Unknown
Bayfield R.	Jun-70	May-06	No	No	---	---	Unknown
United States							
Mission Cr.	Never	Jul-06	---	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.	Jun-06	Sep-08	Yes	Yes	197,114	1,616	2010
Big Munuscong R. (Mainstream)	Jun-99	Sep-08	No	No	---	---	Unknown
Big Munuscong R. (Taylor Cr.)	Jun-06	Sep-08	No	Yes	21,847	0	2010
Carlton Cr.	Sep-01	Jun-05	No	No	---	---	Unknown

Table 17 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			
Canoe Lake Outlet	May-70	May-07	No	No	---	---	Unknown
Caribou Cr.	May-08	Sep-08	Yes	Yes	---	---	Unknown
Bear Lake Outlet	Jun-77	May-06	No	No	---	---	Unknown
Carr Cr.	May-78	Jun-07	No	No	---	---	Unknown
Joe Straw Cr.	May-75	Jun-05	No	No	---	---	Unknown
Huron Point Cr.	Never	May-06	---	No	---	---	Unknown
Albany Cr.	Jul-07	Aug-07	No	No	---	---	Unknown
Trout Cr.	Oct-05	Aug-08	Yes	Yes	4,156	693	2010
Beavertail Cr.	Jun-08	Aug-08	No	No	---	---	Unknown
Prentiss Cr.	May-08	Aug-08	No	No	---	---	Unknown
McKay Cr.	May-08	Aug-08	Yes	No	---	---	Unknown
Flowers Cr.	Sep-83	Sep-08	No	No	---	---	Unknown
Ceville Cr.	Sep-05	Aug-08	No	No	---	---	Unknown
Hessel Cr.	May-08	Aug-08	No	No	----	---	Unknown
Steeles Cr.	Jun-08	Aug-08	No	No	---	---	Unknown
Nunns Cr.	Sep-01	Jun-08	No	Yes	---	---	Unknown
Pine R.	Jun-06	Sep-08	Yes	Yes	---	---	2009[1]
McCloud Cr.	Oct-72	Jul-06	No	No	---	---	Unknown
Carp R.	Jun-07	Sep-08	Yes	Yes	---	---	2010
Martineau Cr.	May-07	Sep-08	No	No	0	0	Unknown
266-20 Cr.	Aug-76	Jun-04	No	No	---	---	Unknown
Beaugrand Cr.	Never	May-07	---	No	---	---	Unknown
Little Black R.	May-67	May-07	No	No	---	---	Unknown
Cheboygan R.	Oct-83	Aug-08	No	Yes	---	---	Unknown
Laperell Cr.	May-00	May-08	No	No	---	---	Unknown
Meyers Cr.	Sep-99	May-08	No	No	---	---	Unknown
Maple R.	Jul-07	Oct-07	No	---	---	---	Unknown
Pigeon R.	Jul-07	Oct-07	No	---	---	---	Unknown
Little Pigeon R.	Aug-98	Oct-06	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	Oct-08	No	---	---	---	Unknown
Greene Cr. (above barrier)	Jun-07	Jun-07	No	---	---	---	Unknown
Grass Cr.	May-78	May-07	No	No	---	---	Unknown
Mulligan Cr.	May-94	Aug-08	No	Yes	143	143	2009
Grace Cr.	Jun-05	Jun-08	Yes	Yes	---	---	2009[1]
Black Mallard Cr. (lower)	May-08	Aug-08	No	---	---	---	2011
Black Mallard Cr (upper).	May-03	Sept-08	Yes	Yes	---	---	2009[1]
Seventeen Cr.	May-67	May-07	No	No	---	---	Unknown
Ocqueoc R. (lower)	Oct-08	Oct-08	No	---	---	---	Unknown
Ocqueoc R. (upper)	Jul-02	Sep-08	No	Yes	---	---	2009[1]

Table 17 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			
Johnny Cr.	Sep-70	Jun-07	No	No	---	---	Unknown
Schmidt Cr.	May-08	May-08	Yes	---	---	---	2011
Trout R.	Oct-07	Oct-07	No	---	---	---	Unknown
Swan R.	Jun-07	Oct-07	No	No	---	---	Unknown
Middle Lake Outlet	Jun-67	Jun-07	No	No	---	---	Unknown
Grand Lake Outlet	Never	Jun-07	---	No	---	---	Unknown
Long Lake Outlet	May-08	Aug-08	No	Yes	---	---	2011
Squaw Cr.	Jun-67	Aug-08	No	Yes	---	---	2010
Devils R.	May-08	Sep-08	Yes	No	---	---	2011
Black R.	Jun-07	Jul-07	No	---	---	---	Unknown
Au Sable R.	Jun-07	Aug-08	Yes	Yes	---	---	2010
Pine R.	May-87	May-03	No	No	---	---	Unknown
Tawas Lake Outlet	Jun-03	Aug-08	No	Yes	2,016	0	2009
Cold Cr.	Jun-03	Aug-08	No	Yes	26,107	2,611	2009
Sims Cr.	Sep-05	Aug-08	No	Yes	2,444	0	2009
Grays Cr.	Sep-05	Aug-08	No	No	0	0	Unknown
Silver Cr.	Sep-05	Aug-08	Yes	Yes	121,438	4,858	2009
East Au Gres R.	Aug-05	Aug-08	Yes	Yes	---	---	2009[1]
Au Gres R.	May-07	Jul-07	No	---	---	---	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.	Jul-05	Sep-08	Yes	Yes	681,579	341,794	2009
Coldwater R.	Jul-05	Jul-08	No	No	---	---	2009
Pine R.	Jun-08	Jul-08	Yes	No	---	---	2009
Little Salt Cr.	May-02	Sep-08	No	Yes	---	---	Unknown
Big Salt Cr.	Jul-05	Sep-08	No	Yes	---	---	2009
North Br.	Never	Sep-08	---	No	---	---	Unknown
Carroll Cr.	May-07	Jun-07	No	---	---	---	Unknown
Big Salt R.	May-06	May-07	No	Yes	---	---	2010
Bluff Cr.	May-06	May-07	No	No	---	---	2010
Shiawassee R.	May-07	Jul-07	No	No	---	---	Unknown
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	Oct-08	No	Yes	---	---	2009[1]
St. Marys R.	Aug-07	Aug-07	Yes	Yes	---	---	2009

[1] *Stream being treated based on expert judgment*

Table 18. Status of larval sea lampreys in historically infested areas of Lake Huron, 2008.

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-08	Aug-08	Never[1]
Albany Cr.	Albany Bay (offshore)	Sep-06	Aug-05	Never
Trout Cr.	Trout Cr. (offshore)	Aug-08	Aug-08	Never[1]
Beavertail Cr.	Beavertail Bay	Aug-07	Aug-07	Never[1]
McKay Cr.	McKay Bay	Sep-06	Sep-06	Jul-07
Flowers Cr.	Flowers Bay	Jul-81	Jul-80	Never
Nunns Cr.	St. Martin Bay	Aug-87	Aug-87	Never
Pine R.	St. Martin Bay	Aug-07	Aug-07	Never[1]
Carp R.	St. Martin Bay	Jun-07	Jun-07	Jun-07
Martineau Cr.	Horseshoe Bay	Jun-07	Jun-07	Never[1]
Cheboygan R.	Straits of Mackinac	Sep-03	Aug-93	Never
	Burt Lake (Sturgeon R.)	Aug-08	Aug-98	Never
Elliot Cr.	Duncan Bay	Jun-04	Aug-86	Never
Hammond Bay Cr.	Hammond Bay	Jun-08	Jun-08	Never[1]
Mulligan Cr.	Mulligan Cr. (offshore)	Sep-08	Sep-08	Never
Ocqueoc R.	Hammond Bay	Jun-04	Sep-86	Never
Devils R.	Thunder Bay	Oct-04	Aug-76	Never
Au Sable R.	Au Sable R. (offshore)	Jul-04	Jul-04	Never[1]
East Au Gres R.	East Au Gres R. (offshore)	May-07	Jun-86	Never

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

Lake Erie

- Larval assessment surveys were conducted in 41 tributaries (12 Canada, 29 U.S.) and offshore of one U.S. tributary. The status of larval sea lamprey populations in historically infested Lake Erie tributaries and lentic areas is presented in Tables 19 and 20.

- Surveys to estimate the abundance of larval sea lampreys were conducted in one U.S. tributary.

- Surveys to detect the presence of new larval sea lamprey populations were conducted in 26 (6 Canada, 20 U.S.) tributaries. No new populations were found.

- Post-treatment assessments were conducted in eight tributaries (3 Canada, 5 U.S.) to determine the effectiveness of lampricide treatments during 2007 and 2008.

- Habitat data were collected for the mainstream of the Chagrin River and an intensive electrofishing effort found no larval sea lampreys present during 2008.

Table 19. Status of larval sea lampreys in Lake Erie tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed during 2008.

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 Cr.	Jun-87	Aug-06	No	No	---	---	Unknown
Catfish Cr.	Jun-87	Jun-07	No	No	---	---	Unknown
Silver Cr.	Jun-08	Jul-08	No	No	---	---	2009[1]
Big Otter Cr.	May-08	Jul-08	No	No	---	---	2009[1]
South Otter Cr.	Oct-86	May-05	No	No	---	---	Unknown
Clear Cr.	May-91	Aug-06	No	No	---	---	Unknown
Big Cr.	May-08	Jul-08	No	No	---	---	2009[1]
Forestville Cr.	May-89	April-08	No	No	---	---	Unknown
Normandale Cr.	Jun-87	April-08	No	Yes	---	---	Unknown
Fishers Cr.	Jun-87	April-08	No	No	---	---	Unknown
Young's Cr.	May-08	April-08	No	No	---	---	2009[1]
United States							
Buffalo R.	Never	Sep-07	---	Yes	---	---	Unknown
Delaware Cr.	Sep-05	Jul-07	No	No	---	---	Unknown
Cattaraugus Cr.	Jun-08	Jun-08	Yes	---	---	---	2009[1]
Halfway Br.	Oct-86	Jul-07	---	No	---	---	Unknown
Canadaway Cr.	Oct-86	Jun-08	---	No	---	---	Unknown
Crooked Cr.	Apr-08	Jun-08	No	---	---	---	2009[1]
Raccoon Cr.	Apr-08	Jun-08	---	---	---	---	2009[1]
Conneaut Cr.	Apr-08	Jun-08	No	Yes	---	---	2009[1]
Wheeler Cr.	Never	May-08	No	No	---	---	Unknown
Grand R.	Apr-08	Sep-08	Yes	Yes	---	---	2009[1]
Chagrin R.	Never	May-08	---	Yes	---	---	Unknown
St. Clair River/Lake St. Clair Tributaries							
Black R.	Never	Jul-07	---	No	---	---	Unknown
Mill Cr.	Never	Jul-07	---	Yes	---	---	2009[1]
Pine R.	Apr-88	Oct-08	---	No	---	---	Unknown
Belle R.	Never	Oct-08	---	No	---	---	Unknown
Clinton R.	Never	Oct-05	---	No	---	---	Unknown
St. Clair R.	Never	Jun-08	---	Yes	---	---	Unknown
Thames R.	Never	Jun-08	---	No	---	---	Unknown

[1] *Stream being treated based on expert judgment*

Table 20. Status of larval sea lampreys in historically infested lentic areas of Lake Erie, 2008.

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
United States				
Cattaraugus Cr.	Sunset Bay	Aug-06	Aug-06	Never[1]
Conneaut Cr.	Conneaut Harbor	Jul-06	Jul-06	Never[1]
Grand R.	Fairport Harbor	Aug-05	Jun-87	Never

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

Lake Ontario

- Larval assessment surveys were conducted on a total of 70 tributaries (26 Canada, 44 U.S.). The status of larval sea lampreys in historically infested Lake Ontario tributaries and lentic areas is presented in Tables 21 and 22.
- Surveys to estimate the abundance of larval sea lampreys were conducted in 12 tributaries (9 Canada, 3 U.S.).
- Surveys to detect the presence of new larval sea lamprey populations were conducted in 24 tributaries (5 Canada, 19 U.S.). No new populations were detected.
- Post-treatment assessments were conducted in 12 tributaries (4 Canada, 8 U.S.) to determine the effectiveness of lampricide treatments conducted during 2007 and 2008.
- A rotary screw trap was operated on Sandy Creek from late October to late November to mitigate a deferred treatment. Six metamorphosed lampreys were captured.

Table 21. Status of larval sea lampreys in Lake Ontario tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed in 2008.

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							
Welland R.	Never	Jul-06	---	No	---	---	Unknown
Niagara R.	Never	Jun-07	---	Yes	---	---	Unknown
Ancaster Cr.	May-03	Aug-08	No	No	---	---	Unknown
Grindstone Cr.	Never	Sep-07	---	Yes	---	---	Unknown
Bronte Cr.	Jun-07	Sep-07	No	Yes	---	---	2010
Sixteen Mile Cr.	Jun-82	Jul-07	No	No	---	---	Unknown
Credit R.	May-08	April-08	---	---	---	---	Unknown
Rouge R.	Oct-07	Aug-08	Yes	No	---	---	2011
Petticoat Cr.	Sep-04	Aug-08	No	No	---	---	Unknown
Duffins Cr.	May-06	Aug-08	Yes	Yes	81,399	51,.346	2009
Carruthers Cr.	Sep-76	May-04	No	No	---	---	Unknown
Lynde Cr.	Sep-05	Sep-08	No	Yes	25,618	14,361	2009
Oshawa Cr.	May-06	Aug-08	No	Yes	231,151	37,909	2009
Farewell Cr.	Apr-07	Aug-07	Yes	Yes	---	---	Unknown
Bowmanville Cr.	May-08	Aug-08	No	Yes	---	---	2011
Wilmot Cr.	May-06	Aug-08	No	Yes	30,866	4,727	2009
Graham Cr.	May-96	Jun-05	No	No	---	---	Unknown
Wesleyville Cr.	Oct-02	Aug-08	No	No	---	---	Unknown
Port Britain Cr.	Oct-07	Aug-08	No	Yes	---	---	Unknown
Gage Cr.	May-71	May-06	No	No	---	---	Unknown
Cobourg Br.	Oct-96	Aug-08	No	Yes	---	---	2011
Covert Cr.	Sep-05	Aug-08	No	Yes	---	---	2010
Grafton Cr.	Oct-07	Aug-08	Yes	No	---	---	Unknown
Shelter Valley Cr.	Sep-03	Aug-08	No	Yes	---	---	2010
Colborne Cr.	Sep-03	Jul-07	Yes	No	---	---	Unknown
Salem Cr.	May-06	Aug-08	No	Yes	46,078	4,883	2009
Proctor Cr.	Aug-98	Aug-08	No	Yes	11,575	7,571	2009
Smithfield Cr.	Sep-86	Jun-06	No	No	---	---	Unknown
Trent R. (Canal System)	Sep-06	Jun-08	Yes	Yes	---	---	Unknown
Mayhew Cr.	May-06	Sept-08	Yes	Yes	21,033	7,440	2009
Moira R.	Never	Jun-08	---	Yes	17,111	16,084	2009
Salmon R.	Jun-00	Jun-08	No	Yes	826	619	Unknown
Napanee R.	Never	Jul-07	---	No	---	---	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	Jul-08	Yes	No	---	---	2011
Skinner Cr.	Apr-05	Sep-07	Yes	No	---	---	Unknown

Table 21 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	Jul-08	Yes	No	---	---	2011
Blind Cr.	May-76	Sep-07	No	No	---	---	Unknown
Little Sandy Cr.	Apr-08	Jul-08	Yes	Yes	---	---	2011
Deer Cr.	Apr-04	Jul-08	No	No	---	---	Unknown
Salmon R.	May-07	Jul-08	Yes	Yes	---	---	2010
Orwell Br.	Apr-08	Jul-08	No	---	---	---	2009[1]
Grindstone Cr.	Apr-07	Jul-08	No	Yes	---	---	2010
Snake Cr.	Apr-08	Jul-08	No	No	---	---	2011
Sage Cr.	May-78	Sep-07	No	No	---	---	Unknown
Little Salmon R.	Apr-06	Sep-08	Yes	Yes	419,870	56,547	2009
Butterfly Cr.	May-72	Jul-08	No	No	---	---	Unknown
Catfish Cr.	May-06	Jul-08	Yes	Yes	12,964	5,818	2009
Oswego R.							
Black Cr.	May-81	Aug-07	No	No	---	---	Unknown
Big Bay Cr.	Sep-93	Jul-06	No	No	---	---	Unknown
Scriba Cr.	May-84	Aug-07	No	Yes	---	---	Unknown
Fish Cr.	May-07	Jul-08	Yes	Yes	---	---	2010
Carpenter Br.	May-94	Jul-06	No	No	---	---	Unknown
Putnam Br./ Coldsprings Cr.	May-96	Jul-08	No	Yes	---	---	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	Yes	Yes	---	---	Unknown
Sterling Cr.	May-06	Sep-08	Yes	Yes	125,462	26,967	2009
Blind Sodus Cr.	May-78	Jun-04	No	No	---	---	Unknown
Red Cr.	May-06	Sep-08	No	Yes	---	---	2010
Wolcott Cr.	May-79	Jul-08	No	No	---	---	Unknown
Sodus Cr.	May-05	Jul-08	No	Yes	---	---	Unknown
Irondequoit Cr.	Never	Jun-07	---	No	---	---	Unknown
Larkin Cr.	Never	May-07	---	Yes	---	---	Unknown
Northrup Cr.	Never	Apr-08	---	No	---	---	Unknown
Salmon Cr.	Apr-05	Apr-07	Yes	No	---	---	Unknown
Sandy Cr.	Never	Apr-08	---	Yes	---	---	2009[1]
Oak Orchard Cr. Marsh Cr.	May-08	Apr-08	No	Yes	---	---	2011
Johnson Cr.	Never	Apr-08	---	Yes	---	---	Unknown
Third Cr.	May-72	Oct-06	No	No	---	---	Unknown
First Cr.	May-95	Apr-08	No	No	---	---	Unknown

[1]Stream is being treated based on expert judgment.

Table 22. Status of larval sea lampreys in historically infested lentic areas of Lake Ontario, 2008.

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 River	Black River Bay	Aug-07	Aug-07	Never

Spawning Phase Assessment

The long-term effectiveness of the management program 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 in a subset of those streams with sea lamprey spawning runs. Mark-recapture is employed to estimate the size of the spawning runs in streams that are trapped. Multiple regression models are used to determine the relationship between spawning runs and within-stream biotic and abiotic factors such as larval population abundance and stream discharge. These models are used to estimate spawning populations in streams that are not trapped. Lake-wide populations have been estimated since 1986 from this combination of mark-recapture estimates in streams with traps and model-predicted estimates in streams without traps.

Lake Superior

- 4,586 sea lampreys were trapped in 22 tributaries during 2008 (Table 23, Fig. 3).

- The estimated population of spawning-phase sea lampreys during 2008 was 27,760 (95% CI; 23,050-32,872), which was significantly lower than the 2007 abundance estimate (Fig. 4).

- The abundance estimate is within the fish-community objective target range of 36,000 ± 18,000 for the first time since the mid-1990s (Fig. 4).

- 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, and in the Miners River with the National Park Service, Pictured Rocks National Lakeshore.

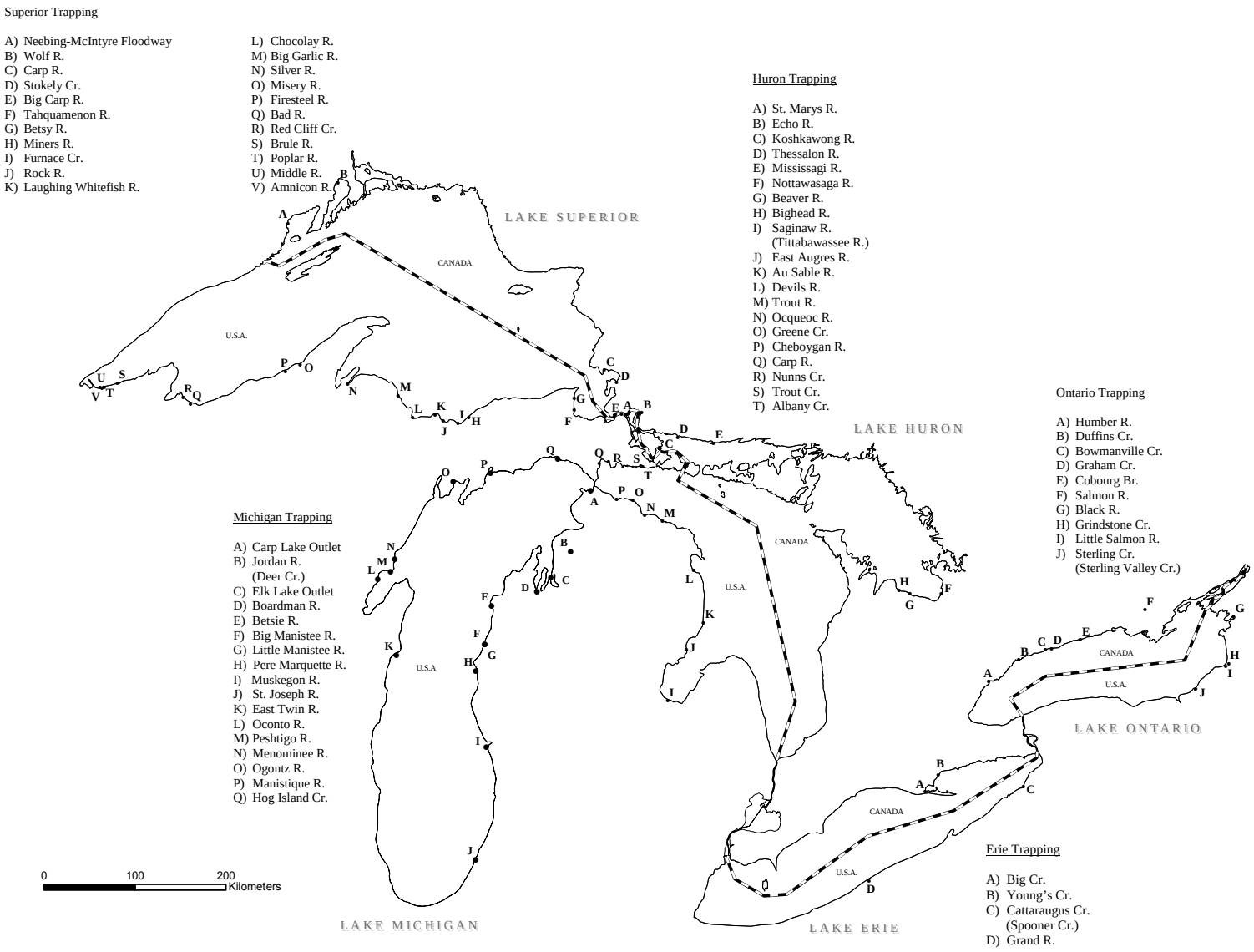

Figure 3. Locations of tributaries where assessment traps were operated during 2008.

Table 23. Stream name, number caught, spawner estimate, trap efficiency, number sampled, percent males, and biological characteristics of adult sea lampreys captured in assessment traps or nets in tributaries of Lake Superior, 2008 (letter in parentheses corresponds to location of stream in Fig. 3).

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									
Neebing-McIntyre Floodway (A)	140	575	24	---	---	---	---	---	---
Wolf R. (B)	0	---	---	---	---	---	---	---	---
Carp R. (C)	140	404	35	---	---	---	---	---	---
Stokely Cr. (D)	65	172	38	---	---	---	---	---	---
Big Carp R. (E)	13	15	87	10	80	---	---	---	---
Total or Mean (North shore)	358	---	---	10	80	---	---	---	---
United States									
Tahquamenon R. (F)	831	5,525	15	32	84	453	469	208	237
Betsy R. (G)	336	823	41	46	70	440	411	208	170
Miners R. (H)	223	696	28	36	75	413	421	181	193
Furnace Bay Cr. (I)	35	---	---	3	67	395	530	151	309
Rock R. (J)	344	1,258	30	70	64	421	430	177	178
Laughing Whitefish R. (K)	2	---	---	0	---	---	---	---	---
Chocolay R.(L)	37	84	44	2	50	385	360	100	114
Big Garlic R. (M)	17	---	---	0	---	---	---	---	---
Silver R. (N)	58	276	21	5	100	447	---	229	---
Misery R. (O)	59	156	38	11	27	358	408	118	169
Firesteel R. (P)	7	---	---	0	---	---	---	---	---
Bad R. (Q)	2,111	12,922	17	101	7	425	439	174	182
Red Cliff Cr. (R)	4	---	---	0	---	---	---	---	---
Brule R. (S)	112	144	77	4	100	453	---	226	---
Poplar R. (T)	0	---	---	0	---	---	---	---	---
Middle R. (U)	4	---	---	0	---	---	---	---	---
Amnicon R. (V)	48	---	---	0	---	---	---	---	---
Total or Mean (South shore)	4,228	---		310	49	429	433	191	183
Total or Mean (for lake)	**4,586**	**---**	**---**	**320**	**66**	**429**	**433**	**191**	**183**

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

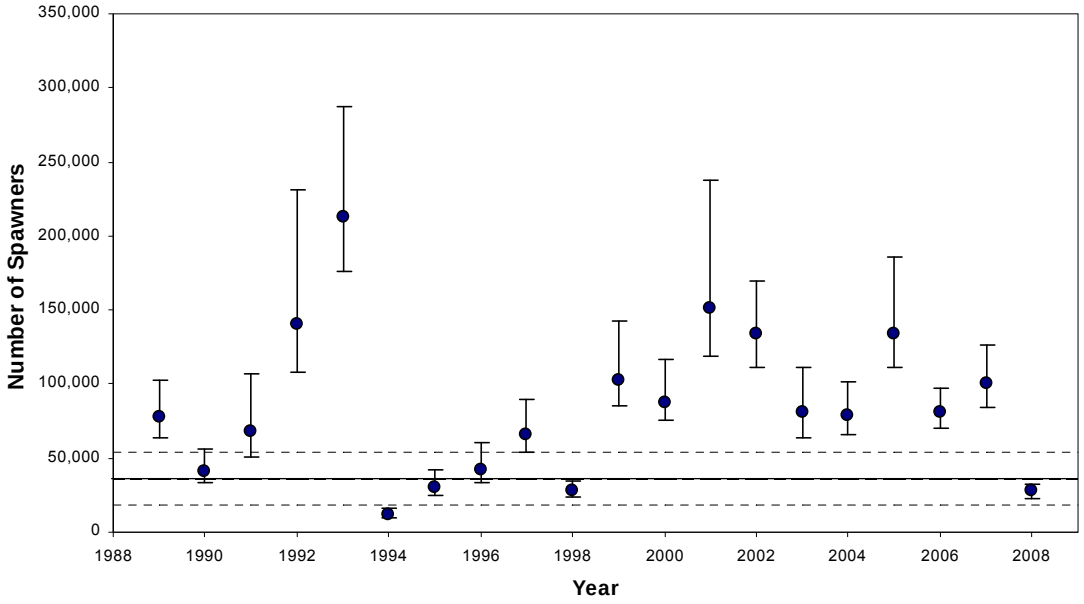

Figure 4. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Superior during 1989-2008 with 95% confidence intervals (vertical error bars). Target level is indicated by the solid horizontal line with 95% confidence intervals (horizontal dashed lines).

Lake Michigan

- A total of 20,956 sea lampreys were trapped at 17 sites in 16 tributaries during 2008 (Table 24, Fig. 3).

- The estimated population of spawning-phase sea lampreys in Lake Michigan was 104,823 (95% CI 96,764-116,642; 55,768 north and 49,055 south), which is above the fish-community objective target (Fig. 5).

- Sea lamprey numbers decreased significantly during 2008 after reaching peak abundance during 2007. Populations were below or within the target range prior to the 2000 spawning year, but had showed a significant trend upward to a peak abundance of 167,126 during 2007 (Fig. 5).

- Spawning runs were monitored in the Boardman and Betsie Rivers through a cooperative agreement with the Grand Traverse Band of Ottawa and Chippewa Indians.

Table 24. Stream name, number caught, spawner estimate, trap efficiency, number sampled, percent males, and biological characteristics of adult sea lampreys captured in assessment traps in tributaries of Lake Michigan during 2008 (letter in parentheses corresponds to location of stream in Fig. 3).

Tributary	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)	2,924	7,178	41	150	54	482	474	221	226
Jordan R.	---	---	---	---	---	---	---	---	---
Deer Cr. (B)	111	776	14	11	18	371	475	230	247
Elk Lake Outlet (C)	89	813	11	7	43	455	437	226	195
Boardman R. (D)	587	743	79	30	37	471	471	246	246
Betsie R. (E)	536	1,451	37	14	43	486	482	226	246
Big Manistee R. (F)	615	4,994	12	4	75	511	493	270	292
Little Manistee R. (G)	475	1,039	46	42	50	477	491	263	276
Pere Marquette R. (H)	459	1,214	38	40	30	518	501	302	291
Muskegon R. (I)	801	2,052	39	61	67	504	495	268	281
St. Joseph R. (J)	595	2,116	28	28	39	508	508	258	272
East Twin R. (K)	45	144	31	1	0	---	530	---	246
Oconto R. (L)	66	115	58	6	67	468	479	209	218
Peshtigo R. (M)	3,383	3,905	87	449	55	498	507	258	281
Menominee R. (N)	587	2,139	27	35	57	497	516	254	298
Ogontz R. (O)	40	144	28	3	67	478	485	247	249
Manistique R. (P)	9,460	29,519	32	246	47	487	494	258	282
Hog Island Cr. (Q)	183	574	32	51	61	495	485	268	265
Total or Mean	20,956	---		1,178	52	493	495	254	271

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

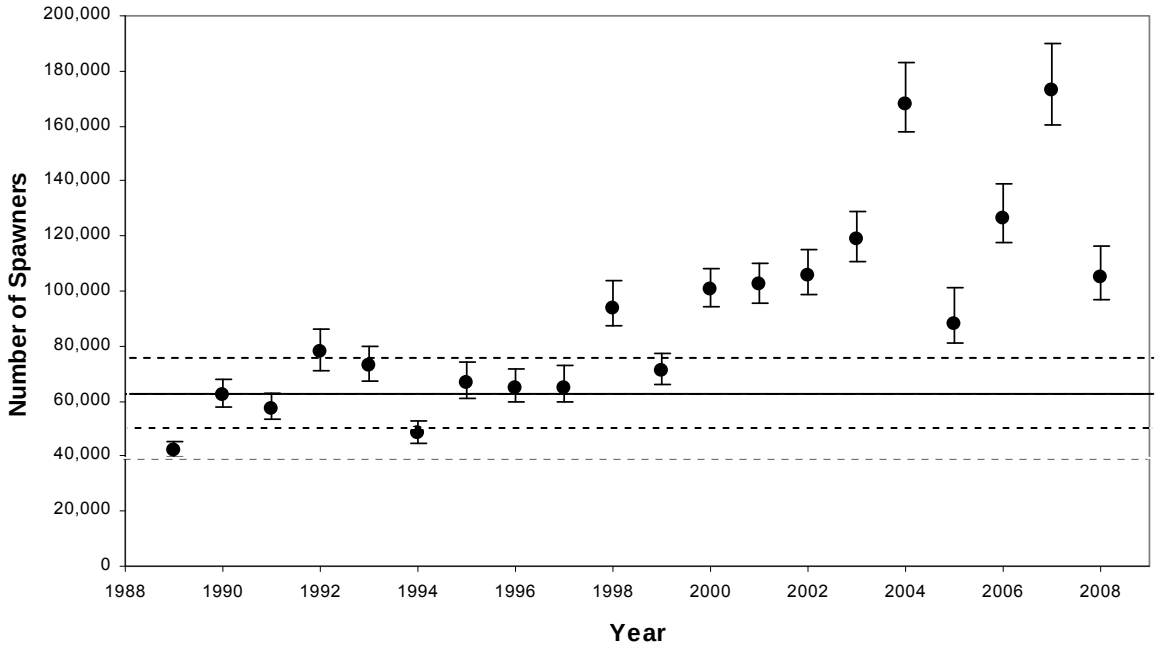

Figure 5. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Michigan during 1989-2008 with 95% confidence intervals (vertical error bars). Target level is indicated by the solid horizontal line with 95% confidence intervals (horizontal dashed lines).

Lake Huron

- 33,123 sea lampreys were trapped at 22 sites in 20 tributaries during 2008 (Table 25, Fig. 3).

- The estimated population of spawning-phase sea lampreys in Lake Huron for 2008 was 190,346 (95% CI; 165,303-224,632), which was greater than the fish-community objective target and has varied widely since 1980 (Fig. 6).

- Of the 33,123 spawning-phase sea lamprey captured in Lake Huron tributaries, 7,526 were captured in traps operated in the St. Marys River at the Great Lakes Power facility in Canada and the U.S. Army Corps of Engineers and Edison Sault Electric facilities in the U.S. The estimated population in the St. Marys River was 17,513 and trap efficiency was 43%.

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

Table 25. Stream name, number caught, spawner estimate, trap efficiency, number sampled, percent males, and biological characteristics of adult sea lampreys captured in assessment traps or nets in tributaries of Lake Huron, 2008 (number in parentheses corresponds to location of stream in Fig. 3).

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)	4,403	17,513	43	0	64	---	---	---	---
Echo R. (B)	2,137	7,893	27	0	65	---	---	---	---
Koshkawong R. (C)	190	---	---	0	56	---	---	---	---
Thessalon R. (D)	27	85	32	0	73	---	---	---	---
Little Thessalon R. (D)	3,682	5,426	68	0	60	---	---	---	---
Mississagi R (E)	9	---	---	0	57	---	---	---	---
Nottawasaga R.(F)	12	---	---	0	75	---	---	---	---
Beaver R. (G)	0	---	---	---	---	---	---	---	---
Bighead R. (H)	30	105	29	0	59	---	---	---	---
Total or Mean (Canada)	10,490	---	---	0	62	---	---	---	---
United States									
Tittabawassee R. (I)	64	138	46	1	100	470	---	228	---
East Au Gres R. (J)	362	2,669	14	11	72	463	448	179	187
Au Sable R. (K)	344	1,024	34	7	57	443	478	181	213
Devils R. (L)	520	2,108	25	134	44	478	483	225	238
Trout R. (M)	22	---	---	0	---	---	---	---	---
Ocqueoc R. (N)	3,449	5,470	63	297	50	464	463	211	214
Greene Cr. (O)	356	481	74	53	42	462	474	199	223
Cheboygan R. (P)	12,262	26,011	47	532	54	483	483	215	224
Carp R. (Q)	33	105	31	4	50	472	470	262	235
Nunns Cr. (R)	4	---	---	---	---	---	---	---	---
Trout Cr. (S)	8	---	---	---	---	---	---	---	---
Albany Cr. (T)	77	531	15	10	90	432	495	177	218
St. Marys R. (A)	3,123	See Canada	See Canada	0	See Canada	---	---	---	---
Total or Mean (U.S.)	22,633	---	---	1,050	62	475	474	213	219
Total or Mean (for lake)	**33,123**	---	---	**1,050**	**62**	**475**	**474**	**213**	**219**

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

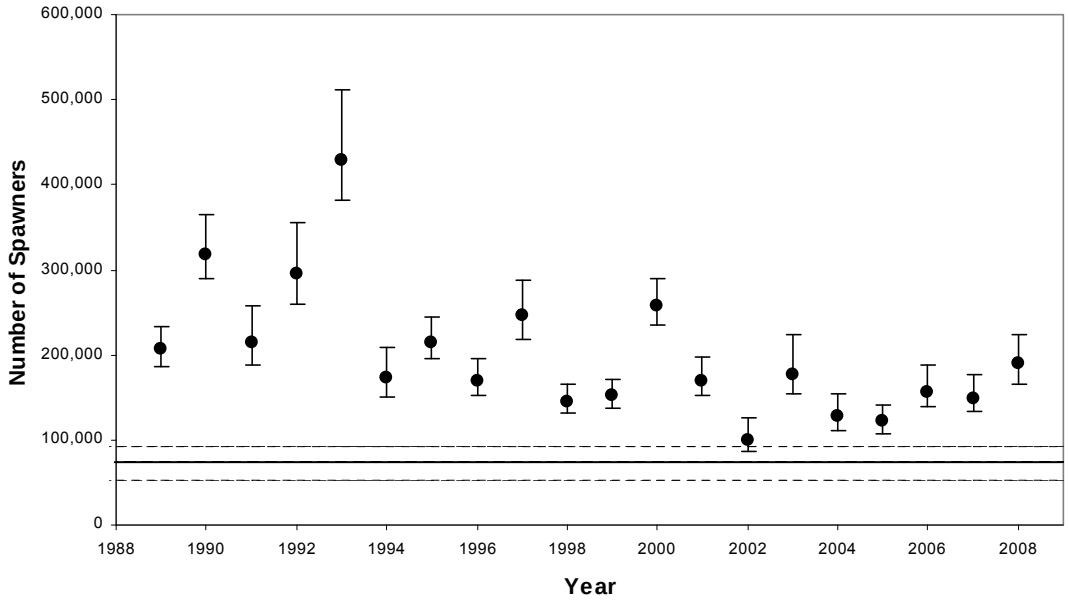

Figure 6. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Huron during 1989-2008 with 95% confidence intervals (vertical error bars). Target level is indicated by the solid horizontal line with 95% confidence intervals (horizontal dashed lines).

Lake Erie

- 258 spawning-phase sea lampreys were trapped at five sites in four tributaries during 2008 (Table 26, Fig. 3).

- Estimated population of spawning-phase sea lampreys was 2,377 (95% CI; 1,576-4,554) during 2008, which is within the fish-community objective target range after being significantly greater than the target for the past three years (Fig. 7).

Table 26. Stream name, number caught, spawner estimate, trap efficiency, number sampled, percent males, and biological characteristics of adult sea lampreys captured in assessment traps or nets in tributaries of Lake Erie, 2008 (number in parentheses corresponds to location of stream in Fig. 3).

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									
Big Cr. (A)	130	594	22	---	---	---	---	---	---
Young's Cr. (B)	93	222	42	---	---	---	---	---	---
Total or Mean (Canada)	223	---	---	---	---	---	---	---	---
United States									
Cattaraugus Cr. (C)	16	104	15	2	100	462	---	238	---
Spooner Cr.	13	---	---	1	100	401	---	167	---
Grand R. (D)	6	---	---	0	---	---	---	---	---
Total or Mean (U.S.)	35	---	---	3	100	441	---	214	---
Total or Mean (for lake)	**258**	---	---	**3**	**100**	**441**	---	**214**	---

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

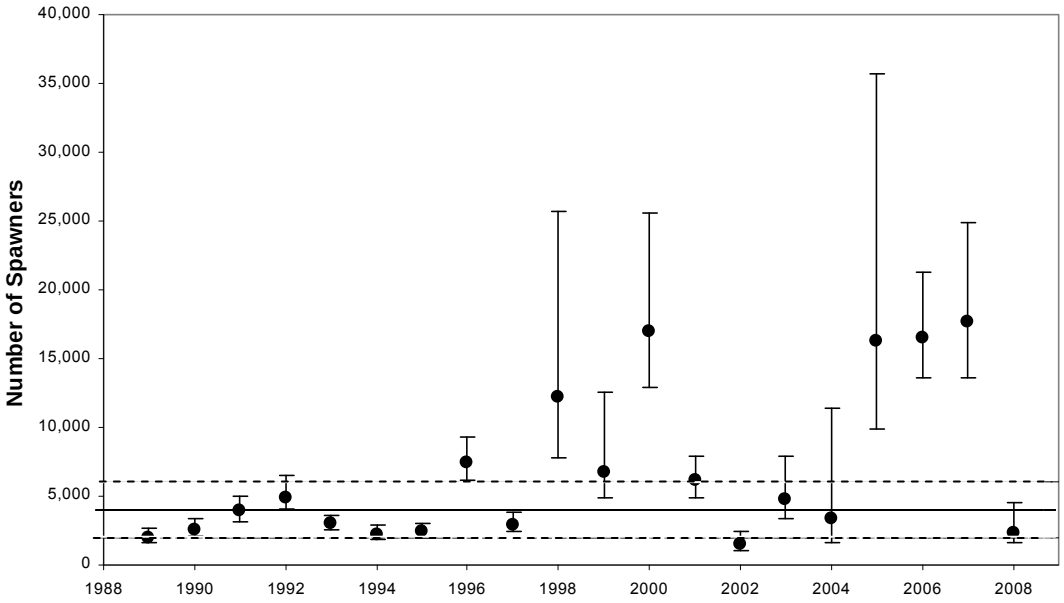

Figure 7. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Erie during 1989-2008 with 95% confidence intervals (vertical error bars). Target level is indicated by the solid horizontal line with 95% confidence intervals (horizontal dashed lines).

Lake Ontario

- 7,195 spawning-phase sea lampreys were trapped at 11 sites on 10 tributaries during 2008 (Table 27, Fig. 3).

- The estimated population of spawning-phase sea lampreys in Lake Ontario for 2008 was 55,448 (95% CI; 50,214-62,249), which remains above the fish-community objective target (Fig. 8).

- Humber River and Duffins Creek traps were jointly operated through a partnership with Toronto and Region Conservation Authority. Cobourg Brook trap was jointly operated through a partnership with Ganaraska River Conservation Authority.

Table 27. Stream name, number caught, spawner estimate, trap efficiency, number sampled, percent males and biological characteristics of adult sea lampreys captured in assessment traps or nets in tributaries of Lake Ontario, 2008 (letter in parentheses corresponds to location of stream in Fig. 3).

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									
Humber R. (A)	3,365	7,101	47	263	52	488	482	273	258
Duffins Cr. (B)	911	2,469	37	81	51	486	497	251	261
Bowmanville Cr. (C)	402	1,726	23	135	52	481	486	237	251
Graham Cr. (D)	119	274	43	35	54	485	501	249	254
Cobourg Cr. (E)	235	475	50	50	30	483	489	229	263
Salmon R. (F)	29	---	---	6	67				
						486	487	258	257
Total or Mean (Canada)	5,061	12,045	---	571	51	488	482	273	258
United States									
Black R. (G)	2,070	17,172	12	114	54	471	482	234	251
Grindstone Cr. (H)	41	---	---	---	---	---	---	---	---
Little Salmon R. (I)	169	1,752	10	7	71	517	466	281	250
Sterling Cr. (J)	389	3,140	12	29	55	497	478	276	266
Sterling Valley Cr.	185	971	19	12	50	497	479	294	291
Total or Mean (U.S.)	2,854	23,035	---	162	58	496	476	271	265
Total or Mean (for lake)	**7,915**	**---**	**---**	**732**	**53**	**488**	**485**	**261**	**259**

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

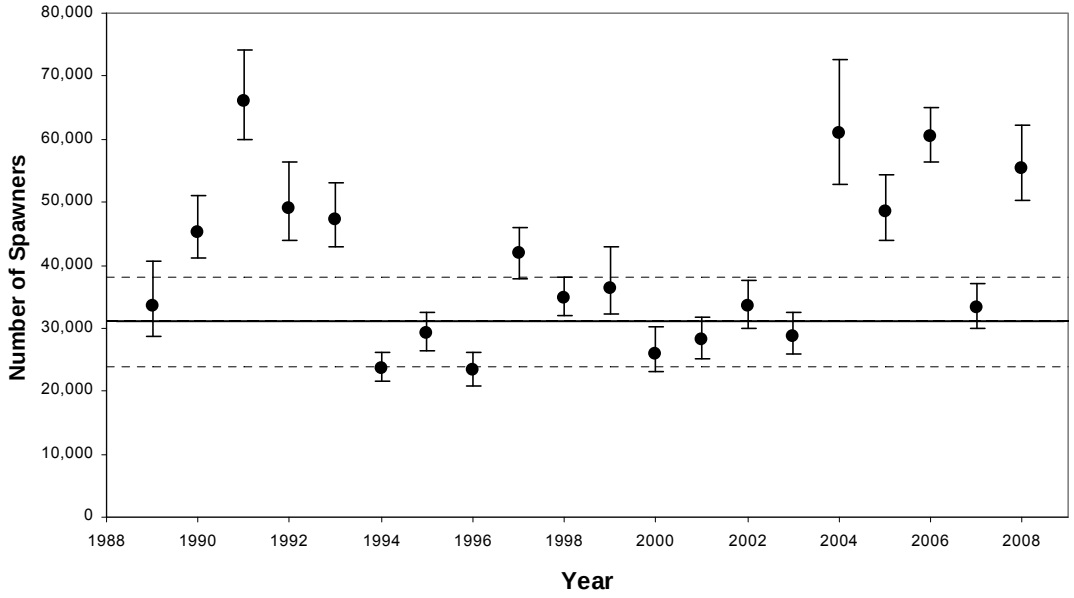

Figure 8. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Ontario during 1989-2008 with 95% confidence intervals (vertical error bars). Target level is indicated by the solid horizontal line with 95% confidence intervals (horizontal dashed lines).

Parasitic Phase

Lake Superior

Lake-wide marking rate on lake trout >533 mm was greater than the target of five A1-3 marks per 100 fish during 2008.

- Lake trout marking rate is currently highest in the northwest and southwest portions of the lake, but the marking rate declined this year in Minnesota waters.

- Surveys in Michigan waters suggest mortality due to sea lampreys exceeds mortality caused by the fishery. Fishing mortality, however, is low in Michigan waters.

- The Michigan Department of Natural Resources provided data on the frequency of parasitic-phase sea lampreys attached to fish caught by sport charter boats during 2008.

    - 26 parasitic-phase sea lampreys attached to lake trout were collected from three management districts.

    - Parasitic-phase sea lampreys were attached at a rate of 1.13 per 100 lake trout (n = 2,299).

Lake Michigan

- Lake-wide marking rate on lake trout >533 mm was greater than target of five A1-3 marks per 100 fish during 2008.

- A lake-wide mark-recapture study was initiated during the fall of 2004 using animals released as metamorphosing-phase juveniles. The releases were suspended in 2006 and resumed in 2007. There were no tagged lampreys available for capture during 2008; recapture of the 2007 releases will occur in 2009.

- The Michigan and Wisconsin Departments of Natural Resources provided data on the frequency of parasitic-phase sea lampreys attached to fish caught by sport charter boats during 2008.

    - 1,239 parasitic-phase sea lampreys were collected from 14 management districts; 216 were attached to lake trout and 1,023 were attached to Chinook salmon.

    - Parasitic-phase sea lampreys were attached at a rate of 1.00 per 100 lake trout (n = 21,440) and 0.70 per 100 Chinook salmon (n = 146,072).

Lake Huron

Lake-wide marking rate on lake trout >533mm was greater than the target of five A1-3 marks per 100 fish during 2008.

- During the early 1990s, marking rate and mortality on lake trout were so large that restoration efforts were suspended in the northern portion of Lake Huron until the St. Marys River treatments commenced.

- Lake trout marking rate declined after completion of the St. Marys River granular Bayluscide spot treatments during 1999 (2001 spawning year).

- A total of 1,872 parasitic-phase sea lampreys (Main Basin – 1,660, North Channel - 212, Georgian Bay - 0) were collected from Canadian commercial fisheries during 2008.

- The Michigan Department of Natural Resources provided data on the frequency of parasitic-phase sea lampreys attached to fish caught by sport charter boats during 2008.

    - 211 parasitic-phase sea lampreys were collected from four of six management districts; 90 were attached to lake trout and 121 were attached to Chinook salmon.

    - Parasitic-phase sea lampreys were attached at a rate of 2.0 per 100 lake trout (n = 4,420) and 9.6 per 100 Chinook salmon (n = 1,267).

- A lake-wide mark-recapture study using metamorphosing-phase juveniles was initiated during the fall of 1997. No coded-wire tagged metamorphosing sea lampreys were released into Lake Huron during 2003, 2004, 2006 or 2008 (Table 28). A total of 667 metamorphosing sea lamprey were released in 2007 and will be available for recapture in 2009.

Lake Erie

Lake-wide marking rate on lake trout >533mm was greater than the target of five A1-3 marks per 100 fish during 2008.

No data is collected in Lake Erie on the frequency of parasitic-phase sea lampreys attached to fish caught by sport charter boats.

Lake Ontario

Lake-wide marking rate on lake trout >433mm was greater than the target of two A1 marks per 100 fish during 2008.

- 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 2008.

    - 2,844 parasitic-phase sea lampreys were sampled; the percent composition of salmonine host species to which lampreys were attached were coho salmon (1%), chinook salmon (74%), rainbow trout (9%), brown trout (14%), and lake trout (2%).
    - Parasitic-phase sea lampreys were attached at a rate of 2.07 per 100 lake trout and salmon in the west region, 0.23 in the west central region, 2.66 in the east central region, and 2.56 in the east.

Table 28. Lake-wide population estimates (PE) and 95% confidence intervals (CI) of metamorphosing, parasitic, and spawning-phase sea lampreys in Lake Huron during 1992-2008.

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	---	---	296	260-371
1993	686	459-1,257	---	---	429	374-511
1994	---	---	515	409-688	171	147-206
1995	---	---	629	518-798	217	197-247
1999	803	505-1,737	1,361	788-3,527	154	140-181
2000	644	513-865	1,759	1,255-2,848	259	234-297
2001	578	491-702	2,302	1,089-14,800	171	152-204
2002	1,000[1]	374-7,813	779	442-2,203	102	87-127
2003	630	443-1,032	1,909	958-8,715	180	153-221
2004	1,100	701-2,301	687	451-1,337	129	113-157
2005	981	659-1,770	611	305-2766	122	108-145
2006	---	---	---	---	157	138-187
2007	---	---	---	---	162	139-201
2008	---	---	---	---	190	165-225

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

RISK MANAGEMENT

Risk management addresses environmental and non-target issues related to the implementation of the sea lamprey management program. In the U.S., the Endangered Species Act and the National Environmental Policy Act require federal agencies to review the effect of their proposed actions and take steps to comply with the laws governing endangered species and environmental protection. This involves coordination with many state, tribal, and federal agencies, and working with others to minimize risk to non-target organisms.

Endangered Species

Federally-listed Species

Section 7 of the Endangered Species Act requires all U.S. federal agencies to consult with Ecological Services (ES) to ensure that actions they fund, authorize, permit, or otherwise carry 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 federally-listed (endangered, threatened, and candidate) species, and develop procedures to protect and avoid disturbance for each listed species.

During 2008, the following ES offices reviewed the effect of 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

Formal Consultations

For proposed lampricide applications that result in a finding of 'likely to adversely affect' an endangered species, the SLMP requests formal consultation with the appropriate ES office.

During 2008, one formal consultation was requested:

- 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 would jeopardize the endangered Hungerford's crawling water beetle (HCWB) population. ELFO provided a BO that stated that 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 to the HCWB. The treatment was postponed until 2009 due to low flow conditions (<12 cfs) during October and November.

Programmatic Review

Because of the broad scope of the SLMP, consultation under Section 7 of the Endangered Species Act 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 to listed species and habitat.

During 2007, a draft of the programmatic review was submitted to all Service Region 3 ES offices in the SLMP action area. 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.

Species or Stream-specific Investigations

- Piping plover (*Charadrius melodus*) - The piping plover is endangered in the Great Lakes. Piping plovers typically nest and feed around the mouths of rivers from May 1 to September 1. To avoid adverse affects to piping plovers, lampricide treatments are scheduled after

September 1 in U.S. streams where there is successful nesting. As the species continues to recover, the number of rivers with nesting piping plovers is expected to increase. This could further confound scheduling of streams for treatment.

It is not known whether lampricides negatively affect piping plovers and available information to calculate the 'no observable adverse effects level' (NOAEL) is minimal. The SLMP has coordinated with the U.S. Geological Survey-Upper Midwest Environmental Sciences Center (UMESC) and the ELFO to refine the NOAEL estimate of TFM on piping plovers. During 2008, the SLMP and UMESC conducted the study '*Evaluation of TFM and Niclosamide Residues in Sediment, Water, and Invertebrates Following a Lampricide Treatment*'. The results (expected during 2009) will provide data to refine the NOAEL. If it is determined that the amount of TFM that the piping plovers are potentially exposed to is below the NOAEL, the constraint to treat only after September 1 could be lifted, and streams with nesting piping plovers could be scheduled throughout the field season.

State-listed Species

Annual Reviews

Endangered species 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 2008, the following state regulatory offices reviewed endangered species within their jurisdiction and issued permits to conduct lampricide applications:

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

Species or Stream-specific Investigations

- Lake sturgeon (*Acipenser fulvescens*) - The lake sturgeon 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 Canada, the lake sturgeon is a provincial species of special concern.

  In its early stages of life (< 10 mm length) the lake sturgeon is more sensitive to TFM than sea lamprey larvae of similar size. This concern led to the adoption of the "*Interim Protocol for Conducting Treatments of Streams with Populations of Young-of-Year Sturgeon (Acipenser fulvescens),"* which stipulates that target lampricide concentrations must not exceed 1.0 x MLC or 1.2 x MLC when niclosamide is applied in combination with TFM, in streams where larval sturgeon are known to be present (McDonald 2007). Unpublished data from the U. S. Fish and Wildlife Service, Marquette Biological Station has indicated that juvenile lake sturgeon reach 10 mm during July. Therefore, streams with populations of juvenile lake sturgeon are treated after August 1 using the protocol.

During 2008, there were ten state-designated sturgeon streams scheduled for treatment. Because of increased populations of sea lampreys in the Great Lakes, the sturgeon protocol was modified. The SLMP and the state of Michigan agreed that the treatment of sturgeon streams would be conducted at 1.5 x MLC, but not before August 1, in order to protect young sturgeon. The modified protocol was used in all of the Great Lake states, as is the policy of the SLMP. No dead lake sturgeons were collected during non-target assessments conducted immediately after each treatment.

- Mudpuppy (*Necturus maculosus*) – The mudpuppy is not a state-listed species, but it is a species of special interest to the State of Ohio and is a species sensitive to TFM. SLMP personnel coordinated with the Ohio Department of Natural Resources Divisions of Wildlife and Division of Natural Areas and Preserves, Lake County Metro Parks, and the Cleveland Museum of Natural History and collected mudpuppies during the treatment of the Grand and Conneaut rivers. A total of 54 live juvenile (year-1) mudpuppies were collected during the leading portion of the lampricide block, held in TFM-free oxygenated water, and released after the lampricide treatment.

Field Protocols

While federal and state listed endangered species are considered separately, a single protocol is developed for staff that addresses conservation measures to be taken based on the list of streams where sea lamprey management activities are scheduled for the year. During 2008, 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/or 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 2008.*

- *Protocol to protect and avoid disturbance to Federal and/or 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 2008.*

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 for the 43 federally or state-listed species listed in the protocols during 2008.

Environmental Policy

Title I of the National Environmental Policy Act (NEPA) contains a Declaration of National Environmental Policy which requires the federal government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony. Section 102 requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. Specifically, all federal agencies are required to prepare detailed statements assessing the environmental impact of, and alternatives to, major federal actions significantly affecting the environment. These statements are commonly referred to as Environmental Assessments (EAs). Generally, an EA includes the need and purpose for the project, the proposed and alternative actions considered, and the environmental impacts of the proposed action and alternatives.

Environmental Assessments

Barrier Projects

- Miners River - An EA was drafted and approved for the repair of the sea lamprey barrier on the Miners River located in Alger County, Michigan.
- Manistique River - An EA is being drafted for the construction of a sea lamprey barrier on the Manistique River located in Schoolcraft County, Michigan.

Trap Projects

- Manistee River - An EA is being drafted for the construction of a permanent sea lamprey trap at Tippy Dam on the Manistee River, located in Manistee County, Michigan.

Compliance Reports

Reports were prepared to comply with the U.S. Environmental Protection Agency (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 Service 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 29).

Table 29. Summary of 6(a)(2) incidents on non-target organisms during 2008.

Lake	Stream	Mortality	Freq	Comments
Huron	Saginaw/Pine R.	stonecat (*Noturus flavus*)	152	Mortality occurred below boost site
Ontario	Little Sandy Cr.	walleye (*Stizostedion vitreum*)	1,500	Mortality occurred to spawning walleye
Seneca	Dresden Delta	brown bullhead (*Ameiurus nebulosus*)	5,000	High concentration of young-of-year
	Catherine Cr.	fantail darter (*Etheostoma flabellare*)	134	Unexpected drop in pH
		blacknose dace (*Rhinichthys atratulus*)	112	
		longnose dace (*Rhinichthys cataractae)*	68	
		margined madtom (*Noturus insignis*)	310	

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. Some of the objectives for the task forces were modified in 2008 and will differ from those reported in previous years. The former task force for connecting channels and lentic areas was disbanded in 2008 and its duties distributed to the other task forces.

Lampricide Control Task Force

Purpose:

To improve the efficiency of lampricide control to maximize sea lamprey 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.

2008 Membership:

Paul Sullivan (Chair) Rob Young, Brian Stephens, (Department); Dorance Brege, Alex Gonzalez, Dave Johnson, Dennis Lavis, Cheryl Kaye, Ellie Koon, Terry Morse, Jeff Slade (Service); Jean Adams, Mike Boogaard, Terry Hubert, Bill Swink, (U.S. Geological Survey); Gord McDonald, (University of Guelph); Dale Burkett, Mike Siefkes, (Commission).

Task Force Meetings were held February 12-13 and September 11-12, 2008.

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 Sea Lamprey Integration Committee, Council of Lake Committees, and fisheries management agencies. Early drafts will be completed by Fall 2009.
2. ***Evaluate and prioritize options to optimize kill of sea lampreys and use of TFM.*** During 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 74 treatments in 2008. In addition, the Department assessment personnel were transferred to treatment crews in the spring to maximize treatment effort when flows more conducive to treatment, larvae exhibit greater susceptibility, and stream alkalinities and pH are lowest, resulting in effective treatment at lower lampricide concentrations. Service personnel transfers were conducted as needed, to the best advantage of both lampricide control and larval assessment field units.

3. ***Annually select streams and lentic areas for lampricide control from the ESTR ranked list.*** This process resulted in the selection and treatment of 100 streams, 8 lentic areas and 143 ha in the St. Marys River in 2008. Included in this list were 9 Lake Erie tributaries that were treated in the spring as part of the Whole Lake Treatment Strategy. Year 2 treatments, designed to eliminate larvae residual to the first treatments and newly-established cohorts, will be completed in fall 2009. After review of the FY 2009 ESTR list, control and assessment staff from all field stations reached consensus. A total of 102 Great Lakes streams, 9 lentic areas, and 148 ha in the St. Marys River are slated for treatment in 2009.

4. ***Develop annual border-blind treatment schedule that maximizes efficiency.*** Tactics have been initiated in recent years to maximize scheduling efficiency. In 2008, this included the treatment of 4 streams based on geographic efficiency by Service and the utilization of US and Canadian treatment crews to treat the highly dendritic and complex Rifle River. In 2009, 10 geographical efficiency treatments will be conducted and a joint Service-Department treatment of the Manistee River is planned.

5. ***Evaluate the effects on the environment of all proposed treatment options.*** The sea lamprey control agents have designated staff to review federal 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. In 2008, a workshop attended by USFWS-MBS, USFWS-LBS, USGS-Hammond Bay, USGS-UMESC, and USFWS-Ecological Services representatives was held to discuss the current temporal constraints on the treatment of US streams adjacent to nesting habitat of the piping plover. Supporting studies on invertebrate uptake of TFM were completed by USGS-UMESCT researchers, and results are pending. A meeting involving a similar list of participants was convened to discuss the conflict presented between planned lampricide treatment of the Carp Lake Outlet and presence of Hungerford's Crawling Water Beetle. A spring treatment of Little Sandy Creek resulted in a significant kill of walleye. Those affected were primarily spawned-out males, with negligible impact to other species. Screening of fish collected by NYDEC for VHS at Cornell University proved negative. The Department filed a 6(a)2 Report with USEPA. The northern brook lamprey has been listed as a "Species of Special Concern" under the Species at Risk Act (SARA) in Canada. This will not confer protection from harm under the Act, however, the Minister of Fisheries is required to develop a Management Plan with recommendations to prevent declines in the population that would qualify it for "Threatened" or "Endangered" status. The Committee on the Status of Endangered Wildlife in Canada has designated the lake sturgeon as "Threatened" in the Canadian waters of the Great Lakes and Upper St. Lawrence River. If the Minister of Fisheries accepts the recommendation of COSEWIC, lake sturgeon will be protected under Canadian law.

6. ***Annually refine estimates of staff effort, lampricide amount and total costs for inclusion in the ESTR model.*** In 2008, treatment supervisors at each of the field stations refined these estimates to aid in development of the 2009 Stream Treatment Ranking List.

7. ***Annually update SOPs.*** Members of the LCTF met in December 2008 to update SOPs. Revisions will be incorporated into field manuals prior to the commencement of the 2009 field season.

8. ***Annually develop estimates of costs for effort and lampricide for upcoming fiscal year.*** The LCTF developed a budget for FY2009 that estimated effort, including the hiring and equipping of eight additional Department treatment staff. The 8 additional personnel that were added to Service control crews in 2008 have been incorporated into the program's base effort for 2009. Lampricide purchases are based on recent usage patterns, and in 2008, the Commission continued to build lampricide inventories to meet the ongoing requirements of a more aggressive lampricide control program. During 2008, the agents took delivery of:

- TFM (liquid) 88,950 kg A.I.
- TFM (bar) 1,000
- Bayluscide 3.2% - Granular 30,845 kg product
- Bayluscide 70% - Wettable Powder 0 kg product
- Bayluscide 20% - Emulsifiable Concentrate 500 liters

Purchases for 2009 include:

- TFM (liquid) 75,710 kg A.I.
- TFM (bar) 0
- Bayluscide 3.2% - Granular 45,360 kg product
- Bayluscide 70% - Wettable Powder 0 kg product
- Bayluscide Technical Material 3,000 kg product

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 Commission 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.*** In 2007, based on an LCTF recommendation, field staff from Marquette Biological Station and the Sea Lamprey Control Centre participated in Year-1 of a 2-year USGS-UMESC studies lampricide distribution during treatment. Work will continue in 2009.

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.

2008 Membership:

Mike Steeves (Chair), Rod McDonald, Fraser Neave, and Brian Stephens (Department); Jessica Barber, Michael Fodale, and Jeffrey Slade (Service); Jean Adams, Roger Bergstedt, and Bill Swink (U.S. Geological Survey); Shawn Sitar (Michigan Department of Natural Resources); Michael Jones (Michigan State University); Dale Burkett and Mike Siefkes (Commission).

The task force met during February and September 2008. The larval assessment workgroup met in February 2008. 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 2009. Included in this ranking were the St. Marys River and lentic areas off the mouths of producing streams in lakes Superior and Huron. All sea lamprey producing streams on Lake Erie were treated in 2008 and are being treated again in 2009 in the second phase of a back-to-back treatment tactic scheduled to be completed in 2009.

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 2008 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. The ATF implemented a modified larval assessment sampling protocol in 2008 that enabled a transfer of effort from the assessment to the lampricide control program.

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, marking 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 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 2008, this included the following new or ongoing projects:

Bergstedt, R.	Determining pathways of migratory adult sea lampreys in large rivers using three-dimensional acoustic telemetry	2008
McLaughlin, R.	Movement pathways and behavior of sea lamprey around traps in the St. Marys River	2008
Swink, W.	Determine the contribution of transformers from lentic areas to sea lamprey populations in lakes Huron and Michigan	2007

Neave, F.	An investigation of a potential morphotype trigger in two Ichthyomyzon species	2007

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 incorporated the former sterile-male-release technique task force, and the pheromone and trapping task force. The Sea Lamprey Integration Committee made changes to the task force objectives as presented here that vary slightly from previous years.

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, and increased use of current methods such as sterile-male release, trapping, and barrier deployment.

2008 Membership

Michael Twohey (chairperson), Kasia Mullett, and Jessica Barber (Service); Weiming Li and Michael Wagner (Michigan State University); Michael Siefkes and Dale Burkett (Commission); Rod McDonald and Mike Steeves (Department); Jane Rivera and Roger Bergstedt (U.S. Geological Survey); Rob McLaughlin (University of Guelph); Ellen Marsden (University of Vermont); Mark Ebener (Chippewa Ottawa Resource Authority). Meetings were held in February and September of 2008.

Progress

1. ***Identify application strategies and solicit field evaluations of the most promising strategies*.** During 2008, two workshops were held to further develop strategies for field implementation of pheromone control techniques and an updated strategy document was developed. The second of these was held in September to develop a proposal to test the utility of 3kPZS in enhancing trap captures at traditional barrier integrated traps. That proposal will be implemented during 2009.

   New techniques were being implemented to evaluate sterilization and conduct trapping.
   - Additional methods of quality assurance for the sterilization technique were implemented and a research proposal to evaluate genetic damage for quality assurance purposes was solicited.
   - A field trial of sterilized females continued.

- Hydroacoustic studies of lamprey movements and behavior were initiated in the St. Marys and Mississagi Rivers.
- A new attractant water trap was constructed in the St. Marys River based on former telemetry data, and a pilot trap was operated in the Mississagi River. These are both large rivers that present challenges to conventional trapping, but are important for control. Both sites use unconventional techniques.
- Planning for a permanent trap in the Manistee River continued.
- Downstream trapping to capture escaping metamorphosing lampreys was initiated as a control measure. Rotary screw traps were acquired to test the feasibility of capturing downstream migrating transformers before they escape to the lake (both for control and assessment). They were used in the fall of 2008 and will again be used in 2009. Further, fyke nets were used in the Carp Lake Outlet in the fall to mitigate deferral of the lampricide treatment.
- A plan for operation and evaluation of traps in the St. Marys River was developed for 2009 and efforts continue to advance trapping.
- The task force developed a proposal to "fish-up" Lake Erie in order to further the gains made by the back-to-back treatment effort.

2. ***Evaluate the role of trapping as an alternate control technique.*** A recent study by Young et al. (manuscript in preparation) of the effect of stock size on recruitment of sea lampreys in Lake Huron suggests 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 effort were to continue. Similarly, a recent publication by Velez-Espino et al. (2008) supports the concept that reductions in stock size leads to reduced parasites in the lakes. The task force developed a proposal to "fish-up" Lake Erie in order to further the gains made by the back-to-back treatment effort.

   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 is a priority of the task force. Issues of trap retention, funnel design, flow regimes and turbulence have been identified as areas of concern. Recent analysis indicates water elevation is closely correlated with trap efficiency. A new attractant water trap was completed at the Great Lakes Power - Francis H. Clergue hydro plant for operation in 2009. Hydroacoustic studies of lamprey movement near traps in the St. Marys River and migratory pathways in the Mississagi River were investigated (Year 1 of 3).

   The task force continued to promote research to advance the technology of trapping and to understand lamprey behaviors that might be exploited for trapping.
   - A study of movement rules for sea lampreys (McLaughlin et al. 2008) was concluding and flow models were available for further work in the Hammond Bay raceways.
   - G. McDonald completed studies of effectiveness of portable traps.
   - A large fishwheel (on loan from USGS) was acquired for future testing on a large river independent of a barrier.
   - Rotary screw traps were acquired and tested during the fall 2008 migration and will be tried again in 2009 to evaluate trapping downstream migrants for control.

- A pilot trapping project in the Mississagi River investigated methods to capture lampreys at this challenging yet important, large river in the North Channel of Lake Huron. The site has potential to provide thousands of males for SMRT.
- Plans for operations, evaluation, and improvement of traps in the St. Marys River continued to be developed.

3. ***Evaluate results of laboratory and field research and revise application strategies accordingly*.** Results from the 2007 and 2008 field studies suggest a paradigm shift in how we have been thinking about pheromones. 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 riverine portion of the migration. A meeting was held in September with agents and researchers to discuss a response to these new findings. A cooperative field study (Li lab, Wagner lab, control agents) has been proposed to immediately test the utility of using 3kPZS in a larger suite of streams to manipulate migratory behavior and improve the efficacy of traps associated with barriers. An ad-hoc work group led by Dr. Michael Wagner last spring continued to develop a strategic plan for implementation of pheromone control that incorporates recent results of laboratory and field studies.

   An expert panel reviewed the sterile-male-release technique during 2003 and noted that implementation and evaluation of the technique was proceeding in a highly effective and efficient manner, that there was compelling evidence the technique had reduced recruitment of sea lampreys in the St. Marys River, and that it was a vital part of the integrated control strategy. Additional measures of quality assurance were being implemented. Efforts to maximize trapping efficiencies and the number of males available for sterilization continued.

   Protocols to control the risk of transferring disease and invasive species continued to be refined. The task force was working with the Fish Health Committee and the lake committees to establish effective protocols for screening and moving sea lampreys from Lake Ontario to the upper Great Lakes. Lampreys from Lake Ontario continue to be screened for diseases before transfer to the upper Great Lakes. No diseases were confirmed that would curtail releases. A workshop was held to support a research project titled, *Real options analysis of Lake Ontario sterile sea lamprey transfers* (Tsao et al. 2008), that was evaluating the risks and benefits of these transfers. Protocols to minimize risk of transmission of invasive species and disease in the Great Lakes were developed and confirmed with Wisconsin and Michigan. A secure water supply was installed at Hammond Bay for the transport of lampreys.

   Observation of lamprey behavior near traps continued to inform trap design and placement. Results of St. Marys River telemetry studies in 2001-2002 were used to identify additional trapping sites on the St. Marys River. Additional hydro-acoustic movement studies began to investigate movement patterns that could be exploited for trapping (Year 1 of 3). Video was used to evaluate lamprey behavior 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. Also, the task force was considering how to mitigate the effect of water elevation on St. Marys River trap efficiency which recent analysis indicated was closely correlated.

   Based on conclusions of recent research, a proposal to “fish-up” the Lake Erie population of sea lampreys was developed.

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.*** 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. The task force continued to monitor studies of population dynamics that are integral to success of alternative controls. The Hammond Bay Biological Station continued to provide support for SMRT related field activities. The task force chair and several members of the task force participated on the Sea Lamprey Research Board.

   Pheromone field experiments were continuing with investigators from MSU and both control agents. The control agent's expertise in trapping has been integral to the field studies. The agents collaborated with researchers to develop a proposal for application of 3kPZS at ten barrier integrated traps during 2009. Good Laboratory Practices training was provided by the Upper Mississippi Environmental Sciences Center (UMESC) and they continue to coordinate registration issues. Extraction of larval (migratory) pheromone continued at Hammond Bay with support from both control agents. This approach was providing a strong interdisciplinary team and building critical expertise for future implementation of a pheromone control strategy.

5. ***Identify chemical-biochemical registration requirements, coordinate registration research, and facilitate the registration process with appropriate agency personnel.*** Experimental use permits were being updated to allow additional field sites. New test sites in Canada will not be available until 2010 due to work-load and permitting timelines. Appropriate records of field evaluations were being kept. Good Laboratory Practices training continued to be coordinated by UMESC for field trial workers, and Nick Johnson will provide field training in 2009. Data was reviewed for compliance with GLP. The EPA requires no interim reports as long as we continue under the same EUPs. UMESC was working with pheromone researchers to address permits to field test various mixtures of pheromone components. Reports were filed with the state of Michigan. Future registration strategies continued to be evaluated by UMESC. A plan for joint registration under NAFTA was accepted by the EPA.

6. ***Develop annual border-blind schedules that maximize efficiency.*** The U.S. and Canadian agents worked on both sides of the border to facilitate effective trapping, processing, and transport of sea lampreys, and continued to consider options to increase these efficiencies. The U.S. and Canadian agents both provided staffing for pheromone field experiments near Hammond Bay. 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 border. Some efforts to achieve further efficiencies were limited by new security requirements.

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. Transfers of lampreys from Lake Ontario were conducted under a protocol that was reviewed by the Fish Health Committee and lake committees. The task force continued to develop procedures and schedules for trap operation on the St. Marys River. Procedures were detailed in the agents' annual work plans. Pheromone field trials were conducted under peer-reviewed study plans.*

8. ***Develop annual estimates of costs for effort for upcoming fiscal year.*** *Budgets were proposed for 2009 for control trapping, sterilization, and pheromones, and presented to the Sea Lamprey Integration Committee. 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.*** *T*ask Force members were involved in development of research priorities, served as investigators, and provided other support. A trap workshop was held in 2006 and attended by internal and external experts. Several research proposals resulted. The task force was working to identify new strategies to advance trapping issues that were languishing, but that could target lampreys that continued to elude traps. Recent research projects were bringing new understanding to the problem 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 addressed issues of inter-stream movements of sea lampreys, pathways of migratory sea lampreys in large rivers, movement pathways and behavior near traps in the St. Marys River, improving effectiveness of portable traps, behavior and swim performance of sea lampreys at barriers and in laboratory flumes, movement rules sea lampreys use to navigate complex flows, using a fishwheel, and recruitment dynamics of Great Lakes sea lamprey. New applications of technology were being investigated to improve trapping efficiencies.

   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 by 2010. A workshop was held in 2008 and a new strategy document was produced. Control agents, internal research and external research collaborated on current pheromone field trials through 2010. A cooperative field study (Li lab, Wagner lab, control agents, Hammond Bay Biological Station) was formulated with task force members. The study will begin in 2009 to test the utility of using 3kPZS at ten barrier integrated traps to manipulate migratory behavior and improve the 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. Progress on themes (SMRT, pheromone, and trapping) and research priorities were reviewed.

Barrier Task Force

Purpose:

The task force was established during April 1991 to coordinate efforts of Fisheries and Oceans Canada (Department), U.S. Fish & Wildlife Service (Service), and U.S. Army Corps of Engineers (Corps) 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.

2008 Membership:

Members were Kasia Mullett (Chair), Cheryl Kaye, Jessica Doemel (Service); Paul Sullivan (Department); Jim Galloway (Corps); Sharon Hanshue (Michigan Department of Natural Resources); Bill Swink (U.S. Geological Survey); Rob McLaughlin (University of Guelph); and Dale Burkett, Mike Siefkes (Commission).

Progress:

1. ***Coordinate operation, maintenance and construction of sea lamprey barriers.***
   Operation - During 2008, 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 2008, safety and maintenance inspections were conducted at 18 U.S. sea lamprey barrier sites and monthly or bi-monthly inspections took place at all Department 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 two streams in the U.S. (Miners River, Middle River) and 9 streams in Canada (Gimlet, Big Carp, Little Carp, Little Otter, Big and Youngs Creeks and Still, Humber and Duffins 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 not operated during 2008 and plans were initiated to remove it in cooperation with other partners and led by the Green Bay National Fish and Wildlife Conservation Office.

Construction **–** Planning continued on two U.S. Barrier projects (Manistique and Chagrin Rivers) and feasibility studies initiated on Red Cliff Creek and Marengo River. Progress on Trail Creek was reinstated by the Corps during 2008. Planning continued for one Department barrier projects (Orwell Brook) and investigations into the feasibility of a barrier project was initiated for the Rouge River.

2. ***Ensure that structures important to sea lamprey management block adult sea lampreys.*** During 2008, U.S. agent staff consulted and provided mitigation recommendations on fish passage or dam/perched culvert removal projects for Billy, Montreal, Silver, Buttermilk, Manton, Wheeler, Blue, Tank, Bark, Castle, Thornapple, McAlpine, Ruddimen, Montague, Little Wold, Silver, Mill and Little Conneaut Creeks and Salmon Trout, Green, St. Joseph, Rabbit, Boardman, and Clinton Rivers. Additional investigations and sea lamprey blocking recommendations were considered for Kewaunee, Little Manistee, White, Carp Lake, Pere Marquette and Menominee Rivers and Cattauragus Creek. Department coordination to ensure sea lampreys remain blocked at existing structures continued regarding the Black Sturgeon River Dam, Denny's Dam in the Saugeen River, Goodyear Dam in Bowmanville Creek and Normandale Creek.

3. ***Develop and annually update a GIS database of structures that block adult sea lampreys.*** Significant progress was made during 2008 toward the development (and ground-truthing) of a GIS-referenced inventory of structures that block (or have the potential to block) sea lampreys and a database of information that assesses the importance of a structure to sea lamprey control. The U.S. agents ground-truthed 95% of the structures listed for U.S. waters and 495 sites were visited during 2008: 305 of the sites had structures present and 217 of them were on infested streams. The Department has not been able to ground-truth its information yet due to the continued vacancy of the barrier coordinator/engineer on the Canadian side. The task force is exploring opportunities for U.S. personnel to assist with the ground-truthing on the Canadian side both to assist in the absence of a coordinator and to ensure consistent cross-border methods. The first draft of the barrier inventory and status list was presented at the fall task force meeting.

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 2009.

5. ***Develop annual border-blind schedules and budget.*** A five year plan on which barriers would be focused on in the near-term was developed. The list included the rebuild of barriers in Still, Manistique, Chagrin, Grand, Saugeen, Rouge and Black Sturgeon Rivers, and construction of new barriers in Trail and Red Cliff Creeks, Orwell Brook and Marengo River. Proposals and associated remediation projects are also being considered for the Days and Ocqueoc 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.*** An important research need continued to be to find a method of passing non-jumping fish yet effectively block sea lamprey. 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 Service and Department 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 lamprey for visitors to experience the sea lamprey first-hand. During 2008, this display was in attendance at the several large capacity events (Table 30).

Table 30. Dates and locations of public outreach performed by agents of the sea lamprey control program in 2008.

Date	Location	Venue	Lead Agency
January 16-25	Cleveland, OH	Cleveland Boat & Waterfront Lifestyle Expo	Service
January 14-18	Chicago, IL	Chicago Boat, RV & Outdoors Show	Department
February 18 -22	Duluth, MN	Boat & Sport Show	Service
February 28-March 2	Novi, MI	Outdoorama	Service
March 16-20	Toronto, ON	Toronto Sportsmans Show	Department
March 2 -24	Ottawa, ON	Lansdown Park	Department
March 28-30	Marquette, MI	Boat Show	Service
April (all month)	Duluth, MN	Omni Max Theatre	Service
June 7	Buffalo, NY	Lower Great Lakes - FA Office	Service
July 19	Minneapolis, MN	Mall Of America	Service
August 11-17	Escanaba, MI	UP State Fair	Service

PERMANENT EMPLOYEES OF THE SEA LAMPREY MANAGEMENT PROGRAM

DEPARTMENT OF FISHERIES AND OCEANS CANADA

Sea Lamprey Control Centre – Sault Ste. Marie, Ontario Canada
Robert Young, Division Manager

Section Head, Control: Paul Sullivan
Fishery Biologists, Control:
Control Supervisor: Brian Stephens
Assistant Control Supervisor: Barry Scotland
Environmental Studies: Tonia Van Kempen
Control Technicians:

Charlie Boudreau	Peter Grey
Jerome Keen	Paul Kyostia
Mike MacKenna	Sean Nickle
Shawn Robertson	Chris Sierzpetowski
Jamie Smith	Randy Stewart
Jamie Storozuk	John Tibbles

Administrative Support:
Office Manager: Lisa Vine
Clerk-Receptionist: Christine Reid
Accounts Clerk: Melanie McCaig
Informatics: John Graham

Section Head, Assessment: Mike Steeves
Fishery Biologists, Assessment:
Adult Supervisor: Rod McDonald
Larval Supervisor (upper lakes): Andrew Treble
Larval Supervisor (lower lakes): Fraser Neave
Assessment Technologists:

Michael McAulay	Richard Middaugh
Sean Morrison	Jeff Rantamaki
Kevin Tallon	Thomas Voigt
Gale Bravener	

Barrier Coordinator: Vacant
Barrier Technician: Joe Hodgson
Maintenance Supervisor: Brian Greene
Maintenance Assistant: Chad Hill

UNITED STATE FISH AND WILDLIFE SERVICE

Robert Adair, Sea Lamprey Management Program Manager and Field Supervisor

Marquette Biological Station – Marquette Michigan
Katherine Mullett, Station Supervisor

Control Supervisor: Terry Morse
Chemist: David Johnson
Fishery Biologists:
Dorance Brege, Treatment Supervisor
Darrian Davis
Joseph Genovese
Lead Physical Science Technician: Robert Wootke
Physical Science Technicians:

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Maintenance Worker: Steve Dagenais
Administrative Support:
Tracy Demeny, Administrative Officer

Pauline Hogan	Terri Todd
Alana Kiple (CS)	Barbara Poirier

Automated Data Processing:

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Robert Kahl	Deborah Larson

Assessment Supervisor (Acting): Katherine Mullett
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Jessica Barber, Adult Supervisor
Michael Twohey, Sterile Male Supervisor
Cheryl Kaye, Risk Management Supervisor

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Mary Henson	Michael Siefkes
Gregory Klingler	Lisa Walter

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Kyle Krysiak	Dennis Smith
Mary Wilson	Deborah Winkler
Susan Becker (CS)	Michael Blohm (CS)
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