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INTEGRATED MANAGEMENT OF SEA LAMPREYS IN THE GREAT LAKES

2007

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INTEGRATED MANAGEMENT OF SEA LAMPREYS IN THE GREAT LAKES 2007

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EXECUTIVE SUMMARY

This report summarises activities in the integrated management of sea lampreys conducted by the United States Fish and Wildlife Service (USFWS) and Department of Fisheries and Oceans Canada (DFO) in the Great Lakes during 2007. Lampricide treatments were conducted on 101 tributaries. Larval assessment crews surveyed 328 Great Lakes tributaries and 36 lentic areas to assess control effectiveness, plan future TFM treatments, and establish production capacity of streams. Assessment traps were operated in 75 tributaries to estimate the spawning-phase population in each Great Lake.

We evaluate sea lamprey populations relative to fish community objectives for each of the lakes. In Lake Superior, sea lamprey abundance (65,500) and wounding (10.0 A1-A3 wounds per100 lake trout) were above targets. Sea lamprey abundance and wounding rates are at their highest levels since 1985, at 167,000 sea lampreys and 16.9 wounds per 100 lake trout, respectively. Both sea lamprey abundance (161,000) and wounding rates (8.0 per 100 lake trout) are declining in Lake Huron and approaching fish community objectives. The population of larvae in the St. Marys River, along with lake trout wounding rates and sea lamprey induced mortality in Lake Huron have declined since a St. Marys River treatment strategy was initiated in 1998. Spawning abundance has been consistently high in Lake Erie since 2005 at 16,500 spawning-phase sea lamprey. Wounding rates in Lake Erie have been more variable, but remain above target, at 16.0 wounds per 100 lake trout. In contrast, Lake Ontario spawning populations have been relatively stable during the past 10 years, and in 2007 were estimated to be 30,700, which is near the target of 30,000. Wounding in Lake Ontario is currently above targets, at 14.2 wounds per 100 lake trout.

INTRODUCTION

Sea lamprey (*Petromyzon marinus*) is a destructive invasive species in the Great Lakes that contributed to the collapse of lake trout (*Salvelinus namycush*) 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 of fish are killed by each sea lamprey. The sea lamprey control program (SLCP) is administered by the Great Lakes Fishery Commission and its two control agents, the U.S. Fish and Wildlife Service (USFWS) and Fisheries and Oceans Canada (DFO). The program is a critical component of fisheries management in the Great Lakes because it significantly reduces the mortality of Great Lakes fish caused by the feeding of parasitic sea lamprey, thereby facilitating the rehabilitation of important fish stocks.

As part of the *Strategic Plan for Great Lakes Fishery Management*, the Lake Committees have developed fish community objectives for each of the Great Lakes. The fish community objectives include targets for the SLCP that, if achieved, would enable establishment and maintenance of self-sustaining stocks of lake trout and other salmonids by minimizing the impact of sea lamprey on these stocks. The lake committees have agreed to sea lamprey abundance and lake trout wounding targets for each of the lakes. This report outlines the program conducted by the control agents and the GLFC in 2007 to meet these targets.

COMMISSION VISION

The "Strategic Vision of the Great Lakes Fishery Commission for the First Decade of the New Millennium" contains a *Vision Statement on Integrated Management of Sea Lamprey:*

The Commission will provide an integrated sea lamprey management program that supports the Fish Community Objectives for each of the Great Lakes and that is ecologically and economically sound and socially acceptable.

To achieve this vision, the Commission set the following milestones:

1) *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.

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

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

4) *Estimate Recruitment* – Estimate recruitment of sea lampreys from all sources, including non-treated rivers, estuaries and connecting channels, by 2005.

FISH COMMUNITY OBJECTIVES

Each lake committee has published qualitative goals for sea lamprey management in their fish community objective documents. Beginning in 2004, the lake committees agreed to explicit target numbers for sea lampreys that will meet their Fish Community Objectives. It has been demonstrated that marking rates of less than 5 per 100 lake trout 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. A target and range for each lake were calculated from the abundance of sea lampreys estimated for a 5-year period when marking rates were closest to five marks per A1-3 marks per 100 lake trout >533 mm.

The performance of the SLCP is evaluated annually by contrasting the abundance of sea lamprey as well as the lake trout wounding 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 wounding is collected by the agencies that comprise the lake committees and their technical committees.

In this section, we report on the performance of the SLCP in 2007 for each of the lakes relative to the sea lamprey abundance and lake trout wounding 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.

Lake-wide estimates of spawning lamprey abundance have been decreasing since 2000. However, the 2007 sea lamprey abundance (65,483 95% CI; 51,275-97,337) remains significantly greater than target (18,000 to 50,000). This is accompanied by a wounding rate of 10 marks per 100 lake trout >533 mm, which is double the target of 5 marks per 100 lake trout of this size. An increasing trend in sea lamprey abundance between 1994 and 2000 led the Commission to increase assessment and treatment effort in Lake Superior. The causes of the increase in sea lamprey numbers during the late 1990s are unclear, with hypotheses ranging from reduced lampricide control effort to increased survival of juvenile lampreys due to changes in the fish community. All known and likely sources of sea lampreys were surveyed, and lampricide control effort in streams and lentic habitats was increased to their highest levels in 20 years, especially in the northwest portion of the lake. The increase in treatment effort since 2000 has likely contributed to recent decreases in lamprey abundance.

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.*

During 2007, sea lamprey numbers were greater than the Fish Community Objective target for Lake Michigan. Sea lamprey numbers were estimated to be 167,125 (151,810 – 189,201, 95% confidence interval), a significant increase from 2006. Sea lamprey numbers were less than or within the target range prior to the 2000 spawning year, but have been greater than targets since the 2000 spawning year. Marking rates have trended upward, but have been greater than target levels of 5 marks per 100 lake trout >533 mm since 1995. Marking rates increased to 16.9 marks per 100 lake trout during 2007. These marking rates may be affected by the abundance of lake trout as well as the abundance of sea lampreys.

The increasing trend in abundance since 2000 led the Commission to increase assessment and treatment effort in Lake Michigan. Like the Lake Superior example, the causes of the increase in sea lamprey numbers are unclear, with hypotheses ranging from reduced lampricide control effort to increased survival of juvenile lampreys due to changes in the fish community. However, all known and likely sources of sea lampreys have been surveyed. Control efforts have been targeted at all potential sources of sea lampreys in Lake Michigan.

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.

During 2007 sea lamprey abundance was estimated to be 160,843 (95%CI: 137,693-200,257), which is above target, but is a significant reduction from levels up to the mid 1990s, when there were more sea lampreys in Lake Huron than in all of the other Great Lakes combined. Concomitant with the reduction in sea lamprey abundance is a large reduction in marking rates on lake trout >533 mm observed during the same period. There were 8.0 marks per 100 lake trout >533 mm in 2007, compared with an average of 26 marks per 100 fish through the 1990's.

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 between lakes Huron and 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 precluded treatment with liquid TFM. An innovative control program was implemented on the river during 1997 that integrated spot treatments with Bayluscide 3.2% Granular Sea Lamprey Larvicide 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. The spot treatments of approximately 100 ha per year have contributed to the decline in sea lamprey numbers and marking rates observed since 2001. This integrated program continued through 2007 with spot treatments of the most densely populated areas, trap capture of migrating adults, and maximizing the release of sterilized males.

Lake Erie

The Lake Erie Committee published "Fish Community Goals and Objectives for Lake Erie" during 2003. While the document does not include a specific sea lamprey objective, 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 salmonids; 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.

During 2007 we estimated 16,664 (95% CI 12,860-24,204) spawning-phase sea lampreys in Lake Erie and a wounding rate of 16.0 marks per 100 lake trout >533 mm; both are significantly greater than the target abundance. The precision of the spawning-phase abundance estimate is lower than other lakes because traps did not function effectively in some streams, reducing the regression sample size. The stream treatments during 1986-94 resulted in an annual sea lamprey abundance within the target range. During the late 1990s sea lamprey abundance increased 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 sub-optimal treatment efficacy resulting from changes in procedures to protect non-target species. In response to the increases in spawning

phase abundance, the Commission and its agents are scheduled to treat all nine currently infested tributaries to Lake Erie during the 2008 field season and then again in the fall of 2009.

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, and the sum of A1-3 wounds is less than 5 marks per 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.

During 2007, the population of sea lampreys was estimated to be 30,715 (95% CI 26,348-46,790) which is within the target range (30,000, 95% CI: 23,000-37,000; see Fig. 3). This represents a decrease from an average spawner abundance of 56,000 for the period 2004 to 2006. Rates of A1-3 wounding on lake trout >431 mm have averaged 17.9 wounds per 100 fish from 2005 to 2007, with 14.2 wounds per 100 fish recorded during 2007. The difference between these indices may be a function of changes in the predator-prey ratio in Lake Ontario.

All streams considered regular sea lamprey producers have been treated in recent years. Beginning in 2001, the Commission increased stream treatment effort from levels applied during the latter 1990s to improve suppression in all lakes. On average, more lampricide treatments have been conducted on Lake Ontario since 2001 than during the period 1997 to 2001. As well, the Niagara River has historically supported a small population of larval sea lampreys that contribute parasitic sea lampreys to Lake Ontario. Although surveys of this river during 2007 have not indicated increased production, continued monitoring of the Niagara River is planned due to the high production potential of this system.

LAMPRICIDE CONTROL

Tributaries harbouring larval sea lampreys are treated periodically with lampricides to eliminate or reduce larval populations before they recruit to the lake as parasitic adults. 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 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. During recent years the combination of improved analytical and predictive techniques has allowed treatment personnel to reduce the amount of lampricide use (kg/yr) in the Great Lakes by 35%. In this section, we summarize lampricide applications conducted in 2007 (Table 1), history of lampricide treatments in each of the Great Lakes and highlights of the 2007 treatments.

The Lampricide Control Task Force was established by the GLFC during December 1995 with charges to improve the efficiency of lampricide control, maximize sea lampreys killed in stream and lentic treatments (while minimizing lampricide use, costs, and impacts on aquatic ecosystems), and define lampricide control options for near and long-term stream selection and target setting. The task force's report on the charges during 2007 is presented on pages 67.

Table 1. Summary of lampricide applications in tributaries of the Great Lakes, 2007.

Lake	Number of Streams	Discharge (m^3/s)	TFM[1] (kg)	Bayluscide[1] (kg)	Distance (km)
Superior	36	54.3	4,848.1	208.7	252.8
Michigan	29	76.3	11,359.2	110.1	1,027.2
Huron	23	84.8	18,301.7	698.5	534.8
Erie	2	7.0	3,623.9	1.2	171.4
Ontario	11	49.4	4,852.5	0	198.0
Total	**101**	**271.8**	**42,985.4**	**1018.5**	**2,184.2**

[1]Lampricide quantities are in kg of active ingredients

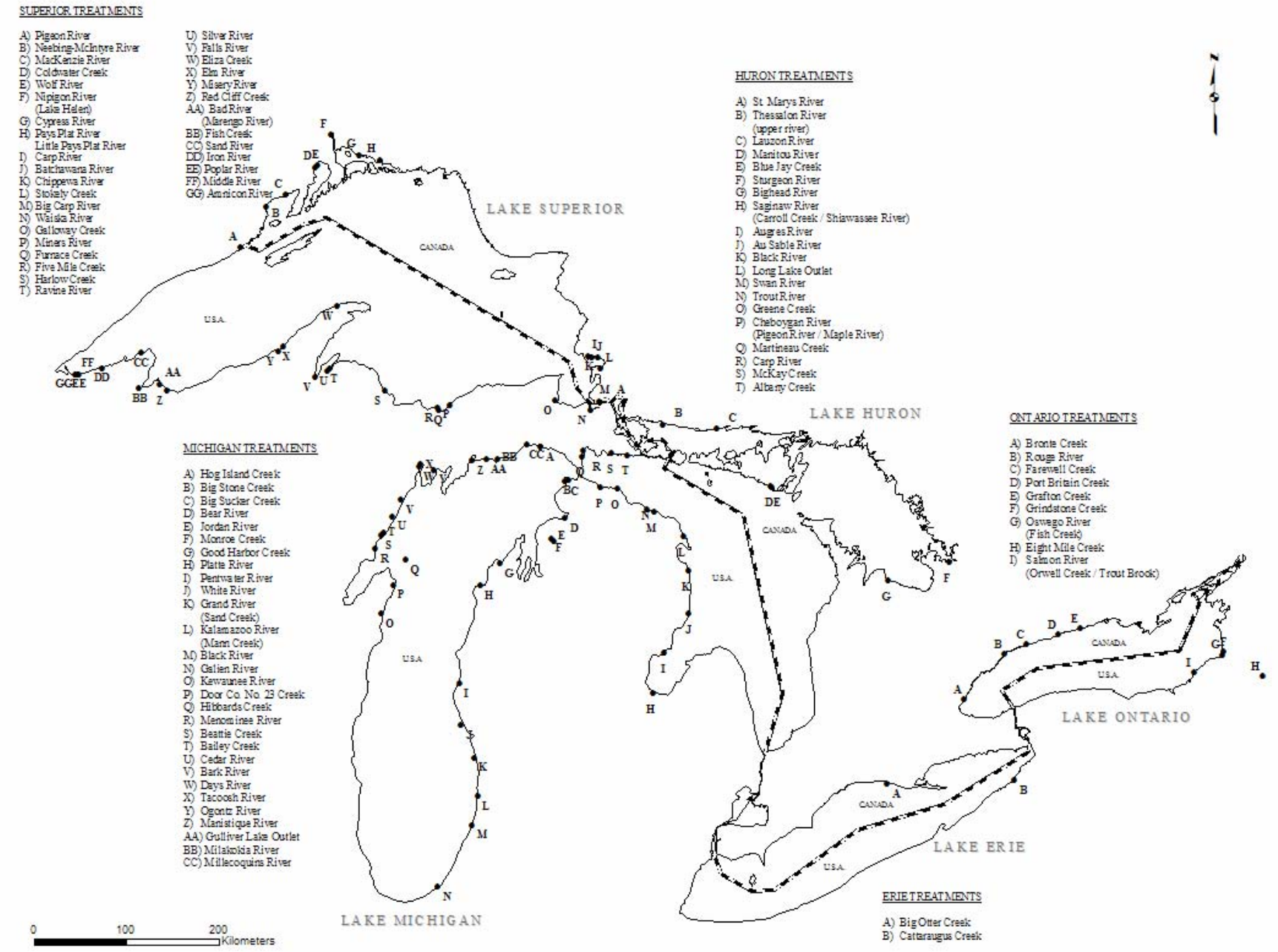

Figure 1. Location of tributaries treated with lampricide in 2007.

Lake Superior

Lake Superior has 1,566 tributaries (833 Canada, 733 United States). One hundred forty-eight tributaries (54 Canada, 94 United States) have historical records of larval sea lamprey production. Of these, 84 tributaries (32 Canada, 52 United States) have been treated with lampricides at least once during 1998-2007. Fifty-three tributaries (17 Canada, 36 United States) are treated on a regular cycle.

Table 2 provides details on the application of lampricides to Lake Superior tributaries treated during 2007 and Fig. 1 shows the locations of these tributaries.

- Lampricide treatments were completed in 29 tributaries (9 Canada, 20 United States) and lentic areas of the MacKenzie, Nipigon (Lake Helen), Cypress, Carp, Batchawana, and Chippewa rivers, and Stokely Creek (Canada), as well as the Falls River and Miners Lake (U.S.).

- Coldwater Creek and Little Pays Plat River were treated for the first time during 2007.

- Lampricide treatments of the Agawa, Cloud, and Jackfish rivers were deferred due to low flow conditions. These treatments have been added to the 2008 field schedule.

- Low stream discharge hampered treatment of many streams including Five Mile, Eliza, and Red Cliff creeks, and Silver, Ravine, Poplar, Middle, and Amnicon rivers. Although all of these streams were treated, lampricide was applied to most by walking the stream and hand-spreading TFM in isolated pools. Only the estuary of the Middle River was treated.

- High stream discharge allowed only a partially successful treatment of the Bad River system. The Marengo River, a major tributary supporting a large number of larvae, was successfully treated, but minimum lethal concentrations of TFM were not maintained for at least 9 hours on the Potato River and the main stem of the Bad River. These streams will be treated again during 2008.

Table 2. Details on the application of lampricides to tributaries of Lake Superior, 2007 (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					
Little Pays Plat R.(H)	Jul 12	0.8	26.9	0	3.1
Cypress R. (G)	Jul 13	5.8	186.7	0	6.2
Coldwater Cr. (D)	Jul 16	2.2	381.2	0	10.4
Cypress R. (G)	Jul 17	---	---	22.5[3]	---
Wolf R. (E)	Jul 18	12.0	825.4	9.1	4.4
Nipigon R. Lake Helen (F)	Jul 18	---	---	20.0[3]	---
MacKenzie R. (C)	Jul 19	---	---	18.6[3]	---
Pigeon R. (A)	Jul 20	5.4	371.3	4.6	5.1
Neebing McIntyre Fl. (B)	Jul 21	0.4	61.7	0	2.8
Pays Plat R. (H)	Jul 24	6.7	380.5	0	9.8
Chippewa R. (K)	Aug 29	---	---	14.5[3]	---
Stokely Cr. (L)	Aug 27	---	---	26.2[3]	---
Carp R. (I)	Aug 30	---	---	10.2[3]	---
Batchawana R. (J)	Sep 4	---	---	61.8[3]	---
Batchawana R (J)	Sep 11	5.7	420.6	0	12.4
Big Carp R. (M)	Sep 13	0.2	19.3	0	10.4
Total (Canada)		**39.2**	**2673.6**	**187.5**	**64.6**
United States					
Harlow Cr. (S)	Jun 27	0.2	46.9	0	12.9
Furnace Cr. (Q)	Jun 29	0.3	46.5	0	6.4
Five Mile Cr. (R)	Jul 3	0.1	1.5	0	1.6
Galloway Cr. (O)	Jul 15	0.1	11.5	0	3.1
Waiska R. (N)	Jul 16	0.3	33.1	0	9.6
Misery R. (Y)	Jul 31	0.4	94.4	0	2.9
Eliza Cr. (W)	Jul 27	0.1	0.7	0	0.8
Elm R. (X)	Jul 29	0.3	51.6	0	1.3
Miners R. (P)	Aug 9	0.6	159.0	0.9[3]	4.8
Silver R. (U)	Aug 24	0.1	45.9	0	7.2
Ravine R. (T)	Aug 26	0.1	0.7	0	0.2
Falls R. (V)	Aug 23	0.3	59.5	20.3[3]	0.2
Poplar R. (EE)	Aug 23	0.1	61.2	0	22.5
Amnicon R. (GG)	Aug 23	0.1	114.7	0	13.4
Iron R. (DD)	Aug 27	1.4	260.8	0	3.2
Sand R. (CC)	Sep 7	0.2	65.2	0	9.7
Red Cliff Cr. (Z)	Sep 8	0.1	25.8	0	5.5
Middle R. (FF)	Sep 9	0.1	29.0	0	0.8
Fish Cr. (BB)	Sep 12	2.3	298.3	0	11.3
Bad R. (AA) Marengo R.	Oct 4	7.9	768.2	0	70.8
Total (United States)		**15.1**	**2174.5**	**21.2**	**188.2**
Total for Lake		**54.3**	**4848.1**	**208.7**	**252.8**

[1] Lampricide quantities are reported in kg of active ingredient.
[2] Includes a total of 25 TFM bars (5.0 kg active ingredient) applied in 3 streams.
[3] Bayluscide 3.2% Granular Sea Lamprey Larvicide 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, 72 tributaries have been treated with lampricides at least once during 1998-2007. Thirty-four tributaries are treated on a regular 3 - 5 year cycle.

The following statements highlight the lampricide control program for Lake Michigan during 2007. Table 3 provides details on the application of lampricides to Lake Michigan tributaries treated during 2007 and Fig. 1 shows the locations of these tributaries.

- Treatments were successfully completed on 27 streams. Norris Creek (Grand River) was replaced on the schedule by the Black River (Allegan Co.) when a large population of large larvae and transformers were discovered during the field season. Norris Creek will be treated in 2008.

- Enhanced treatment strategies to improve the efficacy of lampricide treatments were added to several treatments this year. These strategies may include: adding 10% more lampricide during the treatment; extending lampricide treatment blocks by one or two hours; using crewmembers (secondary treatment crew) to hike the course of a stream to spray backwaters with lampricides or to draw down beaver ponds. Enhanced treatment strategies were used in 15 of 27 treatments.

- The Manistique River was treated with a 50-person combined crew of U.S. and Canadian control staff. Sections of Stutts Creek, and the Driggs and Fox rivers, tributaries of the Manistique River, were treated independently to simplify the mainstream treatment.

- The Milakokia River, Gulliver Lake Outlet and Big Sucker Creek treatments were delayed until October due to the presence of piping plovers. Lack of access prevented treatment of some upper reaches of the Milakokia.

- Furlong, Hog Island, Bailey, and Beattie creeks were treated during periods of low stream discharge. The labor-intensive treatments were completed by walking the lengths of the streams and spreading TFM into isolated pools by hand. Lampricide treatment was repeated on Big Stone Creek after the initial treatment failed due to low discharge. Low water also hampered treatment of the White River.

- A lentic treatment with Bayluscide 3.2% Granular Sea Lamprey Larvicide was conducted at the mouth of the Bear River (Emmet County) for the first time.

- Data was collected for an invertebrate study during the Lower Platte River treatment. Pretreatment and post-treatment invertebrate samples were collected along the shoreline of the Lower Platte River to determine which species are available to be preyed upon by piping plovers.

Table 3. Details on the application of lampricides to tributaries of Lake Michigan, 2007 (Letter in parentheses corresponds to location of stream in Fig. 1).

Stream	Date	Discharge (m^3/s)	TFM (kg)[1,2]	Bayluscide (kg)[1,3]	Distance Treated (km)
Tacoosh R. (X)	May 4	0.6	106.9	0	16.1
Door Co. No. 23 Cr. (P)	May 4	0.1	12.9	0	0.5
Kewaunee R. (O)	May 6	0.2	147.2	0	3.1
Ogontz R. (Y)	May 7	0.5	95.9	0	16.1
Hibbards Cr. (Q)	May 8	0.3	97.1	0	4.7
Cedar R. (U)	May 17	4.5	1472.4	3.3	101.4
Bark R. (V)	May 21	0.4	238.9	0	37.0
Millecoquins R. (CC)	May 31	2.0	32.1	0	40.3
Bear R. (D)	Jun 5	--	0	9.43	--
Jordan R. (E)	Jun 6	5.7	1278.69	23.3	29.0
Kalamazoo R. (L)					
Mann Cr.	Jun 27	0.1	19.0	0	1.6
Hog Island Cr. (A)	Jun 28	0.1	19.2	13.6	3.2
Grand R. (K)					
Sand Cr.	Jun 28	0.5	184.12	0	12.9
Menominee R. (R)	Jun 28	--	0	15.2	--
Pentwater R. (I)	Jul 1	1.5	544.6	0	31.2
Good Harbor Cr. (G)	Jul 26	0.3	127.1	0	4.5
Days R. (W)	Aug 9	0.1	79.7	0	6.9
Beattie Cr. (S)	Aug 12	0.1	2.2	0	1.8
Bailey Cr. (T)	Aug 13	0.1	2.2	0	1.3
White R. (J)	Aug 13	9.8	1811.5	20.1	129.0
Platte R. (H)	Aug 23	8.7	452.1	8.7	35.3
Monroe Cr. (F)	Sep 9	0.1	36.3	0	1.6
Manistique R. (Z)	Sep 20	34.0	3323.9	16.5	450.8
Black R. (M)	Oct 4	0.9	220.8	0	35.7
Galien R. (N)	Oct 8	0.9	273.8	0	29.1
Big Stone Cr. (B)	Oct 18	0.2	25.7	0	1.6
Big Sucker Cr. (C)	Oct 19	0.7	103.0	0	4.8
Gulliver Lake Outlet (AA)	Oct 21	0.5	108.5	0	2.6
Milakokia River (BB)	Oct 22	3.4	543.4	0	25.1
Grand Total		76.3	11,359.2	110.1	1,027.2

[1]Lampricide quantities are reported in kg of active ingredient.
[2]Includes 377 TFM bars (78.7 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 United States). One hundred seventeen tributaries (56 Canada, 61 United States) have historical records of larval sea lamprey production. Of these, 71 tributaries (36 Canada, 35 United States) have been treated with lampricide at least once during 1998 - 2007. Forty-five tributaries (21 Canada, 24 United States) are treated on a regular cycle.

Table 4 provides details on the application of lampricides to Lake Huron tributaries treated during 2007 and Fig. 1 shows the locations of these tributaries.

- Lampricide treatments were completed in 19 tributaries (6 Canada, 13 United States) and the St. Marys River.
- A total of 101 ha (36 Canada, 65 United States) of the St. Marys River was treated with Bayluscide 3.2% Granular Sea Lamprey Larvicide. All work relating to the St. Marys application was performed by DFO personnel.
- The proposed treatment of Timber Bay Creek was deferred due to low discharge conditions. It has been rescheduled for treatment during 2008.
- The Upper Thessalon River was treated in sections due to an extremely low treatment discharge.
- A tributary to the Bighead River, Bognor Marsh Creek, was treated a second time in the fall after post-treatment surveys found substantial numbers of residual lampreys.
- USFWS applied enhanced treatment strategies to improve the efficacy of lampricide treatments on many rivers. These strategies included adding 10 percent more lampricide during treatments, extending lampricide treatment blocks by one or two hours, and walking streams to spray backwaters with lampricides or to de-water beaver dams.
- DFO enhanced treatments by extending the duration of lampricide blocks on some streams. DFO had already adopted lampricide applications to backwater areas and de-watering beaver dams as part of their regular stream treatment protocol.
- Treatments of McKay and Greene creeks and the Trout River were hampered by low discharge and numerous beaver dams. Caribou Creek could not be treated due to low stream discharge, and treatment of Black Mallard Creek was deferred for research purposes. McKay, Caribou, and Black Mallard creeks will be treated during 2008.
- The AuSable River was treated at an elevated stream discharge.
- DFO personnel assisted USFWS crews on treatments of the AuSable and Carp rivers.
- Spawning lampreys continue to bypass the dam on the Shiawassee River at Chesaning, Michigan. Consequently, the Shiawassee River was treated from the Shiawasseetown dam which added 39 miles to the length of the treatment and required 70 additional staff days.

- Hammond Bay Biological Station (U.S. Geological Survey) personnel conducted a study during treatment of the Pigeon River, a Cheboygan River tributary, to determine if ground water can serve as a treatment refuge to larval lampreys.

Table 4. Details on the application of lampricides to tributaries of Lake Huron, 2007.
(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					
Lauzon Cr. (C)	Jun 4	0.6	19.5	0	0.9
Sturgeon R. (F)	Jun 5	1.0	248.4	0	1.9
Bighead R. (G)	Jun 25	1.1	609.4	0	62.6
St. Marys R. (A)	Jun 26	---	---	203.3[3]	---
Thessalon R. (Upper) (B)	Oct 2	1.6	193.7	0	38.4
Blue Jay Cr.(E)	Oct 18	0.7	156.2	0	10.5
Manitou R. (D)	Oct 19	0.6	147.7	0	0.7
Total (Canada)		**5.6**	**1374.9**	**203.3**	**115.0**
United States					
AuGres R. (I)	May 5	4.2	1250.6	0	106.3
Saginaw R. (H)					
Carroll Cr.	May 17	1.7	168.4	0	3.7
Shiawassee R.	May 20	18.7	6389.5	0	70.5
Martineau Cr. (Q)	May 30	0.1	5.8	0	2.5
Greene Cr. (O)	Jun 1	0.1	10.3	0.6[3]	2.6
Long Lake Outlet (L)	Jun 1	0.9	144.6	0	1.9
Swan R. (M)	Jun 5	2.0	447.6	0	8.5
Black R. (K)	Jun 14	0.6	184.7	0	14.8
Carp R. (R)	Jun 17	2.0	832.5	49.4[3]	98.2
Au Sable R. (J)	Jun 19	43.3	6100.9	70.4	25.0
St. Marys R. (A)	Jun 26	---	---	361.3[3]	---
Cheboygan R. (P)					
Pigeon R.	Jul 13	3.3	807.8	3.3	57.3
Maple R.	Jul 28	2.0	497.8	0	12.2
Albany Cr. (T)	Jul 27	0.1	24.3	0	1.0
McKay Cr. (S)	Jul 28	0.1	43.4	10.2[3]	7.2
Trout R. (N)	Oct 22	0.1	18.6	0	8.1
Total (United States)		**79.2**	**16926.8**	**495.2**	**419.8**
Total (for Lake)		**84.8**	**18301.7**	**698.5**	**534.8**

[1] Lampricide quantities are reported in kg of active ingredient.
[2] Includes a total of 78.5 TFM bars (16.4 kg active ingredient) applied in 7 streams.
[3] Bayluscide 3.2% Granular Sea Lamprey Larvicide applied to lentic areas.

Lake Erie

Lake Erie has 842 tributaries (525 Canada, 317 United States). Twenty-two tributaries (11 Canada, 11 United States) have historical records of larval sea lamprey production. Of these, nine tributaries (3 Canada, 6 United States) have been treated with lampricides at least once during 1998-2007. Five tributaries (2 Canada, 3 United States) are treated on a regular 3-5 year cycle.

Table 5 provides details on the application of lampricides to Lake Erie tributaries treated during 2007 and Fig. 1 shows the locations of these tributaries.

- Lampricide treatments were completed in two tributaries (1 Canada, 1 United States).
- Big Otter Creek was treated in two sections due to low stream discharge and time constraints.
- Cattaraugus Creek, a major sea lamprey-producing stream, was treated at low stream discharge, and treatment of Clear Creek, a major tributary, was hampered by the presence of beaver dams. The lower two miles of Cattaraugus Creek from U.S. 20 to the mouth received a sub-lethal dose of lampricide when heavy rain increased discharge six-fold. Cattaraugus Creek will be treated again during 2008.

Table 5. Details on the application of lampricides to tributaries of Lake Erie, 2007 (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					
Big Otter Cr. (A)	Jun 21	3.5	1485.6	1.16	77.4
Total (Canada)		**3.5**	**1485.6**	**0**	**77.4**
United States					
Cattaraugus Cr. (B)	Oct 18	3.5	2138.3	0	94.0
Total (United States)		**3.5**	**2138.3**	**0**	**94.0**
Total (for Lake)		**7.0**	**3623.9**	**1.16**	**171.4**

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

Lake Ontario

Lake Ontario has 659 tributaries (405 Canada, 254 United States). Sixty-five tributaries (31 Canada, 34 United States) have historical records of larval sea lamprey production, and of these, 39 tributaries (21 Canada, 18 United States) have been treated with lampricides at least once during 1998 - 2007. Twenty-nine tributaries (13 Canada, 16 United States) are treated on a regular cycle**.**

Table 6 provides details on the application of lampricides to Lake Ontario tributaries treated during 2007 and Fig. 1 shows the locations of these tributaries.

- Treatments were completed in 9 tributaries (5 Canada, 4 United States).

- During the treatment of the Salmon River some non-target mortality of mudpuppies and stonecats (< 200 of each) was observed and a 6(a)2 report was filed with the Environmental Protection Agency (EPA).

- Grafton and Port Britain creeks were treated in the fall following the completion of a recruitment and growth study conducted by Heather Dawson (USFWS/Michigan State University). The distribution of lampreys was further upstream than expected on Port Britain Creek due to failure of a temporary dam located upstream of highway 401.

- The treatment of Grindstone Creek was initiated upstream of the historical application site on the main branch due to the presence of larval sea lampreys upstream of the dam located in the village of Fernwood.

- Marsh (tributary to Oak Orchard Creek) and Sandy creeks were added to the treatment schedule due to the presence of a significant number of large larval lampreys that were detected by assessment surveys. Both streams were deferred until 2008 due to low stream discharge.

Table 6. Details on the application of lampricides to tributaries of Lake Ontario during 2007 (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					
Farewell Cr. (C)	Apr 19	1.4	335.9	0	6.3
Bronte Cr. (A)	Jun 1	2.0	711.6	0	37.9
Rouge R. (B)	Oct 12	0.9	316.2	0	16.3
Grafton Cr. (E)	Oct 15	0.1	54.5	0	6.5
Port Britain Cr. (D)	Oct 15	0.1	62.4	0	8.9
Total (Canada)		**4.5**	**1480.6**	**0**	**75.9**
United States					
Eightmile Cr. (I)	Apr 22	0.9	90.2	0	4.5
Salmon R. (F)	Apr 22	21.8	1354.0	0	30.3
Orwell Cr.	Apr 27	3.2	279.5	0	12.3
Trout Br.	May 1	2.4	205.5	0	15.9
Grindstone Cr. (G)	Apr 23	3.5	397.2	0	37.1
Oswego R. (H)					
Fish Cr.	May 27	13.1	1045.5	0	22.0
Total (United States)		**44.9**	**3371.9**	**0**	**122.1**
Total (for Lake)		**49.4**	**4852.5**	**0**	**198.0**

[1] Lampricide quantities are reported in kg of active ingredient.
[2] Includes a total of 26 TFM bars (5.4 kg active ingredient) applied in 3 streams.

ALTERNATIVE CONTROL

The GLFC has embarked on a program to develop alternatives to the lampricide control program in order to provide a broader spectrum of tactics to better ensure the long-term viability of the program. We have deployed two alternative control methods, construction of low-head barriers and release of sterilized male lampreys, to augment the lampricide program. The activities of these two programs in 2007 are summarized in this section.

Sterile-Male-Release Technique

Research on the use of a sterile-male-release technique (SMRT) in sea lamprey control 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.

Male sea lampreys have been 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 in areas where sterile males were released the number of eggs hatching in nests had been reduced.

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 assumed these responsibilities in 2003. A report outlining the progress of this task force is presented on page 74.

Highlights of the sterile male release program during 2007 are presented in Table 7 and include the following:

- A total of 1,755 spawning-phase male sea lampreys were delivered to the sterilization facility from trapping operations on the Amnicon, Brule, Middle, Bad, and Misery rivers.
- A total of 15,239 spawning-phase male sea lampreys were delivered to the sterilization facility from trapping operations on the Betsie (780), Boardman (266), Manistee (194), Manistique (10,274), Muskegon (669), Pere Marquette (131), Peshtigo (1,506), and St. Joseph (33) rivers, Carp Lake Outlet (535) and 851 from a mix of Lake Michigan tributaries.
- 18,152 spawning-phase male sea lampreys were delivered to the sterilization facility from trapping operations on the Au Sable (542), Cheboygan (9,024), East Au Gres (175), Echo (1,427), Greene (57), Koshkawong (174), Ocqueoc (691), St. Marys (2,566), and Thessalon (1,623) rivers, and 1,873 from a mix of Lake Huron tributaries.
- No spawning-phase male sea lampreys were delivered to the sterilization facility from trapping operations on the Humber River and Duffins Creek due to mortality of animals while awaiting disease-screening results.

- 32,141 sterilized male sea lampreys were released in the St Marys River during May – July. The estimated resident population of spawning-phase sea lampreys in the St. Marys River was 22,808 (14,759 males). Assessment traps removed 5,633 sea lampreys (3,660 males), an estimated reduction of 25% from trapping. The ratio of sterile to resident male sea lampreys remaining in the St. Marys River was estimated at 2.9:1 (32,142 sterile: 11,099 estimated resident).

- The reduction in recruitment from trapping and enhanced sterile male release was estimated at 81% during 2007. The reduction in recruitment from trapping and enhanced sterile male release averaged 86% during 1997-2007. Prior to enhancement (1991-1996) the reduction in reproduction averaged 58%.

- The release of sterile males combined with the removal of lampreys by traps, reduced the theoretical number of effective fertile females in the river from about 8,049 to 1,559 during 2007.

- In the St. Marys River rapids, 12 sterile and 16 untreated males were observed on 28 nests. Egg viability averaged 45% in the 26 nests that were excavated. Average egg viability (weighted by nests per year) during 1997-2007 was 25%.

- To test the effect of sterile-female release, in year 1 of a 4-year study, 4,544 females were sterilized and released into the Trout River in Presque Isle, Michigan. Spawning activity was observed in the river, and eggs were sampled from sixteen nests.

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 1991-2007.

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

[1] $\left[f = \frac{1-t}{s{:}n+1} \right]$ 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. Ultimately, supression will be measured in terms of reductions in larval sea lamprey production. While estimates of larval production suppression by barriers are developed, an interim measure of preferred (type 1) larval sea lamprey habitat was used as a surrogate. Approximately 1,900 ha of type 1 larval habitat was available in Great Lakes tributaries that are regularly treated with lampricide or have sea lamprey barriers. By the end of 2004, the Commission's network of 69 sea lamprey barriers in the Great Lakes had eliminated over 14% of the 1,900 ha of type 1 larval habitat from production.

A review of the sea lamprey barrier program during 2007 established the following priorities:

1) Operate and maintain existing Commission sea lamprey barriers.
2) Ensure sea lampreys are blocked at important or desired de facto barrier sites.
3) Construct new 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.

A report on the progress of the barrier task force is presented on page 78.

Lake Superior

Presently, there are 15 sea lamprey barriers on Lake Superior (Fig. 2).

Operation and Maintenance of Existing Barriers

- DFO conducted spring and fall safety and maintenance inspections on six barriers.
- Whitefish River (Kaministiquia R.) - DFO installed leveloggers to collect data for a potential new barrier site.
- Wolf River - DFO contracted Lake Head Region Conservation Authority to carry out barrier inspections during the summer.
- Wolf River - DFO repaired the access road and rebuilt the bank on the trap side of the barrier.
- Big Carp River - DFO installed a backup generator at the inflatable barrier to prevent loss of crest during power outages.
- Little Carp River - DFO repaired the access road to the barrier at the landowner's request.

- USFWS personnel conducted spring start-up inspections on three barriers to ensure that all gates and stop-logs were in place prior to lamprey migrations.

- USFWS personnel performed routine maintenance and safety inspections on five barriers.

Ensured Blockage at Other Barriers

- Black Sturgeon River - The Black Sturgeon Dam serves a vital sea lamprey control function but has been identified as an impediment to walleye rehabilitation in Black Bay in an Ontario Ministry of Natural Resources (OMNR) report. During 2007, scientists and managers from DFO, OMNR, USFWS, U.S Geological Survey (USGS) and University of Guelph formed a scoping committee to identify knowledge gaps and investigate actions designed to satisfy sea lamprey control and fish passage objectives.

- Trout Brook, Vaughn and Billy creeks (Bad River) – The USFWS Ashland National Fish and Wildlife Conservation Office, in consultation with USFWS – Marquette Biological Station (MBS), completed culvert modifications in three tributaries to the Bad River system. MBS staff determined that modification would not negatively affect sea lamprey management efforts.

New Construction

- Stokely Creek – DFO replaced the failing sheet pile barrier with a modular concrete low-head dam.

- Gimlet Creek (Pancake River) - Replacement of the sheet pile dam with one similar to the new Stokely Creek barrier was initiated during 2007 and will be completed during 2008.

Lake Michigan

Operation and Maintenance of Existing Barriers

- Pere Marquette - The electric barrier was operated from March 1 through July 31. The fishway was operated seven days per week from March 2 through June 22 and during weekdays from June 23 through July 31. The fishway passed 7,725 steelhead, 41,882 suckers, 83 brown trout, and 9 Chinook salmon.

- Jordan River - The electric barrier was not operated during 2007 because it was not effectively blocking sea lampreys.

- USFWS personnel conducted spring start-up inspections on six barriers to ensure that all gates and stop-logs were in place prior to lamprey migrations.

- USFWS personnel performed routine maintenance and safety inspections on eight barriers.

Ensured Blockage at Other Barriers

- Thompson Creek – The Michigan Department of Natural Resources (MDNR) and Marquette Biological Station (MBS) continue coordination efforts to remove a series of dams at the Thompson State Fish Hatchery. MBS staff determined that removal of these dams may affect sea lamprey control efforts.

- Little Calumet Creek– The Indiana Department of Environmental Management and the USFWS Green Bay National Fish and Wildlife Conservation Office (USFWS - GBNFWCO) are coordinating with MBS on a fish passage project at the sea lamprey barrier.

- Bark Creek (Grand River) – The USFWS - GBNFWCO consulted with MBS to replace a culvert at State Road. MBS staff determined that replacement would not affect sea lamprey control efforts.

- Castle Creek (Grand River) - The USFWS - GBNFWCO consulted with MBS to replace a culvert at Hayes Street. MBS staff determined that replacement would not affect sea lamprey control efforts.

- Greene River (Jordan River) – The USFWS-GBNFWCO, MDNR, and MBS completed efforts to remove the dam on this tributary.

- Boardman River – The Boardman River Dams Settlement Agreement Implementation Team and MBS continue coordination efforts with several upstream dam removal projects and a lake sturgeon fish passage project at the Union Street dam. MBS staff determined that the upstream dam removals would not affect sea lamprey control efforts, but that any modification to the Union Street dam must include plans to ensure that the structure remains a sea lamprey barrier.

- Stover Creek – MBS completed a culvert removal project with the Irish Boat Shop, owner of a dam located near the mouth, ensuring that the dam structure remains a sea lamprey barrier.

- Antrim Creek (Jordan River) – The USFWS-GBNFWCO and MBS continue coordination efforts to remove a dam on this tributary. MBS staff determined that removal would not affect sea lamprey control efforts.

- Dair Creek (Betsie River) – The MDNR and MBS continue coordination efforts to remove a dam on this tributary. MBS staff determined that removal would not affect sea lamprey control efforts.

New Construction

- New barrier projects were in various stages of planning for Trail Creek and the Manistique River.

- The Cedar and South Branch Galien River barrier projects were terminated.

Lake Huron

Operation and Maintenance of Existing Barriers

- DFO performed routine safety and maintenance inspections on five barriers in the spring and the fall of the year.

- Still River - DFO contracted an engineering firm to evaluate the structural integrity of the barrier. They concluded that the barrier is at risk for failure and recommended reconstruction at the same site. The design contract has been awarded, and reconstruction is planned during 2008.

- Echo and Sturgeon rivers - DFO restored eroded areas of the tailrace and banks at these barrier sites.

- Ocqueoc River - The electric component of the combination low-head/electrical barrier was operational 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.

- Albany Creek - The lift gate barrier was operational from March 21 through September 4.

- Greene Creek - The stop-log barrier was operational from March 21 through September 4.

- USFWS personnel conducted spring start-up inspections on four barriers to ensure that all gates, stop-logs and blocking structures were in place prior to lamprey migrations.

- USFWS personnel performed routine maintenance and safety inspections on five barriers.

Ensured Blockage at Other Barriers

- Saugeen River - DFO participated in a steering committee formed by Ontario Ministry of Natural Resources (OMNR) to evaluate options to repair Denny's Dam, rebuilt by OMNR and DFO in 1971 to block spawning sea lamprey migrations, which is showing moderate deterioration. An OMNR-sponsored engineering report on proposed dam safety upgrades for Denny's Dam will be completed during 2008. Repairs are tentatively scheduled to begin in 2009.

- McCormick Creek – The USFWS Alpena National Fish and Wildlife Conservation Office (USFWS-Alpena NFWCO) consulted with USFWS- Marquette Biological Station (MBS) to replace a culvert at McCormick Road. MBS staff determined that replacement would not negatively affect sea lamprey control efforts.

- Cass River (Saginaw River) – USFWS-Alpena NFWCO, U.S. Army Corps of Engineers, and Michigan Department of Natural Resources consulted with MBS regarding a fish passage project at the Frankenmuth Dam. MBS is requesting the proposed dam be modified to accommodate sea lamprey trapping and assessment.

Lake Erie

Operation and Maintenance of Existing Barriers

- DFO conducted spring and fall safety and maintenance inspections on seven barriers.
- DFO contracted Long Point Region Conservation Authority to perform four barrier inspections during the summer.
- Venison Creek (Big Creek) – DFO installed new aluminium stop logs on the barrier to address an escapement problem.
- Big Creek – DFO calibrated crest gates, installed new step ladders on the fishway, and repaired an air line on the inflatable barrier.

Ensured Blockage at Other Barriers

- Chautauqua Creek – The New York State Department of Environmental Conservation and U.S. Army Corps of Engineers consulted with Marquette Biological Station (MBS) staff regarding modification or removal of two dams located behind the Westfield Water Works Plant. MBS staff recommended cutting a notch in the lower dam to allow passage of all fish species. Sea lamprey do not currently use Chautauqua Creek as a nursery stream, but stop logs will be placed in the notch to block upstream migration of adult sea lampreys if sea lamprey recruitment is subsequently detected in the system. MBS staff determined that removal of the upper dam would not negatively affect sea lamprey management efforts, provided blockage is ensured at the lower dam.
- Euclid Creek – The Euclid Watershed Council and Alpena National Fish and Wildlife Conservation Office consulted with MBS on projects to modify or remove the 185th Street Dam and the Metro Park Dam. MBS staff determined that removal of the Metro Park Dam would not negatively affect sea lamprey management efforts, provided the 185th Street Dam remains intact as a sea lamprey barrier.
- Ashtabula River – The Ohio Department of Natural Resources consulted with MBS staff regarding removal of the Haddock Road Dam to enhance fish passage. MBS staff determined that removal would not negatively affect sea lamprey management efforts.

New Construction

- A new barrier project was in development for the Chagrin River. The existing dam at Daniels Park washed out at the end of December 2004. A site visit was conducted during 2007 to initiate the planning process for rebuilding the structure as a sea lamprey barrier.

Lake Ontario

Operation and Maintenance of Existing Barriers

- DFO performed spring and fall safety and maintenance inspections on 10 barriers
- DFO contracted Ganaraska Region and Toronto Region Conservation Authorities, as well as Technical Services from the Mohawks of the Bay of Quinte, to perform summer inspections on barriers within their jurisdictions.
- Duffins Creek - DFO increased the head height on the west side of the barrier to prevent lamprey escapement over the side wall, and installed new safety signs up and downstream of the barrier.
- Salmon River (Ontario) - DFO installed bilingual safety signs (English & Mohawk) at the barrier site.
- Graham Creek - DFO removed a fallen tree and applied rip rap across the upstream side of the barrier to prevent undermining.

Ensured Blockage at Other Barriers

- South Sandy Creek – The Nature Conservancy consulted with Marquette Biological Station (MBS) staff regarding modification or removal of the Monitor Hill Dam. MBS staff continues coordination efforts with the Nature Conservancy on this project.

New Construction

- Planning has begun to construct a low-head sea lamprey barrier on Orwell Brook, tributary to the Salmon River near Altmar, NY. DFO-SLCC has selected a preferred location and has entered into discussion with NYDEC and private landowners. During 2007, leveloggers were installed to monitor instream discharge at a potential barrier site. Hydrology and design work is planned for 2008, with construction tentatively scheduled for 2009.

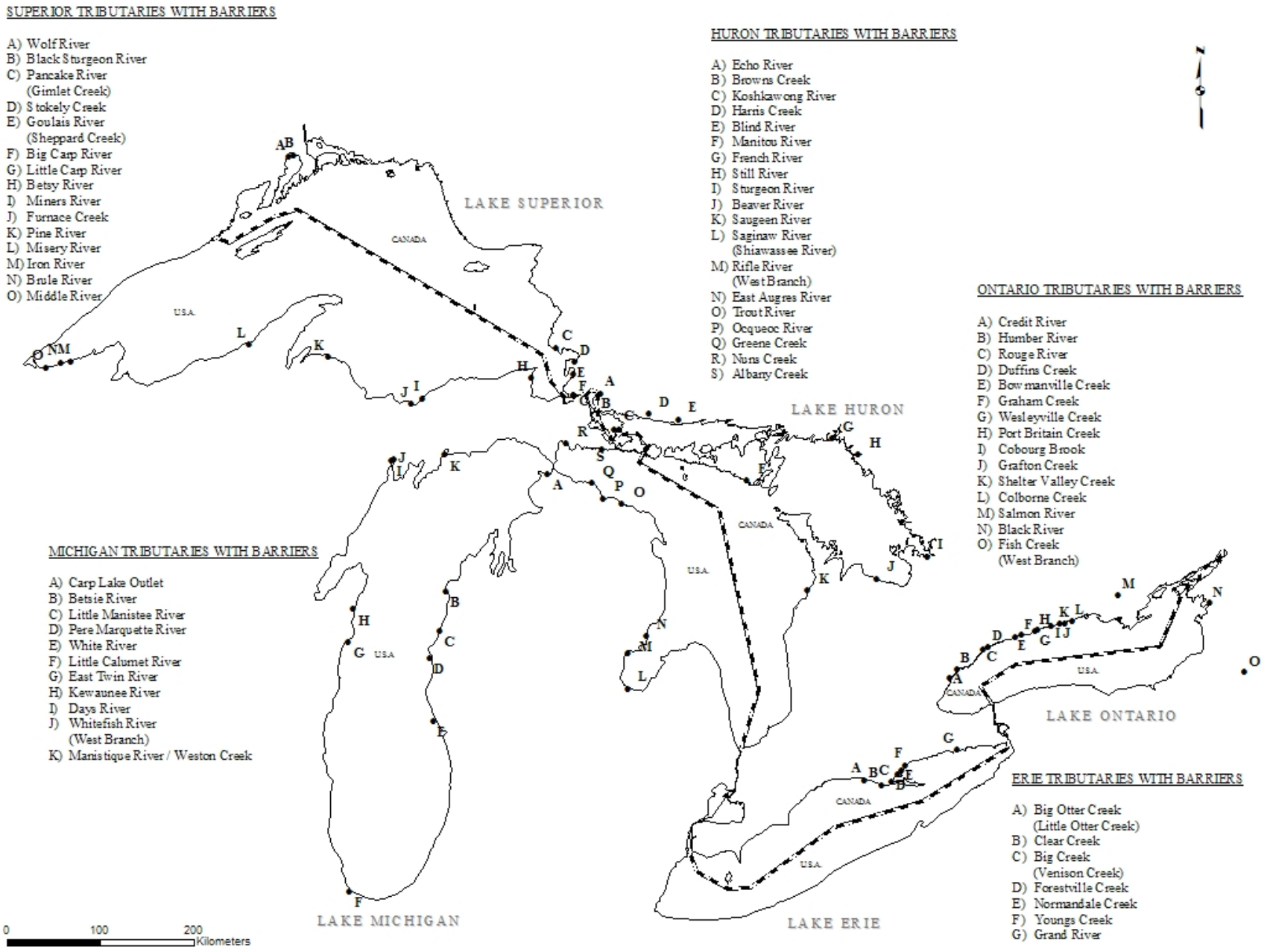

Figure 2. Locations of tributaries with sea lamprey barriers**.**

ASSESSMENT

The SLCP's assessment program has two 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 SLCP, 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 2007 data from these two components.

The Assessment Task Force was established in 1996 by the GLFC. The Connecting Channel and Lentic Area Task Force was created in 2007 to deal with specific issues relating to lamprey populations in these areas. Reports on the progress of these Task Forces are presented on pages 69 and 71, respectively.

Larval

Tributaries to the Great Lakes are systematically assessed for abundance and distribution of larval sea lampreys. Quantitative estimates of metamorphosing sea lampreys are used to prioritize streams for lampricide treatment. Qualitative sampling is 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 distribution of larvae in deepwater areas.

Tributaries considered for lampricide treatment during 2008 were assessed during 2007 to estimate larval sea lamprey density and amount of suitable larval habitat. Assessments were conducted with backpack electrofishers in waters <1m deep. Waters >1m in depth were surveyed with deepwater electrofishers or Bayluscide 3.2% Granular Sea Lamprey Larvicide. Survey plots were randomly selected in each tributary, catches of larvae were adjusted for gear efficiency, and lengths were standardized to the end of the growing season. Larval populations in each tributary were estimated by multiplying the mean density of larvae (number per m^2) by an estimated area of suitable habitat (m^2). The proportion of metamorphosing larvae during 2008 was developed from historical relations of the proportion of metamorphosed to larval sea lampreys collected during previous lampricide applications. Tributaries were ranked for treatment during 2008 based on an estimated cost per kill of metamorphosed sea lampreys.

Lake Superior

- Qualitative assessments to detect new infestation or to evaluate existing larval sea lamprey populations were conducted in 63 tributaries (24 Canada, 39 U.S.) and offshore of 14 (6 Canada, 8 U.S.) tributaries. Qualitative surveys are conducted to assess the relative abundance and larval size structure within a stream to determine when quantitative assessments (used to ranks streams for lampricide treatment) are required. The status of larval sea lamprey populations in historically infested Lake Superior tributaries and lentic areas are presented in Tables 8 and 9.

- Populations of larval sea lampreys were estimated in 19 tributaries (15 Canada, 4 U.S.; Table 8) and offshore of 3 Canadian tributaries (Table 9).

- Post-treatment assessments were conducted in 29 tributaries (15 Canada, 14 U.S.) to determine the effectiveness of lampricide treatments during 2006 and 2007.

- Assessments to detect the presence of new larval sea lamprey populations were conducted in two Canadian tributaries.

- Paired quantitative assessment and catch-per-unit-effort sampling methods were conducted cooperatively with researchers from Michigan State University in 9 tributaries (8 Canada, 1 U.S.) as part of a larger project to test a potentially more efficient sampling methodology for selecting streams for lampricide application. Mark-recapture studies were performed on 4 tributaries (2 Canada, 2 U.S.) to obtain estimates of larval sea lamprey populations as an additional component to this study. Researchers from Michigan State University used the mark-recapture estimates to evaluate which larval assessment sampling methodology results in the most cost-effective method of ranking streams for lampricide application.

- The lower St. Louis River was evaluated during 2007. Dredge samples and GIS technology were used to map larval habitat in the mainstream during 2006, and Bayluscide 3.2% Granular Sea Lamprey Larvicide was applied to twelve 518m^2 plots of optimal larval habitat. No larval sea lampreys were recovered.

Table 8. Status of larval sea lampreys in Lake Superior tributaries with a history of sea lamprey production and estimates of abundance from tributaries surveyed during 2007.

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	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	May-07	Yes	No	---	---	2010
Little Carp R.	Sep-01	Aug-07	Yes	Yes	4,267	113	***2008***
Big Carp R.	Sep-07	Oct-07	Yes	No	---	---	Unknown
Cranberry Cr.	Jun-04	Jul-05	No	No	---	---	2011
Goulais R.	Jun-05	Aug-07	Yes	Yes	---	---	2009
Bostons Cr.	Never	Jul-05	N/A	No	---	---	Unknown
Horseshoe Cr.	Never	Jul-05	N/A	No	---	---	Unknown
Haviland Cr.	Never	Jul-05	N/A	Yes	---	---	Unknown
Stokely Cr.	Sep-00	Jun-07	Yes	Yes	228	217	***2008***
Tier Cr.	Never	Jul-05	N/A	No	---	---	Unknown
Harmony R.	Jun-90	Oct-07	No	Yes	6,254	0	Unknown
Sawmill Cr.	Jun-68	Jul-05	No	No	---	---	Unknown
Jones Landing Cr.	Never	Jun-00	N/A	No	---	---	Unknown
Tiny Cr.	Never	Jul-05	N/A	No	---	---	Unknown
Chippewa R.	Oct-04	Aug-07	Yes	Yes	6,574	3	2010
Unger Cr.	Never	Jun-00	N/A	No	---	---	Unknown
Batchawana R.	Sep-07	Aug-07	---	---	---	---	2011
Digby Cr.	Never	Jul-05	N/A	No	---	---	Unknown
Carp R.	Nov-06	Jun-07	Yes	Yes	---	---	2010
Pancake R.	Sep-04	Jul-05	Yes	Yes	84,079	405	***2008***
Westman Cr.	Never	Aug-07	N/A	No	---	---	Unknown
Agawa R.	Jul-01	Aug-07	Yes	Yes	4,473	411	***2008***
Sand R.	Sep-71	Jun-06	No	No	---	---	Unknown
Baldhead R.	Never	Jun-06	N/A	No	---	---	Unknown
Gargantua R.	Aug-04	Aug-07	Yes	Yes	---	---	2009
Michipicoten R.	Aug-04	Aug-07	Yes	Yes	---	---	***2008***
Dog R.	Aug-63	Jul-02	No	No	---	---	Unknown
White R.	Aug-05	Aug-07	No	Yes	---	---	2011
Pic R.	Jul-06	Sep-07	No	Yes	---	---	2012
Little Pic R.	Sep-94	Jul-06	No	Yes	5,116	5	Unknown
Prairie R.	Jul-94	Jul-06	No	No	---	---	Unknown
Steel R.	Aug-04	Aug-07	Yes	Yes	96,572	366	***2008***
Pays Plat R.	Jul-07	Sep-07	No	No	---	---	2012
Little Pays Plat Cr.	Jul-07	Jul-07	No	No	---	---	Unknown
Gravel R.	Aug-04	Sep-07	Yes	Yes	372,860	434	***2008***
Little Gravel R.	Jul-03	Sep-07	Yes	Yes	4,878	36	***2008***
Cypress R.	Jul-07	Jul-07	Yes	No	---	---	Unknown
Jackpine R.	Never	Aug-05	N/A	No	---	---	Unknown
Jackfish R.	Nov-05	Sep-07	Yes	No	8,556	377	***2008***

Table 8 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Expected Year of Next Treatment
			Residuals Present	Recruitment Evident			
Nipigon R.							
Upper Nipigon R.	Aug-03	Jul-07	Yes	Yes	---	---	2009
Lower Nipigon R.	Aug-06	Jul-07	Yes	No	---	---	Unknown
Cash Cr.	Aug-03	Sep-07	Yes	Yes	50,781	6	2009
Polly Cr	Jul-87	Jul-04	No	No	---	---	Unknown
Stillwater Cr.	Aug-05	Jul-07	Yes	Yes	---	---	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 River	Jul-07	Aug-06	Yes	No	---	---	2011
Coldwater Creek	Jul-07	Jul-07	Yes	No	---	---	2011
Pearl R.	Aug-04	Aug-06	Yes	Yes	---	---	2009
Blende Cr.	Aug-64	Aug-05	No	No	---	---	Unknown
MacKenzie R.	Sep-78	Jul-07	No	Yes	1,465	38	***2008***
Neebing-McIntyre Floodway							
McIntyre R.	Jul-07	Jul-07	No	No	---	---	Unknown
Neebing R.	Aug-97	Jul-07	No	Yes	32,983	4,298	***2008***
Kaministikwia R.	Aug-06	Aug-06	Yes	Yes	---	---	2010
Cloud R.	Jul-94	Aug-05	No	Yes	9,568	3,100	***2008***
Pine R.	Jul-73	Aug-05	No	No	---	---	Unknown
Pigeon R.	Jul-07	Jul-07	No	No	---	---	Unknown
U.S.							
Waiska R.	Jul-07	Jun-07	---	---	---	---	Unknown
Sec. 11 SW Trib.	Never	Sep-04	N/A	Yes	---	---	Unknown
Pendills Cr.	Sep-88	Jun-06	---	Yes	---	---	Unknown
Grants Cr.	Jul-63	Oct-07	---	Yes	---	---	***2008***
Naomikong Cr.	Jul-63	Jul-07	---	No	---	---	Unknown
Ankodosh Cr.	Jul-73	Jul-07	---	Yes	4,324	190	***2008***
Roxbury Cr.	Never	Oct-07	N/A	Yes	4,315	3	Unknown
Galloway Cr.	Jul-07	Aug-06	---	---	---	---	Unknown
Tahquamenon R.	Oct-06	Jul-07	No	No	---	---	2010
Betsy R.	Oct-06	Jul-07	No	No	---	---	Unknown
Three Mile Cr.	Jun-62	Jun-04	---	No	---	---	Unknown
Little Two Hearted R.	Sep-04	Oct-07	Yes	Yes	---	---	***2008***
Two Hearted R.	Aug-04	Oct-07	Yes	Yes	---	---	***2008***
Dead Sucker R.	Jul-75	Jun-06	---	No	---	---	Unknown
Sucker R. (Alger)	Sep-06	Oct-07	Yes	Yes	---	---	2009
Chipmunk Cr.	Sep-62	Jul-04	---	No	---	---	Unknown
Carpenter Cr.	Aug-05	May-05	---	---	---	---	Unknown
Sable Cr.	Sep-89	Jul-05	---	Yes	---	---	Unknown
Hurricane R.	Never	Jul-04	N/A	No	---	---	Unknown
Sullivans Cr.	Jul-04	Oct-07	No	Yes	210	1	Unknown
Seven Mile Cr.	Jul-67	Jul-06	---	No	---	---	Unknown

Table 8 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	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	Jul-03	---	Yes	---	---	Unknown
Miners R. (barrier Downstream)	Aug-07	Aug-07	No	---	---	---	2011
Miners R. (barrier to Miners Falls)	Aug-07	Aug-07	No	---	---	---	Unknown
Munising Falls Cr.	Sep-64	Jun-05	---	No	---	---	Unknown
Anna R.	Sep-65	Jun-06	---	No	---	---	Unknown
Furnace Cr.	Jul-07	Oct-06	---	---	---	---	Unknown
Five Mile Cr.	Jul-07	Jun-06	---	---	---	---	Unknown
Au Train R. (upper)	Jul-06	Jul-07	Yes	Yes	---	---	***2008***
Au Train R. (Buck Bay Cr.)	Jul-06	Jul-07	Yes	Yes	---	---	***2008***
Au Train R. (lower)	Aug-97	Oct-05	---	No	---	---	Unknown
Rock R.	Jul-02	Jun-05	No	No	---	---	Unknown
Deer Lake Cr.	Aug-70	Jun-06	---	No	---	---	Unknown
Laughing Whitefish R.	Jul-05	Jun-07	Yes	Yes	---	---	Unknown
Sand R.	Jul-85	Jun-05	---	No	---	---	Unknown
Chocolay R.	Jul-06	Aug-07	No	Yes	---	---	2010
Carp R.	Jun-06	Aug-06	Yes	Yes			Unknown
Dead R.	Jul-06	Jul-07	No	No	---	---	Unknown
Harlow Cr.	Jun-07	Aug-07	No	No	---	---	Unknown
Little Garlic R.	Jun-06	Aug-06	Yes	No	---	---	2010
Garlic R. (entire)	Jul-06	Aug-06	Yes	No	---	---	2010
Iron R.	Jun-05	Aug-07	No	No	---	---	Unknown
Salmon Trout R. (Marquette)	Jul-05	Aug-07	Yes	Yes	---	---	2010
Pine R.	Jul-04	Jul-06	No	No	---	---	Unknown
Huron R.	Sep-06	Oct-06	Yes	No	---	---	2010
Ravine R.	Aug-07	Aug-07	---	---	---	---	***2008***
Slate R.	Sep-85	Sep-07	N/A	Yes	---	---	Unknown
Silver R.	Aug-07	Sep-07	No	No	---	---	***2008***
Falls R.	Aug-07	Jul-07	---	---	---	---	***2008***
Six Mile Cr.	May-63	Jul-04	---	No	---	---	Unknown
Sturgeon R.	Oct-06	Aug-07	Yes	Yes	---	---	2010
Pilgrim R.	Aug-62	Sep-04	---	No	---	---	Unknown
Trap Rock R.	Aug-05	Aug-07	No	Yes	---	---	2009
McCallum Cr.	Aug-63	Sep-05	---	No	---	---	Unknown
Traverse R.	Jun-06	Aug-07	Yes	Yes	306,376	24	2009
Little Gratiot R.	Aug-72	Oct-07	---	Yes	---	---	Unknown
Eliza Cr.	Jul-08	Aug-07	No	---	---	---	Unknown
Gratiot R.	Jun-06	Jul-06	Yes	No	---	---	Unknown
Smiths Cr.	May-64	Jun-07	---	No	---	---	Unknown
Boston-Lily Cr.	Aug-62	Jun-07	---	No	---	---	Unknown

Table 8 *continued.*

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Expected Year of Next Treatment
			Residuals Present	Recruitment Evident			
Salmon Trout R. (Houghton)	Aug-92	Sep-07	---	Yes	---	---	***2008***
Mud Lake Outlet	Oct-73	Sep-05	---	No	---	---	Unknown
Graveraet R.	Aug-63	Jun-06	---	No	---	---	Unknown
Elm R.	Jul-08	Sep-07	No	---	---	---	Unknown
Misery R. (barrier downstream)	Aug-07	Sep-07	No	---	---	---	2011
Misery R. (barrier upstream)	Sep-00	Sep-05	Yes	No	---	---	Unknown
East Sleeping R.	Aug-04	Sep-07	Yes	Yes	---	---	***2008***
Firesteel R.	May-05	Oct-07	Yes	Yes	---	---	***2008***
Ontonagon R.	Jul-05	Sep-07	Yes	Yes	---	---	***2008***
Potato R.	May-05	Sep-07	Yes	Yes	---	---	***2008***
Floodwood R.	Never	Jun-07	N/A	No	---	---	Unknown
Cranberry R.	May-05	Sep-07	Yes	Yes	---	---	***2008***
Little Iron R.	Sep-75	Aug-04	---	No	---	---	Unknown
Union R.	May-64	Aug-04	---	No	---	---	Unknown
Black R.	Aug-88	Sep-92	---	No	---	---	Unknown
Montreal R.	Jul-75	Aug-07	---	No	---	---	Unknown
Washington Cr.	Jun-80	Sep-04	---	No	---	---	Unknown
Bad R.	Sep-05	Sep-06	Yes	Yes	---	---	***2008***
Marengo R.	Oct-07	Aug-07	---	---	---	---	***2008***
Brunsweiler R.	Oct-07	Aug-07	---	---	---	---	Unknown
Fish Cr.- Eileen Twp.	Sep-08	Jul-06	---	---	---	---	Unknown
Red Cliff Cr.	Jun-04	Sep-07	---	---	---	---	Unknown
Raspberry R.	Jun-63	Jun-04	---	No	---	---	Unknown
Sand R.	Oct-91	Sep-07	---	---	---	---	Unknown
Cranberry R.	Never	Jun-06	N/A	No	---	---	Unknown
Iron R. (barrier downstream)	Aug-07	Aug-06	---	---	---	---	Unknown
Iron R. (barrier upstream)	Never	Aug-04	N/A	No	---	---	Unknown
Reefer Cr.	Oct-64	Aug-04	---	No	---	---	Unknown
Fish Cr. – Orienta Twp.	Oct-64	Aug-04	---	No	---	---	***2008***
Brule R.	Sep-05	Aug-07	Yes	Yes	---	---	***2008***
Poplar R.	Aug-07	Aug-06	---	---	---	---	***2008***
Middle R. (barrier downstream)	Sep-07	Aug-06	---	---	---	---	2011
Amnicon R.	Aug-07	Jun-06	---	---	---	---	2009
Nemadji R. (entire)	Jun-06	Sep-07	Yes	Yes	---	---	Unknown
St. Louis R.	Sep-87	Sep-07	---	Yes	---	---	Unknown
Sucker R. (St. Louis)	Never	Jul-06	N/A	No	---	---	Unknown
Gooseberry R.	Aug-76	Jul-06	---	No	---	---	Unknown
Splitrock R.	Aug-76	Jul-06	---	No	---	---	Unknown
Poplar R.	Jul-77	Jul-06	---	No	---	---	Unknown
Arrowhead R.	Sep-83	Jul-06	---	Yes	---	---	***2008***

Table 9. Status of larval sea lampreys in historically infested lentic areas of Lake Superior, 2007.

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Canada				
Goulais R.	Goulais Bay	Aug-07	Jul-88	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	Jul-06	Jul-06	Aug-07
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	Jul-07	Jul-07	Aug-06
Little Gravel R.	Mountain Bay	Jul-07	Jul-07	Aug-06
Little Cypress R.	Cypress Bay	Aug-78	Aug-78	Never
Cypress R.	Cypress Bay	Jul-07	Jul-07	Jul-07
Jackpine R.	Nipigon Bay	Jul-02	Jul-89	Never
Jackfish R.	Nipigon Bay	Jul-07	Aug-05	Never
Nipigon R.	Lake Helen	Aug-06	Aug-06	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	Jul-04	Jul-04	Never
MacKenzie R.	MacKenzie Bay	Jul-07	Jul-07	Jul-07[1]
Current R.	Thunder Bay	Aug-05	Aug-05	Never
Neebing-McIntyre Floodway	Thunder Bay	Aug-05	Jul-90	Never
Kaministiquia R. (lower)	Thunder Bay	Jul-07	Jul-07	Never[1]
Pigeon R.	Pigeon Bay	Jul-07	Jul-07	Never
United States				
Grants Cr.	Tahquamenon Bay	Sep-05	Never	Never
Ankodosh Cr.	Tahquamenon Bay	Aug-06	Aug-06	Never[2]
Roxbury Cr.	Tahquamenon Bay	Aug-06	Aug-06	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]
Anna R.	Munising Bay	Aug-06	Aug-06	Never[2]
Miners River	Miners Lake	Jul-06	Jul-06	Aug-07
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	Jul-07	Jul-07	Never[2]
Harlow Cr.	Harlow Lake (Bismark Cr.- offshore)	Jun-07	Jun-07	Never[2]
Little Garlic R.	Little Garlic R.	Sep-05	Jul-86	Never
Garlic R.	Garlic R.	Sep-05	Sep-05	Never[2]
	Saux Head Lake	Aug-07	Aug-07	Never
Ravine R.	Huron Bay	Jul-06	Jul-06	Aug-87[1]
Slate R.	Huron Bay	Jul-07	Jul-07	Never
Silver R.	Huron Bay	Jul-07	Jul-07	Never[2]
Falls R.	Huron Bay	Jul-07	Jul-07	Sep-07[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 2008.

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

Lake Michigan

- Assessments of sea lamprey larvae were conducted in 83 tributaries and offshore of 12 tributaries. Tables 10 and 11 present the status of larval sea lamprey populations in streams and lentic areas with a history of sea lamprey production.

- Larval populations were estimated in 23 tributaries for potential lampricide treatment during 2008 (Table 10).

- Post-treatment assessments were conducted in 18 tributaries to determine the effectiveness of lampricide treatments during 2006 and 2007.

- Assessments to detect the presence of new sea lamprey populations were conducted in 1 tributary along the east shore and 10 tributaries along the west shore. No new populations were found.

- Paired quantitative assessment and catch-per-unit-effort sampling methods were conducted cooperatively with researchers from Michigan State University (MSU) in 13 tributaries as part of a larger project to test a potentially more efficient sampling method for selecting streams for lampricide application. Personnel from the Marquette and Ludington Biological stations participated in mark recapture estimates of larval sea lamprey populations in the Bark River and Sand Creek (Grand River). Results of these studies were used by researchers from MSU to evaluate which larval assessment sampling methodology results in the most cost-effective method of ranking streams for lampricide application.

- Larval sea lampreys were collected from one tributary for ongoing migratory pheromone research being conducted by MSU.

Table 10. Status of larval sea lampreys in Lake Michigan tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed during 2007.

Tributary	Last Treated	Last Treated	Status of larval lamprey population (most recent survey since treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Proposed Next Treatment Year
			Residuals present	Recruitment evident			
Brevort R. (Lower)	Oct-06	Aug-06	---	---	---	---	2010
Brevort R. (Upper)	Oct-87	Aug-07	---	Yes	10,655	2	***2008***
Paquin Cr.	Oct-87	Oct-07	---	Yes	---	---	Unknown
Davenport Cr.	Aug-63	May-07	---	Yes	---	---	Unknown
Hog Island Cr.	Jul-07	May-07	---	---	---	---	2010
Sucker R.	Jun-61	May-07	---	Yes	---	---	Unknown
Black R.	Jun-06	Oct-06	Yes	Yes	3,377	7	2009
Mile Cr.	Sep-72	Oct-07	---	Yes	117	0	Unknown
Millecoquins R.							
Upper	Jun-07	May-07	---	---	---	---	2011
McAlpine Cr.	Jun-07	Oct-06	---	---	---	---	2011
Furlong Cr.	Jun-07	Jul-06	---	---	---	---	2011
Rock R.	May-06	Sep-06	No	Yes	---	---	Unknown
Crow R.	May-06	Sep-06	No	Yes	---	---	Unknown
Cataract R.	Aug-04	Oct-07	Yes	Yes	1005	1	Unknown
Pt. Patterson Cr.	Sep-83	May-06	---	No	---	---	Unknown
Hudson Cr.	May-98	Oct-07	---	Yes	---	---	***2008***
Swan Cr.	Jul-92	May-07	No	No	---	---	Unknown
Seiners Cr.	May-84	May-07	No	No	---	---	Unknown
Milakokia R.	Oct-07	Sep-07	---	---	---	---	2012
Bulldog Cr.	Jun-97	Jul-07	---	Yes	540	10	***2008***
Gulliver Lake Outlet	Oct-07	May-07	---	---	---	---	Unknown
Marblehead Cr.	May-05	Jun-04	---	---	---	---	2009
Manistique R.							
Above Dam	Sep-07	Jul-07	---	---	---	---	Unknown
Below Dam	Sep-07	Sep-06	---	---	---	---	Unknown
Estuary	Sep-07	Sep-06	---	---	---	---	Unknown
Southtown Cr.	Jun-77	Jun-06	---	Yes	---	---	Unknown
Thompson Cr.	Never	Jul-07	N/A	Yes	---	---	Unknown
Johnson Cr.	Aug-81	Jul-07	---	Yes	35	0	Unknown
Deadhorse Cr.	Jul-04	Jul-07	---	Yes	701	1	Unknown
Gierke Cr.	Never	May-07	N/A	Yes	---	---	Unknown
Bursaw Cr.	Jul-04	Sep-07	Yes	Yes	1,133	14	***2008***
Parent Cr.	Jun-91	Sep-07	---	Yes	172	5	Unknown
Poodle Pete Cr.	Aug-01	Jun-05	No	No	---	---	Unknown
Valentine Cr.	Jun-97	Sep-07	---	Yes	15,830	191	***2008***
Little Fishdam R.	May-01	May-07	No	No	---	---	Unknown
Big Fishdam R.	Aug-04	Sep-07	Yes	Yes	23,461	761	***2008***
Sturgeon R.	Jun-03	Oct-07	Yes	Yes	---	---	***2008***
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.	May-06	Sep-07	Yes	Yes	176,895	12,547	***2008***
Rapid R.	May-06	Sep-06	No	---	---	---	2009
Tacoosh R.	May-07	Oct-07	No	---	---	---	2011
Days R.	Aug-07	Jul-07	---	---	---	---	***2008***
Portage Cr.	Sep-05	May-07	---	Yes	---	---	Unknown
Ford R.	Jun-05	Oct-07	Yes	Yes	---	---	***2008***
Sunnybrook Cr.	May-71	May-05	---	No	---	---	Unknown
Bark R.	May-07	Oct-07	No	No	---	---	Unknown
Cedar R.	May-07	Oct-07	Yes	Yes	---	---	2010
Sugar Cr.	Aug-77	Aug-07	---	Yes	523	25	***2008***
Arthur Bay Cr.	Apr-70	May-05	---	No	---	---	Unknown

Table 10. *continued*

Tributary	Last Treated	Last Treated	Status of larval lamprey population (most recent survey since treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Proposed Next Treatment Year
			Residuals present	Recruitment evident			
Rochereau Cr.	Apr-63	May-07	---	No	---	---	Unknown
Johnson Cr.	Apr-63	May-07	---	Yes	---	---	Unknown
Bailey Cr.	Aug-07	Sep-07	Yes	---	---	---	Unknown
Beattie Cr.	Aug-07	Sep-07	Yes	---	---	---	Unknown
Springer Cr.	May-99	Aug-07	No	Yes	785	12	***2008***
Menominee R.	Jun-07	Sep-06	---	---	---	---	Unknown
Little R.	Aug-87	Sep-04	---	No	---	---	Unknown
Peshtigo R.	Oct-06	Aug-07	No	Yes	---	---	2009
Oconto R.	Jul-05	Oct-07	Yes	Yes	26,259	828	***2008***
Pensaukee R.	Nov-77	Aug-06	---	No	---	---	Unknown
Suamico R.	Never	Sep-05	N/A	No	---	---	Unknown
Ephraim Cr.	Apr-63	May-03	---	No	---	---	Unknown
Hibbards Cr.	May-07	Sep-07	No	No	---	---	Unknown
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	Sep-04	---	No	---	---	Unknown
Three Mile Cr.	May-75	Sep-07	---	Yes	---	---	***2008***
Kewaunee R.(Casco Cr.)	May-07	May-07	---	---	---	---	Unknown
East Twin R.	Jun-04	Aug-07	---	---	---	---	***2008***
Fischer Cr.	May-87	Sep-04	---	No	---	---	Unknown
Carp Lake R.	Oct-04	Oct-07	Yes	Yes	---	---	***2008***
Big Stone Cr.	Oct-07	Oct-07	Yes	---	---	---	Unknown
Big Sucker R.	Oct-07	Oct-07	Yes	---	---	---	Unknown
Wycamp Lake Outlet	May-00	Oct-07	---	Yes	---	---	***2008***
Horton Cr.	Oct-04	Jul-06	No	Yes	---	---	Unknown
Boyne R.	May-06	Jul-06	Yes	---	---	---	2009
Porter Cr.	Oct-04	Jul-06	Yes	Yes	---	---	Unknown
Jordan R.	Sep-07	Oct-07	Yes	---	---	---	2011
Monroe Cr.	Sep-07	Oct-07	No	No	---	---	2011
Loeb Cr.	Oct-04	Aug-07	No	Yes	---	---	***2008***
McGeach Cr.	Oct-99	Jun-05	No	No	---	---	Unknown
Elk Lake Outlet	Sep-04	Aug-07	No	Yes	271	2	Unknown
Yuba Cr.	May-06	Jun-06	No	---	---	---	Unknown
Acme Cr.	Aug-63	Jun-06	---	No	---	---	Unknown
Mitchell Cr.	Sep-03	Aug-07	Yes	Yes	5,147	87	***2008***
Boardman R.	May-06	May-06	No	---	---	---	2009
Leo Cr.	Never	May-07	N/A	No	---	---	Unknown
Goodharbor Cr.	Jul-07	Aug-07	No	---	---	---	2011
Crystal R.	Oct-72	May-04	---	No	---	---	Unknown
Platte R. (upper)	Aug-07	Oct-07	Yes	---	---	---	2011
Platte R. (middle)	Aug-07	Oct-07	No	---	---	---	2011
Platte R. (lower)	Aug-07	Oct-07	No	---	---	---	2011
Betsie R.	Sep-06	Sep-06	No	---	---	---	2010
Bowen Cr.	Never	Jul-04	N/A	No	---	---	Unknown
Big Manistee R.	Aug-06	Sep-06	Yes	---	---	---	2009
L. Manistee R.	Jul-04	Oct-07	Yes	Yes	355,331	3,461	***2008***
Gurney Cr.	Jul-05	Aug-06	Yes	No	---	---	Unknown
Cooper Cr.	Never	Sep-07	N/A	Yes	319	4	***2008***
Lincoln R.	Jul-06	Sep-06	Yes	---	---	---	2010
Pere Marquette R.	Aug-06	Oct-07	Yes	Yes	---	---	2010
Bass Lake Outlet	Aug-78	Jul-07	---	No	---	---	Unknown
Pentwater R. (North Br.)	Jun-07	Oct-07	No	Yes	---	---	2011
Lambricks Cr.	Sep-84	Jun-05	---	No	---	---	Unknown

Table 10. *continued*

Tributary	Last Treated	Last Treated	Status of larval lamprey population (most recent survey since treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Proposed Next Treatment Year
			Residuals present	Recruitment evident			
Stony Cr.	Jul-87	Jun-05	---	Yes	---	---	Unknown
Flower Cr.	Sep-81	Sep-05	---	No	---	---	Unknown
White R.	Aug-07	Sep-07	Yes	---	---	---	2010
Duck Cr.	Jul-84	Jun-06	---	No	---	---	Unknown
Muskegon R.	Aug-05	Jul-07	Yes	Yes	3,040,978	12,797	***2008***
Brooks Cr.	Aug-05	Sep-07	No	No	---	---	2009
Cedar Cr.	Aug-05	Jul-07	No	No	---	---	2009
Bridgeton Cr.	Jul-04	Jun-06	No	No	---	---	***2008***
Minnie Cr.	Aug-04	Jul-07	Yes	Yes	1,356	31	***2008***
Bigelow Cr.	Aug-05	Jul-07	Yes	Yes	74,401	481	***2008***
Big Bear Cr.	Aug-70	Jun-07	---	No	---	---	Unknown
Mosquito Cr.	Sep-68	Jul-07	---	Yes	---	---	***2008***
Black Cr.	Aug-70	Oct-07	---	Yes	27,381	1,208	***2008***
Grand R.	Never	Jul-07	N/A	No	---	---	Unknown
Norris Cr.	Jun-00	Aug-07	---	Yes	1,195	744	***2008***
Lowell Cr	Sep-65	Aug-05	---	No	---	---	Unknown
Buck Cr.	Sep-65	Aug-05	---	No	---	---	Unknown
Rush Cr.	Sep-65	Aug-05	---	No	---	---	Unknown
Sand Cr.	Jun-07	Jun-07	No	Yes	---	---	2011
Crockery Cr.	Sep-04	Jun-07	No	Yes	---	---	Unknown
Bass R.	Aug-04	Jul-07	No	No	---	---	Unknown
Pigeon R.	Oct-64	Jun-07	---	No	---	---	Unknown
Pine Cr.	Oct-64	Jun-07	---	No	---	---	Unknown
Gibson Cr.	Jul-84	Jul-07	---	No	---	---	Unknown
Kalamazoo R.	Never	Jul-07	N/A	Yes	---	---	Unknown
Bear Cr.	Aug-04	Jul-07	No	No	---	---	Unknown
Sand Cr.	Aug-04	Jul-07	Yes	No	---	---	Unknown
Mann Cr.	Jun-07	Jul-07	No	No	---	---	2011
Rabbit R.	Jul-81	Jul-07	---	Yes	---	---	***2008***
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	N/A	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	Jul-07	N/A	No	---	---	Unknown
Lemon Cr.	Oct-65	May-03	---	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	Sep-07	Yes	Yes	65,152	9,467	2009
Blue Cr.	May-01	Sep-07	No	No	---	---	Unknown
Mill Cr.	May-05	Sep-07	No	Yes	570	12	2009
Brandywine Cr.	May-05	Sep-07	No	No	---	0	2009
Brush Cr.	May-05	Sep-07	Yes	No	119	118	2009
Galien R. (N. Br.)	Oct-07	Jul-07	---	---	---	---	2011
E. Br. Galien & Dowling Cr.	Oct-07	Jul-07	---	---	---	---	2011
S. Br. Galien & Galina Cr.	Oct-05	Sep-06	Yes	---	---	---	2009
Spring Cr.	Oct-05	Jun-06	No	---	---	---	2009
South Br. Spring Cr.	Oct-05	Jun-06	No	---	---	---	2009
State Cr.	May-86	Jul-07	---	No	---	---	Unknown
Trail Cr.	Jul-06	Jul-07	No	No	---	---	2010
Donns Cr.	May-66	Jun-06	---	No	---	---	Unknown
Burns Ditch	Jul-99	Jul-07	No	No	---	---	Unknown

Table 11. Status of larval sea lampreys in historically infested lentic areas of Lake Michigan during 2007.

Stream Name	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Brevort R.	Brevort Lake (Silver Cr. – Offshore)	Aug-07	Aug-07	Never
	Brevort Lake (L. Brevort R. – Offshore)	Aug-07	Aug-74	Never
Hog Island Cr.	Hog Island Cr. (Offshore)	Aug-06	Aug-06	Jun-07
Black R.	Black R. (Offshore)	Aug-06	Aug-06	Never[2]
Millecoquins R.	Millecoquins Lake (Cold Cr. – Offshore)	Aug-07	Aug-07	Never
Milakokia R.	Seul Choix Bay	Sep-07	Aug-80	Never
Manistique R.	Manistique R. (Offshore)	Jul-07	Jul-07	Aug-03[1]
Bursaw Cr.	Bursaw Cr. (Offshore)	Jul-86	Jul-76	Never
Ogontz R.	Ogontz R. (Offshore)	Aug-07	Aug-07	Never[2]
Whitefish R.	Big Bay De Noc	Jul-07	Jul-07	Never
Rapid R.	Little Bay De Noc	Aug-88	Jul-80	Never
Days R.	Little Bay De Noc	Jul-06	Jul-06	Never[2]
Escanaba R.	Little Bay De Noc	Aug-07	Jul-06	Never[2]
Portage Cr.	Portage Bay	Jul-84	Jul-77	Never
Ford R.	Green Bay	Jun-07	Jun-07	Never
Cedar R.	Green Bay	Aug-07	Aug-07	Never[1]
Beattie Cr.	Green Bay	Jul-85	Jul-85	Never
Menominee R.	Green Bay	Sep-06	Sep-06	Never[2]
Whitefish Bay Cr.	Whitefish Bay	Sep-06	Never	Never
Carp Lake R.	Cecil Bay	Aug-06	Aug-06	Never[2]
Bear R.	Little Traverse Bay	May-06	May-06	May-07
Horton Cr.	Horton Bay (Lake Charlevoix)	Jul-06	Jun-04	Never[2]
Boyne R.	Boyne Harbor (Lake Charlevoix)	Oct-07	Oct-07	May-06
Porter Cr.	Lake Charlevoix	Jul-06	Jul-06	Never[2]
Jordan R.	Lake Charlevoix	Jul-06	Jul-06	May-07
Monroe Cr.	Lake Charlevoix	Jul-06	Jul-06	Never[2]
Mitchell Cr.	Grand Traverse Bay (East Arm)	May-04	May-04	Never[2]
Boardman R.	Grand Traverse Bay (West Arm)	Jun-06	May-04	Never[2]
Leland R.	Leland R. (Offshore)	May-07	May-07	Never[2]
Platte R.	Loon Lake	Sep-00	Aug-96	Never
	Platte Lake	Jul-03	Jul-03	Never[2]
Betsie R.	Betsie Lake	Aug-83	Aug-83	Never[2]
Big Manistee R.	Manistee Lake	Sep-06	Aug-90	Never

[1] Scheduled for treatment during 2008.

[2] Low-density larval population monitored with Bayluscide 3.2% Granular Sea Lamprey Larvicide surveys.

Lake Huron

- Qualitative assessments to detect new infestation or evaluate existing larval sea lamprey populations were conducted in 87 tributaries (55 U.S., 32 Canada) and offshore of 9 tributaries (1 Canada, 8 U.S.). The status of larval sea lamprey populations in historically infested Lake Huron tributaries and lentic areas are presented in Tables 12 and 13.

- Populations of larval sea lampreys were estimated in 24 tributaries (10 Canada, 14 U.S.; Table 3) and offshore of 2 Canadian tributaries.

- Post-treatment assessments were conducted in 26 tributaries (13 U.S., 13 Canada) to determine the effectiveness of lampricide treatments during 2006 and 2007. Post-treatment populations of larval sea lampreys were estimated for potential re-treatment on 1 U.S. tributary (Table 3).

- Assessments to detect the presence of new populations of larval sea lampreys were conducted in 14 tributaries (2 Canada, 12 U.S.).

- Paired quantitative assessment and catch-per-unit-effort sampling methods were conducted cooperatively with researchers from Michigan State University (MSU) in 15 tributaries (6 Canada, 9 U.S.) as part of a larger project to test a potentially more efficient sampling methodology for selecting streams for lampricide application. A mark-recapture study was performed on 1 U.S. tributary (Carroll Cr., Saginaw River) where the larval sea lamprey population was estimated to be 4,137. Results of these studies were used by researchers from MSU to evaluate which larval assessment sampling methodology results in the most cost-effective method of ranking streams for lampricide application.

- Monitoring of larval sea lampreys in the St. Marys River continued during 2007. Approximately 800 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 was estimated to be 1.4 million (95%; confidence limits (0.8.-2.1 million)). This is a 69% reduction from estimated abundance prior to the integrated control effort, which began during 1999.

Table 12. Status of larval sea lampreys in Lake Huron tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed during 2007.

Tributary	Last Treated	Last Surveyed	Status of larval lamprey population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Expected Year of Next Treatment
			Residuals present	Recruitment evident			
Canada							
Root R.							
Main	Oct-05	Aug-07	Yes	Yes	---	---	2009
West Root	Oct-05	Aug-07	Yes	No	---	---	2009
Garden R.	Jun-06	Aug-07	Yes	Yes	---	---	2010
Echo R.							
Upper	Oct-99	Aug-07	No	No	---	---	Unknown
Lower	Oct-99	Oct-07	No	Yes	---	---	Unknown
Bar & Iron Cr.	Oct-04	Sep-07	Yes	Yes	5,150	110	***2008***
Bar R.	Oct-01	Aug-07	Yes	Yes	---	---	Unknown
Sucker Cr.	May-05	Aug-06	No	No	---	---	2010
Twotree R.	Oct-01	Aug-07	Yes	Yes	1,828	0	Unknown
Richardson Cr.	May-04	Aug-07	Yes	No	---	---	Unknown
Watson Cr.	May-06	Aug-07	Yes	No	---	---	2010
Gordon Cr.	May-01	Aug-07	Yes	Yes	---	---	2009
Browns Cr.	Oct-03	Aug-07	Yes	No	---	---	Unknown
Koshkawong R.	Jun-06	Aug-07	Yes	Yes	---	---	2010
No Name	Aug-75	Jul-05	No	Yes	---	---	Unknown
No Name	Sep-75	Jul-05	No	Yes	---	---	Unknown
MacBeth Cr.	Jun-67	Aug-05	No	No	---	---	Unknown
Thessalon R.							
Upper	Oct-07	Aug-07	Yes	No	---	---	2011
Lower	Jun-05	Aug-06	Yes	No	---	---	2009
Livingstone Cr.	Jun-00	Aug-07	No	Yes	---	---	Unknown
Mississagi R.							
Main	Aug-04	Oct-07	Yes	Yes	456,256	5,786	***2008***
Pickerel Cr.	Jun-98	Jun-07	No	No	---	---	***2008***
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-00	Jun-07	No	Yes	56,176	3,730	***2008***
Grassy Cr.	Jun-06	Jun-07	Yes	Yes	---	---	2009
Spanish R.	Sep-02	Jun-07	Yes	Yes	---	---	2009
Aux Sables R.	Sep-02	Jun-07	Yes	Yes	32,578	35	***2008***
Kagawong R.	Aug-67	Jun-06	No	No	---	---	Unknown
Unnamed	Jun-02	Aug-07	Yes	Yes	374	128	***2008***
Silver Cr.	Jul-04	Aug-07	No	No	---	---	2010
Sand Cr.	Oct-01	Jun-04	Yes	No	---	---	Unknown
Mindemoya R.	Jun-06	Aug-07	Yes	Yes	---	---	2010
Timber Bay Cr.	Oct-05	Jun-06	Yes	Yes	17,999	2,414	***2008***
Manitou R.	Oct-07	May-06	---	---	---	---	2011
Blue Jay Cr.	Oct-07	Oct-07	---	---	---	---	2011
Kaboni Cr.	Oct-78	May-06	No	No	---	---	Unknown
Chikanishing R.	Jul-03	Jun-07	No	No	---	---	2011
French R. System							
O.V. Channel	Jun-06	Sep-07	No	No	---	---	Unknown
Wanapitei R.	Jul-05	Jun-07	Yes	No	---	---	2010

Table 12 *continued.*

Tributary	Last Treated	Last Surveyed	Status of larval lamprey population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Expected Year of Next Treatment
			Residuals present	Recruitment evident			
Key R. (Nesbit Cr.)	Sep-72	Jul-05	No	No	---	---	Unknown
Still R.	Jun-96	Jun-07	No	Yes	---	---	Unknown
Magnetawan R.	Jun-06	Jun-07	No	Yes	---	---	2011
Naiscoot R.	Jun-04	Sep-07	Yes	Yes	7,093	117	***2008***
Shebeshekong R.	Never	Jul-04	N/A	No	---	---	Unknown
Boyne R.	Jun-03	Sep-07	Yes	Yes	11,424	930	***2008***
Musquash R.	Sep-05	May-07	No	No	---	---	Unknown
McDonald Cr.	Never	Jun-99	N/A	No	---	---	Unknown
Simcoe/Severn	Never	Jun-06	N/A	Yes	---	---	Unknown
Coldwater R.	Never	Sep-07	N/A	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	May-07	Yes	Yes	---	---	2009
Boyne Cr.	May-02	May-07	Yes	Yes	---	---	2009
Bear Cr.	May-02	May-07	Yes	Yes	---	---	2009
Pine R.	Jun-05	May-07	Yes	Yes	---	---	2009
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	919	609	***2008***
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	Aug-04	---	No	---	---	Unknown
Ermatinger Cr.	Never	Aug-04	---	No	---	---	Unknown
Charlotte R.	Oct-81	Jun-08	---	Yes	---	---	Unknown
Little Munuscong R.	Jun-06	May-07	No	No	---	---	Unknown
Big Munuscong R. (Mainstream)	Jun-99	Aug-04	No	No	---	---	Unknown
Big Munuscong R. (Taylor Creek)	Jun-06	Jul-06	No	No	---	---	Unknown
Carlton Cr.	Sep-01	Jun-05	No	No	---	---	2009
Canoe Lake Outlet	May-70	May-07	No	No	---	---	Unknown
Caribou Cr.	Jun-04	May-07	Yes	Yes	---	---	***2008***
Bear Lake Outlet	Jun-77	May-06	No	No	---	---	Unknown
Carr Cr.	May-78	Jun-07	---	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	Sep-04	---	No	---	---	2009

Table 12 *continued.*

Tributary	Last Treated	Last Surveyed	Status of larval lamprey population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Expected Year of Next Treatment
			Residuals present	Recruitment evident			
Beavertail Cr.	Jun-05	Aug-07	Yes	Yes	9,502	61	***2008***
Prentiss Cr.	May-01	Aug-07	No	Yes	5,509	292	***2008***
McKay Cr.	Jul-07	May-07	---	---	---	---	***2008***
Flowers Cr.	Sep-83	May-02	No	No	---	---	Unknown
Ceville Cr.	Sep-05	Sep-04	---	No	---	---	Unknown
Hessel Cr.	Jun-04	Aug-07	Yes	Yes	45,157	320	***2008***
Steeles Cr.	May-05	Oct-04	---	No	117	768	***2008***
Nunns Cr.	Sep-01	Jul-06	No	Yes	---	---	Unknown
Pine R.	Jun-06	Aug-07	Yes	Yes	---	---	2009
McCloud Cr.	Oct-72	Jul-06	No	No	---	---	Unknown
Carp R.	Jun-07	Aug-07	Yes	Yes	---	---	2011
Martineau Cr.	May-07	Jun-07	---	Yes	---	---	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	May-07	No	Yes	---	---	Unknown
Laperell Cr.	May-00	Jun-05	No	No	---	---	Unknown
Meyers Cr.	Sep-99	Jun-05	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.	Aug-04	Aug-07	No	Yes	34,617	838	***2008***
Elliot Cr.	May-04	Aug-07	Yes	Yes	39,981	58	***2008***
Greene Cr.	Jun-07	Jun-07	No	---	---	---	Unknown
Grass Cr.	May-78	May-07	No	No	---	---	Unknown
Mulligan Cr.	May-94	Oct-07	No	Yes	---	---	Unknown
Grace Cr.	Jun-05	Aug-07	Yes	Yes	3,088	18	***2008***
Black Mallard Cr.	May-03	Oct-06	Yes	Yes	97,000	4,542	***2008***
Seventeen Cr.	May-67	May-07	No	No	---	---	Unknown
Ocqueoc R.	Jul-02	Aug-07	Yes	Yes	5,059	85	***2008***
Johnny Cr.	Sep-70	Jun-07	No	No	---	---	Unknown
Schmidt Cr.	Jun-04	Aug-07	Yes	Yes	38,359	340	***2008***
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	Jun-07	Jun-07	Yes	---	---	---	***2008***
Squaw Cr.	Jun-67	May-03	No	No	---	---	Unknown
Devils R.	Jun-04	Aug-07	No	Yes	65,998	4,674	***2008***
Black R.	Jun-07	Jul-07	No	---	---	---	Unknown
Au Sable R.	Jun-07	Jun-07	Yes	---	---	---	2011
Pine R.	May-87	May-03	No	No	---	---	Unknown

Table 12 *continued.*

Tributary	Last Treated	Last Surveyed	Status of larval lamprey population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Expected Year of Next Treatment
			Residuals present	Recruitment evident			
Tawas Lake Outlet	Jun-03	Aug-06	No	No	---	---	Unknown
Cold Cr.	Jun-03	Aug-06	No	No	---	---	Unknown
Sims Cr.	Sep-05	Jun-07	No	No	---	---	2009
Grays Cr.	Sep-05	Jun-07	Yes	No	---	---	2009
Silver Cr.	Sep-05	Jun-07	Yes	Yes	---	---	2009
East Au Gres R.	Aug-05	Sep-07	Yes	Yes	---	---	2009
Au Gres R.	May-07	Oct-06	No	---	---	---	2010
Rifle R.	Sep-06	Sep-07	Yes	Yes	301,530	1,791	***2008***
Saginaw R.							
Cass R.	Oct-84	Sep-07	No	Yes	23,608	731	***2008***
Juniata Cr.	Sep-05	Jun-07	No	No	---	---	Unknown
Tittabawasse R.	Never	Jul-03	---	No	---	---	Unknown
Chippewa R.	Jul-05	Jun-07	No	No	---	---	2009
Coldwater R.	Jul-05	Sep-04	---	---	---	---	Unknown
Chippewa R.	Jul-05	Jun-07	Yes	No	---	---	2009
Pine R.	Jun-03	Sep-07	No	Yes	2,339	556	***2008***
Little Salt Cr.	May-02	Jun-05	No	Yes	---	---	Unknown
Big Salt Cr.	Jul-05	Aug-06	No	No	---	---	Unknown
North Br.	Never	Jun-05	---	No	---	---	Unknown
Carroll Cr.	May-07	Jun-07	No	---	---	---	Unknown
Big Salt R.	May-06	May-07	No	Yes	---	---	Unknown
Bluff Cr.	May-06	May-07	No	No	---	---	Unknown
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	Jul-07	No	Yes	38	32	***2008***
St. Marys River	Aug-07	Aug-07	Yes	Yes	---	---	***2008***

Table 13. Status of larval sea lampreys in historically infested areas of Lake Huron, 2007.

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Canada				
Echo River	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
Gordon's Cr.	North Channel	Aug-91	Aug-91	Jul-84
Brown's 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	Never[1]

Table 13 *Continued*

Tributary	Lentic Area	Last Surveyed	Last Survey Showing Infestation	Last Treated
Kagawong R.	Mudge Bay	Jul-90	Jul-90	Aug-87
Mindemoya R.	Providence Bay	Jul-88	Jul-88	Jul-81
Manitou R.	Michael's Bay	Aug-07	Aug-07	Aug-87
Blue jay Cr.	Michael's Bay	Aug-07	Aug-07	Aug-87
United States				
Caribou Cr.	Caribou Cr. (Offshore)	Aug-07	Aug-07	Never
Albany Cr.	Albany Bay (Offshore)	Sep-06	Aug-05	Never
Trout Cr.	Trout Cr. (Offshore)	Aug-07	Aug-07	Never[2]
Beavertail Cr.	Beavertail Bay	Aug-07	Aug-07	Never
McKay Cr.	McKay Bay	Sep-06	Sep-06	Never[1]
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
Carp R.	St. Martin Bay	Jun-07	Jun-07	Jun-07
Martineau Cr.	Horseshoe Bay	Jun-07	Jun-07	Never
Cheboygan R.	Straits of Mackinac	Sep-03	Aug-93	Never
	Burt Lake (Sturgeon R.)	Aug-03	Aug-98	Never
Elliot Cr.	Duncan Bay	Jun-04	Aug-86	Never
Hammond Bay Cr.	Hammond Bay	Jun-07	Jun-07	Never[2]
Mulligan Cr.	Mulligan Cr. (Offshore)	Sep-84	Aug-73	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[2]
East Au Gres R.	East Au Gres R. (Offshore)	May-07	Jun-86	Never

[1] Scheduled for treatment during 2008.

[2] Low-density larval population monitored with Bayluscide 3.2% Granular Sea Lamprey Larvicide surveys.

Lake Erie

- Qualitative assessments to detect new infestation or to evaluate existing larval sea lamprey populations were conducted in 25 tributaries (13 Canada, 12 U.S.) and offshore of 1 United States tributary. The status of larval sea lamprey populations in historically infested Lake Erie tributaries and lentic areas are presented in Table 14 and Table 15.

- Post-treatment assessments were conducted in two (1 Canada, 1 U.S.) tributaries to determine the effectiveness of lampricide treatments during 2006 and 2007. Post-treatment larval populations were estimated for potential re-treatment in one U.S. tributary (Conneaut Creek).

- Assessments to detect the presence of new populations of larval sea lampreys were conducted in 11 (9 Canada, 2 U.S.) tributaries.

- The Chagrin River was surveyed using backpack electrofishers and Bayluscide 3.2% Granular Sea Lamprey Larvicide during 2007. The Service has increased survey effort on this stream since the Daniels Park Dam washed out during 2004. While no larval sea lampreys were recovered from the 2007 surveys, a single sea lamprey larva has been found in the river since the wash-out.

- Paired quantitative assessment and catch-per-unit-effort sampling methods were conducted cooperatively with researchers from Michigan State University in one U.S. tributary as part of a larger project to test a potentially more efficient sampling methodology for selecting streams for lampricide application.

Table 14. Status of larval sea lampreys in Lake Erie tributaries with a history of sea lamprey production and estimates of abundance from tributaries surveyed during 2007.

Tributary	Last Treated	Last Surveyed	Status of Larval Lamprey Population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	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.	Never	Jun-07	---	Yes	---	---	***2008***
Big Otter Cr.	Jun-07	Jun-07	---	---	---	---	***2008***
South Otter Cr.	Oct-86	May-05	No	No	---	---	Unknown
Clear Cr.	May-91	Aug-06	No	No	---	---	Unknown
Big Cr.	Sep-06	Jun-07	No	No	---	---	***2008***
Forestville Cr.	May-89	Aug-06	No	No	---	---	Unknown
Normandale Cr.	Jun-87	Aug-06	No	No	---	---	Unknown
Fishers Cr.	Jun-87	Aug-06	No	No	---	---	Unknown
Young's Cr.	Sep-06	May-05	---	---	---	---	***2008***
United States							
Buffalo R.	Never	Sep-07	N/A	Yes	---	---	Unknown
Delaware Cr.	Sep-05	Jul-07	No	No	---	---	Unknown
Cattaraugus Cr.	Oct-07	Oct-07	---	---	---	---	***2008***
Halfway Brook	Oct-86	Jul-07	---	No	---	---	Unknown
Canadaway Cr.	Oct-86	Sep-07	---	No	---	---	Unknown
Crooked Cr.	Apr-06	Sep-07	Yes	Yes	---	---	***2008***
Raccoon Cr.	Sep-05	Sep-07	---	Yes	---	---	***2008***
Conneaut Cr.	Apr-06	Sep-07	Yes	Yes	7,311	1,483	***2008***
Grand R.	Apr-06	Sep-07	Yes	Yes	---	---	***2008***
Chagrin R.	Never	Sep-07	N/A	Yes	---	---	Unknown
St. Clair River\Lake St. Clair Tributaries							
Black R.	Never	Jul-07	---	No	---	---	Unknown
Mill Creek	Never	Jul-07	---	Yes	270	268	***2008***
Pine R.	Apr-88	Oct-07	---	No	---	---	Unknown
Belle R.	Never	Jun-05	---	No	---	---	Unknown
Clinton R.	Never	Oct-05		No			Unknown
St. Clair R.	Never	Jul-05	---	Yes	---	---	Unknown
Thames R.	Never	Jul-04	---	No	---	---	Unknown

Table 15. Status of larval sea lampreys in historically infested lentic areas of Lake Erie, 2007.

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 Bayluscide 3.2% Granular Sea Lamprey Larvicide surveys.

Lake Ontario

- Qualitative assessments to detect new infestation or to evaluate existing larval sea lamprey populations were conducted in 70 tributaries (26 Canada, 44 U.S.). The status of larval sea lampreys in historically infested Lake Ontario tributaries and lentic areas are presented in Tables 16 and 17.

- Populations of larval sea lampreys were estimated in 8 tributaries (2 Canada, 6 U.S.; Table 2).

- Post-treatment assessments were conducted in 7 tributaries (3 Canada, 4 U.S.) to determine the effectiveness of lampricide treatments during 2006 and 2007. Post-treatment populations of larval sea lampreys were estimated in one U.S. tributary (Lindsey Creek) (Table 2).

- Assessments to detect the presence of new populations of larval sea lampreys were conducted in 35 tributaries (13 Canada, 22 U.S.), and one new population was located in Sandy Creek, New York.

- Surveys with Bayluscide 3.2% Granular Sea Lamprey Larvicide (forty-three 500 m^2 plots) conducted on the Niagara River captured 3 larval sea lampreys. At present the Niagara River is not considered a significant contributor of sea lampreys to Lake Ontario. This system will be closely monitored for increased larval lamprey abundance due to its production potential.

- Paired quantitative assessment and catch-per-unit-effort sampling was conducted cooperatively with researchers from Michigan State University in 5 tributaries (1 Canada, 4 U.S.) as part of a larger project to test a potentially more efficient sampling method for selecting streams for lampricide application.

Table 26. Status of larval sea lampreys in Lake Ontario tributaries with a history of sea lamprey production, and estimates of abundance from tributaries surveyed in 2007.

Tributary	Last Treated	Last Surveyed	Status of larval lamprey population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Expected Year of Next Treatment
			Residuals present	Recruitment evident			
Canada							
Welland R.	Never	Jul-06	---	No	---	---	Unknown
Niagara R.	Never	Jun-07	N/A	Yes	---	---	Unknown
Ancaster Cr.	May-03	May-05	No	No	---	---	Unknown
Grindstone Cr.	Never	Sep-07	N/A	Yes	---	---	Unknown
Bronte Cr.	Jun-07	Sep-07	No	Yes			2010
Sixteen Mile Cr.	Jun-82	Jul-07	No	No	---	---	Unknown
Credit R.	May-02	Jul-07	No	Yes	1,043,449	29,489	***2008***
Rouge R.	Oct-07	Sep-07	N/A	No			Unknown
Petticoat Cr.	Sep-04	May-06	No	No	---	---	Unknown
Duffins Cr.	May-06	May-06	---	---	---	---	2009
Carruthers Cr.	Sep-76	May-04	No	No	---	---	Unknown
Lynde Cr.	Sep-05	May-06	No	No	---	---	2009
Oshawa Cr.	May-06	May-06	No	No	---	---	2009
Farewell Cr.	Apr-07	Aug-07	Yes	Yes	---	---	Unknown
Bowmanville Cr.	Sep-04	Aug-07	Yes	Yes	68,426	3,850	***2008***
Wilmot Cr.	May-06	May-06	No	No			2009
Graham Cr.	May-96	Jun-05	No	No	---	---	Uknown
Wesleyville Cr.	Oct-02	May-06	No	No	---	---	Unknown
Port Britain Cr.	Oct-07	Sep-07	N/A	N/A	---	---	Unknown
Gage Cr.	May-71	May-06	No	No	---	---	Unknown
Cobourg Br.	Oct-96	Jun-06	No	No	---	---	Unknown
Covert Cr.	Sep-05	Jun-06	No	No	---	---	Unknown
Grafton Cr.	Oct-07	Sep-07	N/A	No	---	---	Unknown
Shelter Valley Cr.	Sep-03	Jun-06	No	No	---	---	Unknown
Colborne Cr.	Sep-03	Jul-07	Yes	No	---	---	Unknown
Salem Cr.	May-06	May-06	No	No	---	---	2009
Proctor Cr.	Aug-98	Jun-05	No	No	---	---	Unknown
Smithfield Cr.	Sep-86	Jun-06	No	No	---	---	Uknown
Trent R. (Canal System)	Sep-06	Jul-07	Yes	N/A	---	---	Unknown
Mayhew Cr.	May-06	Jul-06	Yes	No	---	---	2009
Moira R.	Never	Jun-06	N/A	Yes	---	---	Unknown
Salmon R.	Jun-00	Jun-06	No	Yes			Unknown
Napanee R.	Never	Jul-07	N/A	No	---	---	Unknown
United States							
Black R.	Jul-04	Aug-07	Yes	Yes	313,672	10,761	***2008***
Stony Cr.	Sep-82	Jun-04	No	No	---	---	Unknown
Sandy Cr.	Never	Jul-05	N/A	No	---	---	Unknown
South Sandy Cr.	May-05	Aug-07	Yes	Yes	20,930	1,404	***2008***
Skinner Cr.	Apr-05	Sep-07	Yes	No	---	---	Unknown

Table 16 *Continued*

Tributary	Last Treated	Last Surveyed	Status of larval lamprey population (surveys since last treatment)		Estimate of 2007 Larval Population	2008 Metamorphosing Estimate	Expected Year of Next Treatment
			Residuals present	Recruitment evident			
Lindsey Cr.	Apr-06	Sep-07	Yes	Yes	36,247	271	***2008***
Blind Cr.	May-76	Sep-07	No	No	---	---	Unknown
Little Sandy Cr.	Jun-05	Aug-07	Yes	Yes	64,849	9,946	***2008***
Deer Cr.	Apr-04	Sep-06	Yes	No	---	---	Unknown
Salmon R.	May-07	Apr-07	---	---	---	---	Unknown
Grindstone Cr.	Apr-07	Aug-07	No	Yes	---	---	Unknown
Snake Cr.	Apr-05	Aug-07	Yes	Yes	226,994	5,156	***2008***
Sage Cr.	May-78	Sep-07	No	No		---	Unknown
Little Salmon R.	Apr-06	Sep-06	No	Yes	---	---	2009
Butterfly Cr.	May-72	Jun-04	No	No	---	---	Unknown
Catfish Cr.	May-06	Aug-07	Yes	No	---	---	Unknown
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	Apr-07	---	---	---	---	Unknown
Carpenter Br.	May-94	Jul-06	No	No	---	---	Unknown
Putnam Br./ Coldsprings Cr.	May-96	Apr-05	No	Yes	---	---	Unknown
Hall Br.	Never	Apr-05	N/A	No	---	---	Unknown
Crane Br.	Never	Jul-06	N/A	No	---	---	Unknown
Skaneateles Cr.	Never	Jul-05	N/A	No	---	---	Unknown
Rice Cr.	May-72	Apr-06	No	No	---	---	Unknown
Eight Mile Cr.	Apr-07	Aug-07	No	No	---	---	Unknown
Nine Mile Cr.	Jun-05	Aug-07	Yes	Yes	---	---	Unknown
Sterling Cr.	May-06	Sep-06	Yes	Yes	---	---	2009
Blind Sodus Cr.	May-78	Jun-04	No	No	---	---	Unknown
Red Cr.	May-06	Aug-07	No	No	---	---	Unknown
Wolcott Cr.	May-79	Oct-05	No	No	---	---	Unknown
Sodus Cr.	May-05	Aug-07	No	Yes	---	---	Unknown
Irondequoit Cr.	Never	Jun-07	N/A	No	---	---	Unknown
Larkin Cr.	Never	May-07	N/A	Yes	---	---	Unknown
Northrup Cr.	Never	Aug-07	N/A	No	---	---	Unknown
Salmon Cr.	Apr-05	Apr-07	Yes	No	---	---	Unknown
Sandy Cr.	Never	May-07	N/A	Yes	2,042	1,732	***2008***
Oak Orchard Cr.	May-88	May-07	N/A	Yes	---	---	***2008***
Johnson Cr.	Never	May-07	N/A	Yes	---	---	Unknown
Third Cr.	May-72	May-00	No	No	---	---	Unknown
First Cr.	May-95	Oct-05	No	No	---	---	Unknown

Spawning Phase

The long-term effectiveness of the control program has been measured by the annual estimation of the lake-wide populations of spawning-phase sea lampreys. Traps and nets were used to capture migrating spawning-phase sea lampreys during the spring and early summer in a subset of streams with sea lamprey spawning runs. Multiple regression models are used to estimate 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 a combination of mark-recapture estimates in streams with traps and model-predicted estimates in streams without traps.

Lake Superior

- 8,355 sea lampreys were trapped in 22 tributaries during 2007 (Table 18, Fig. 3).

- The estimated population of spawning-phase sea lampreys during 2007 was 65,483 (30,067 - west U.S., 20,035 - east U.S., 15,381 - Canada; $r^2 = 0.48$), which is above the Fish Community Objective target (34,000) (Figure 4).

- Lake-wide estimates of spawning-phase sea lampreys increased above the target range beginning during 1999. Although they have remained above targets since that time, there has been a decreasing trend since 2001.

- 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.

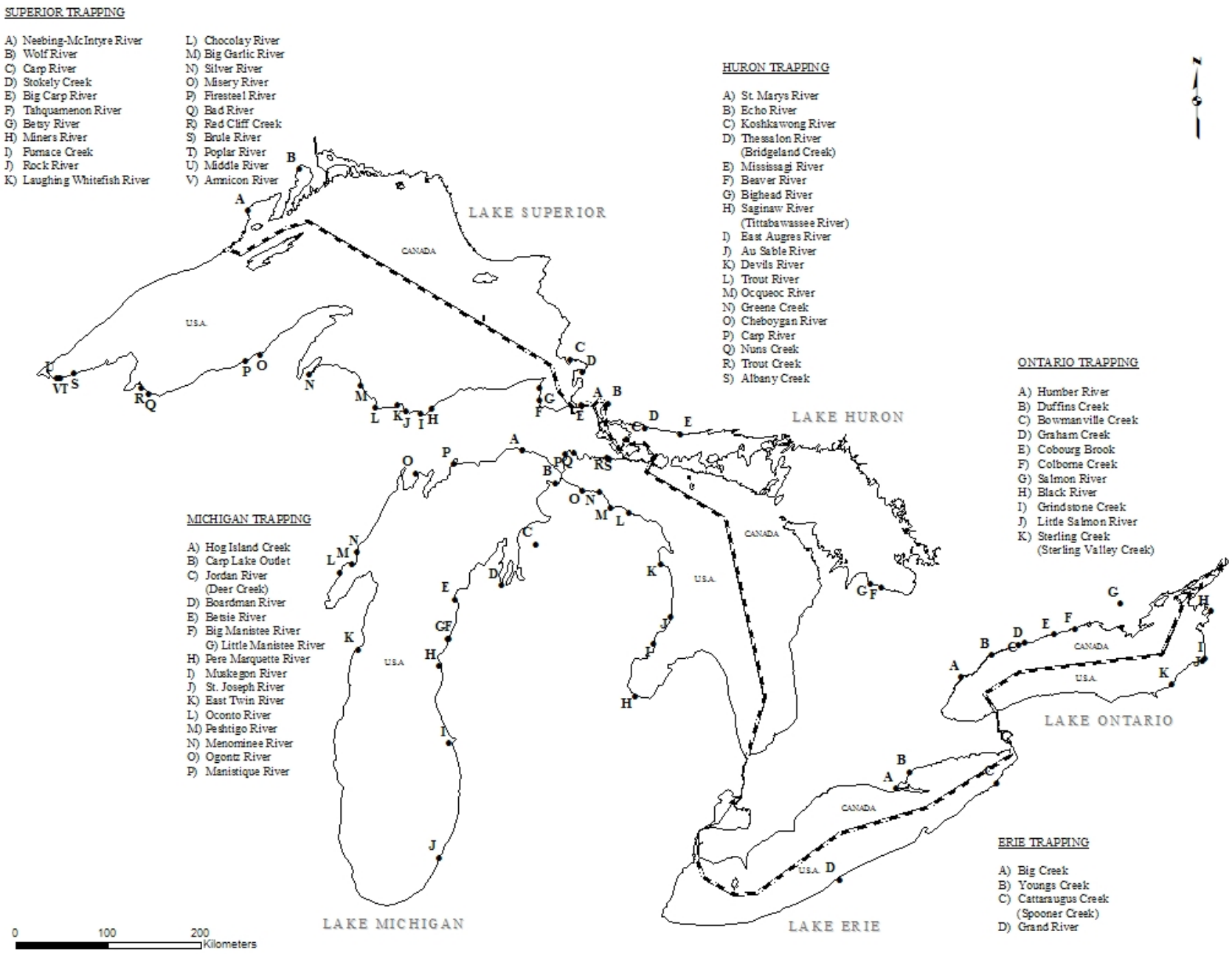

Figure 3. Locations of tributaries where assessment traps were operated during 2007.

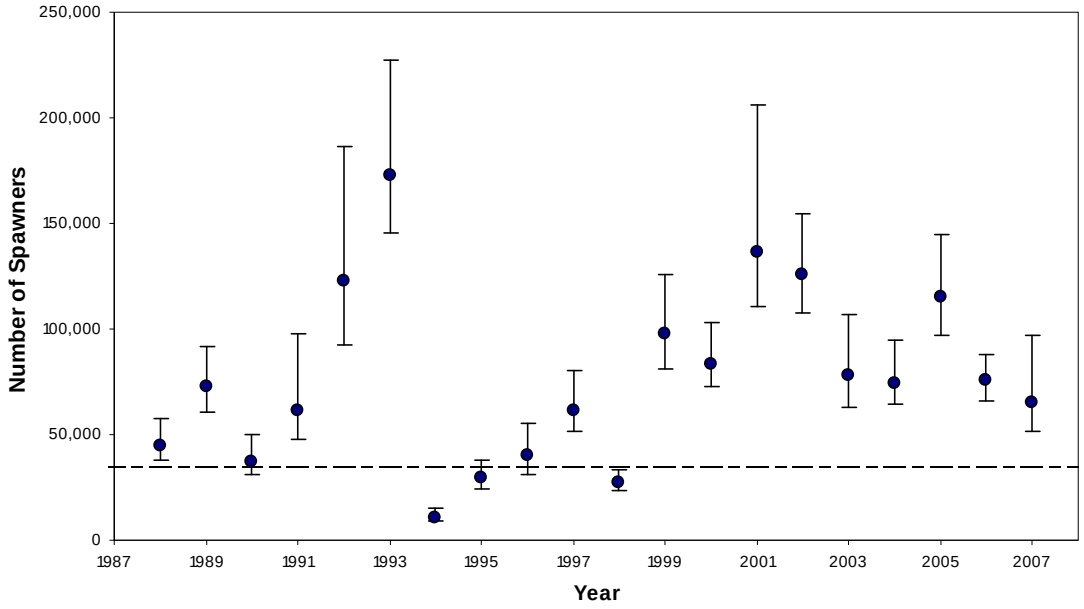

Figure 4. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Superior during 1988 - 2007 with 95% confidence intervals (vertical lines) and target level (dashed line).

Table 37. 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, 2007 (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)	143	365	39	0	---	---	---	---	---
Wolf R. (B)	39	---	---	0	---	---	---	---	---
Carp R. (C)	109	158	69	0	68	---	---	---	---
Stokely Cr. (D)	206	353	58	0	73	---	---	---	---
Big Carp Cr. (E)	40	52	77	0	53	---	---	---	---
Total or Mean (North shore)	537	---	---	0	69	---	---	---	---
United States									
Tahquamenon R. (F)	1,833	9,325	20	113	69	462	459	217	223
Betsy R. (G)	295	690	43	64	72	453	445	210	199
Miners R. (H)	154	826	19	9	56	433	448	202	231
Furnace Bay Cr. (I)	297	1,316	23	31	48	431	413	179	175
Rock R. (J)	674	1,431	47	193	49	445	444	190	194
Laughing Whitefish R. (K)	0	0	---	0	---	---	---	---	---
Chocolay R.(L)	47	72	4	2	100	450	---	198	---
Big Garlic R. (M)	26	54	48	3	66	483	520	238	252
Silver R. (N)	303	1,473	21	45	73	452	443	238	250
Misery R. (O)	527	---		73	4	410	440	187	209
Firesteel R. (P)	27	---	---	9	0	---	459	---	232
Bad R. (Q)	1,987	15,165	13	55	31	430	423	190	177
Red Cliff Cr. (R)	5	---	---	0	---	---	---	---	---

Table 17 *Continued*

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
Brule R. (S)	1,065	1,345	79	112	60	458	461	228	230
Poplar R. (T)	200	1,525	13	16	56	461	465	226	233
Middle R. (U)	316	333	95	70	61	447	447	210	221
Amnicon R. (V)	62	---	---	0	---	---	---	---	---
Total or Mean (South shore)	7,818	---		795	52	451	445	210	207
Total or Mean (for Lake)	**8,355**	**---**	**---**	**795**	**53**	**451**	**445**	**210**	**207**

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

Lake Michigan

- A total of 39,147 sea lampreys was trapped at 16 sites in 15 tributaries during 2007 (Table 19, Fig. 3).

- The estimated population of spawning-phase sea lampreys in Lake Michigan was 167,125 (99,971 north and 67,154 south; $r^2 = 0.77$), which is above the Fish Community Objective target and a significant increase from 2006 (Fig 4).

- Sea lamprey numbers were below or within the target range prior to the 2000 spawning year, but 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 and in the Carp Lake Outlet with the Little Traverse Bay Bands of Odawa Indians.

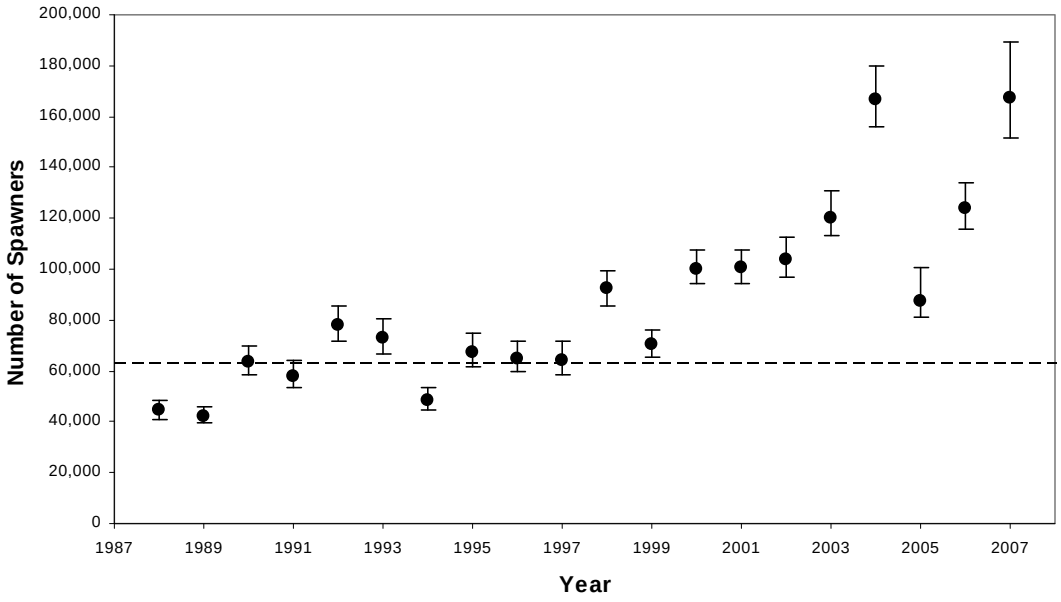

Figure 5. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Michigan during 1988 - 2007 with 95% confidence intervals (vertical lines) and target level (dashed line).

Table 18. 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 2007
(Letter in parentheses corresponds to location of stream in Fig. 3).

Stream Name	Number caught	Spawner estimate	Trap efficiency	Number sampled[1]	Percent males	Mean length (mm)		Mean weight (g)	
						Males	Females	Males	Females
Carp Lake Outlet (B)	3,110	5,883	53	225	55	486	479	240	243
Jordan R.	---	---	---	---	---	---	---	---	---
Deer Cr. (C)	116	630	18	15	80	471	410	233	160
Boardman R. (D)	583	1,045	56	65	52	492	482	311	285
Betsie R. (E)	2,062	4,493	46	184	34	501	501	264	277
Big Manistee R. (F)	258	---	---	---	---	---	---	---	269
Little Manistee R. (G)	429	995	43	37	59	496	488	267	268
Pere Marquette R. (H)	546	888	61	53	49	516	503	288	286
Muskegon R. (I)	2,043	5,370	38	116	71	506	500	274	279
St. Joseph R. (J)	374	1,089	34	17	35	526	531	287	299
East Twin R. (K)	115	486	24	16	50	495	480	244	257
Oconto R. (L)	148	288	51	59	51	518	507	282	273
Peshtigo R. (M)	4,786	6,051	79	633	52	510	508	275	285
Menominee R. (N)	1,227	4,250	29	262	58	512	510	261	274
Ogontz R. (O)	1	---	---	---	---	---	---	---	---
Manistique R. (P)	23,211	47,289	49	475	51	512	507	279	285
Hog Island Cr. (G)	138	511	27	35	74	501	494	267	253
Total or Mean	**39,147**	**79,268**		**2,192**	**53**	**506**	**503**	**269**	**227**

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

Lake Huron

- 35,610 sea lampreys were trapped at 21 sites in 19 tributaries during 2007 (Table 20, Fig. 3).

- The estimated population of spawning-phase sea lampreys in Lake Huron for 2007 was 160,843 (135,847 north and 24,996 south; $r^2 = 0.78$), which was greater than the Fish Community Objective target (Fig. 6).

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

- Traps operated in the St. Marys River at the Great Lakes Power facility in Canada and the U.S. Army Corps of Engineers facilities in the U.S. captured 6,075 spawning-phase sea lampreys. The estimated population in the river was 22,839 and trap efficiency was 27%.

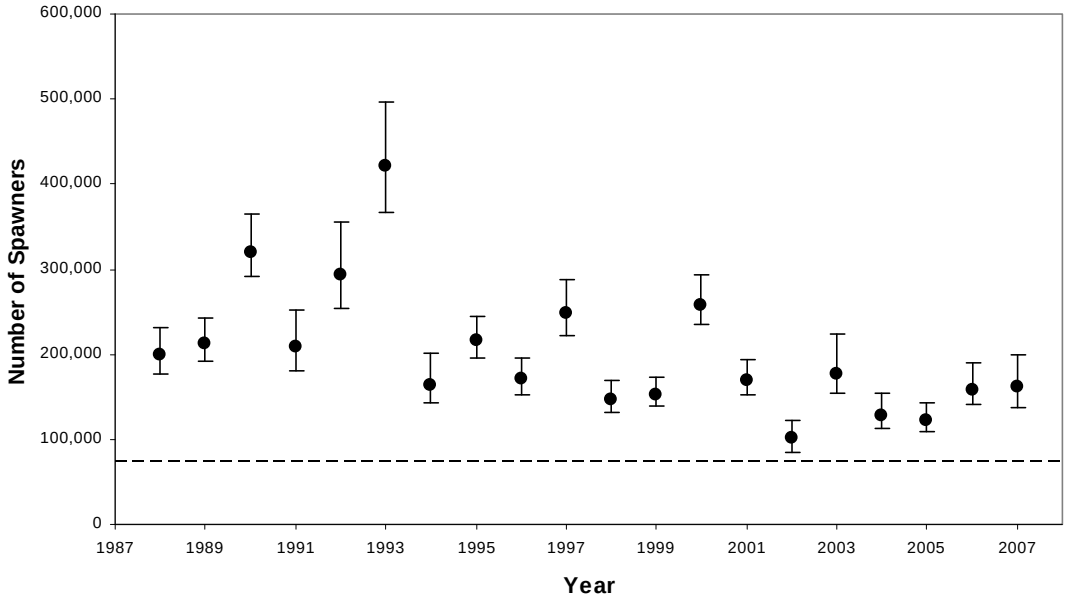

Figure 6. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Huron during 1988 - 2007 with 95% confidence intervals (vertical lines) and target level (dashed line).

Table 19. 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, 2007 (number in parentheses corresponds to location of stream in Fig. 4).

Tributary	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males	Mean Length (mm) Males	Mean Length (mm) Females	Mean Weight (g) Males	Mean Weight (g) Females
Canada									
St. Marys R. (A)	4,210	22,839	27	0	65	---	---	---	---
Echo R. (B)	2,616	8,070	32	0	65	---	---	---	---
Koshkawong R. (C)	323	---	---	0	56	---	---	---	---
Thessalon R. (D)	93	648	14	0	76	---	---	---	---
Little Thessalon R. (D)	3,839	5,146	75	0	61	---	---	---	---
Mississagi R (E)	6	---	---	0	---	---	---	---	---
Bighead R. (G)	203	1,001	20	0	58	---	---	---	---
Beaver R. (F)	2	---	---	0	---	---	---	---	---
Total or Mean (Canada)	11,292	---	---	0	61	---	---	---	---
United States									
Tittabawassee R. (H)	760	---	---	---	---	---	---	---	---
East Au Gres R. (I)	495	---	---	---	---	---	---	---	---
Au Sable R. (J)	1,802	---	---	---	---	---	---	---	---
Devils R. (K)	154	359	43	44	48	463	481	225	239
Trout R. (L)	19	---	---	3	0	---	470	---	233
Greene Cr. (N)	172	302	57	15	27	488	464	241	222
Ocqueoc R. (M)	1,547	3,465	45	74	43	465	459	234	225
Cheboygan R. (O)	17,418	25,465	68	780	52	488	482	244	244
Carp R. (P)	23	---	---	8	63	465	453	270	267
Nunns Cr. (Q)	1	---	---	1	---	---	---	---	---
Trout Cr. (R)	1	---	---	1	---	---	---	---	---
Albany Cr. (S)	61	329	19	8	88	446	430	186	155
St. Marys R. (A)	1,865	See Canada	See Canada	---	See Canada	---	---	---	---
Total or Mean (U.S.)	24,318	---	---	934	51	485	479	242	241
Total or Mean (for Lake)	**35,610**	**---**	**---**	**934**	**54**	**485**	**479**	**242**	**241**

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

Lake Erie

- 1,641 spawning-phase sea lampreys were trapped at 5 sites in 4 tributaries (Table 21, Fig. 3).
- Estimated population of spawning-phase sea lampreys was 16,664, which was significantly greater than the Fish Community Objective target during 2007 (Fig 7).

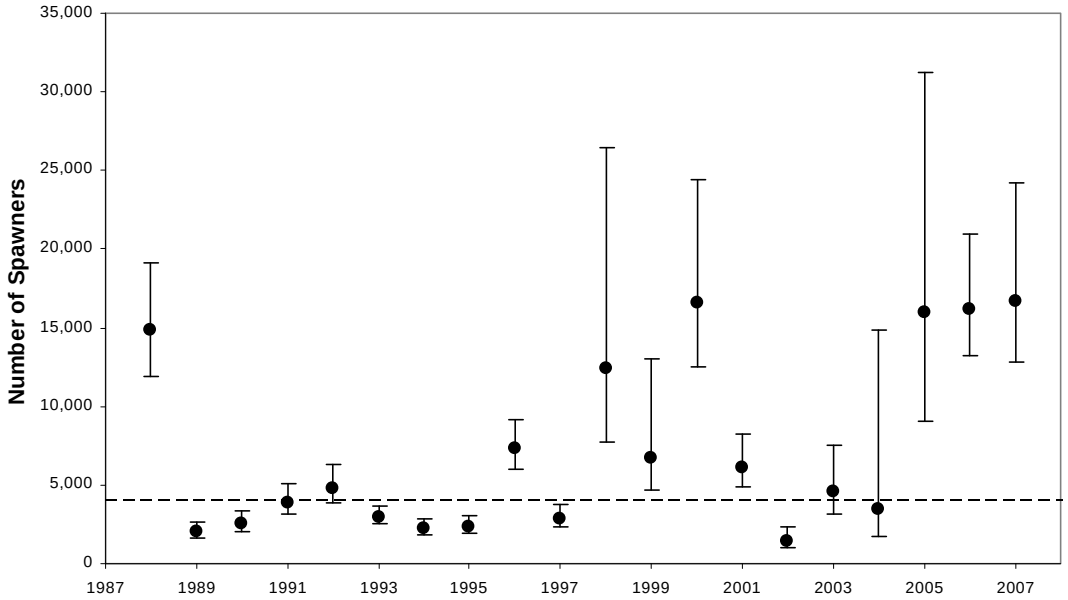

Figure 7. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Erie during 1988 - 2007 with 95% confidence intervals (vertical lines) and target level (dashed line).

Table 20. 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, 2007 (number in parentheses corresponds to location of stream in Fig. 4).

Tributary	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males	Mean Length (**m**m) Males	Mean Length (**m**m) Females	Mean Weight (g) Males	Mean Weight (g) Females
Canada									
Big Cr. (A)	998	4,428	22	0	---	---	---	---	---
Young's Cr. (B)	419	1,125	37	0	---	---	---	---	---
Total or Mean (Canada)	1417	---	---	0	---	---	---	---	---
United States									
Cattaraugus Cr. (C)	120	496	24	4	75	492	425	316	255
Spooner Cr.	48	253	19	3	67	491	483	296	289
Grand R. (D)	56	---	---	0	---	---	---	---	---
Total or Mean (U.S.)	224	---		0	71	492	454	308	272
Total or Mean (for Lake)	**1641**	**---**	**---**	**7**	**71**	**492**	**454**	**308**	**272**

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

Lake Ontario

- 6,137 spawning-phase sea lampreys were trapped at 12 sites on 11 tributaries (Table 22, Fig. 3).

- The estimated population of spawning-phase sea lampreys in Lake Ontario for 2007 was 30,175 (11,540 – U.S., 19,175 – Canada; r^2=0.51), which was at the Fish Community Objective target (Fig. 8).

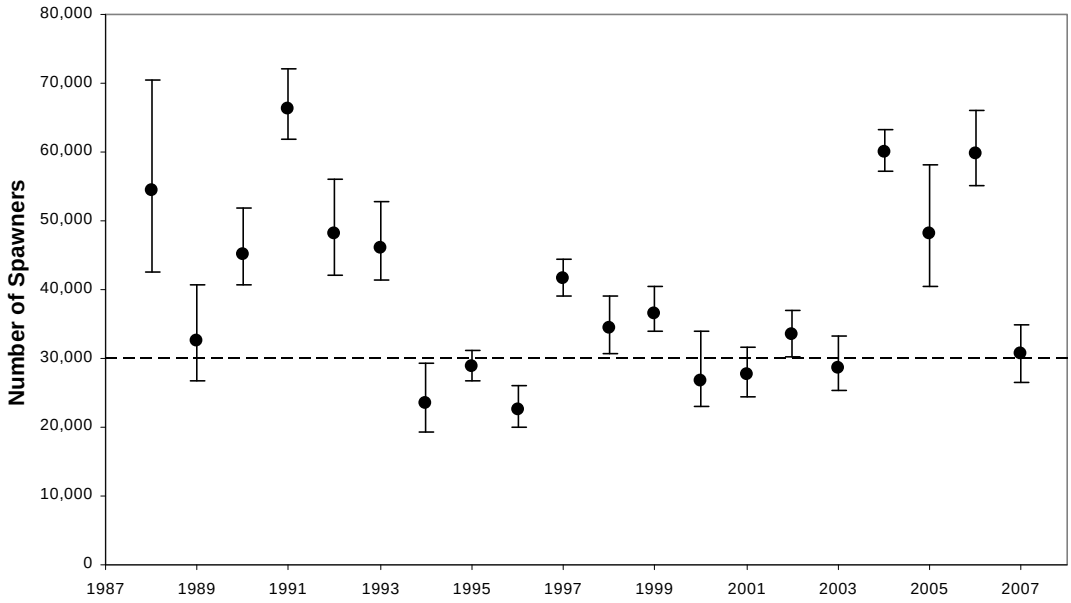

Figure 8. Annual lake-wide population estimates of spawning-phase sea lampreys in Lake Ontario during 1988 – 2007 with 95% confidence intervals (vertical lines) and target level (dashed line).

Table 21. 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, 2007 (Letter in parentheses corresponds to location of stream in Fig. 4).

Tributary	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males	Mean Length (mm) Males	Mean Length (mm) Females	Mean Weight (g) Males	Mean Weight (g) Females
Canada									
Humber R. (A)	4,358	10,056	43	235	55	494	482	268	270
Duffins Cr. (B)	756	1,525	50	61	57	485	501	246	260
Bowmanville Cr. (C)	432	1,751	25	145	55	495	483	274	269
Graham Cr. (D)	156	230	68	49	65	500	485	241	239
Cobourg Cr. (E)	243	478	51	75	49	500	493	253	252
Colborne Cr. (F)	0	---	---	0	---	---	---	---	---
Salmon R. (G)	14	---	---	11	55	485	494	283	281
Total or Mean (Canada)	5,959	---	---	576	55	495	486	264	264
United States									
Black R. (H)	501	4,541	11	44	59	497	497	252	263
Grindstone Cr. (I)	20	---	---	---	---	---	---	---	---
Little Salmon R. (J)	45	---	---	58	100	490	---	270	---
Sterling Cr. (K)	285	1,438	20	52	73	488	456	264	230
Sterling Valley Cr. (L)	215	1,141	19	35	60	493	481	275	266
Total or Mean (U.S.)	1,066	---	---	189	65	492	480	263	254
Total or Mean (for Lake)	**7,025**	**---**	**---**	**765**	**58**	**494**	**484**	**264**	**261**

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

Parasitic Phase

Lake Superior

- Lake trout wounding rate is greater than the target of 5 wounds per 100 fish and has trended upward since 1994.
- Lake trout wounding rate is currently highest in the northwest and southwest portions of the lake, but the wounding 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 charter boats during 2007.
    - 53 parasitic-phase sea lampreys attached to lake trout were collected from 5 management districts.
    - Parasitic-phase sea lampreys were attached at a rate of 1.57 per 100 lake trout (n = 3,379).

Lake Michigan

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 2007.

- A total of 3,204 parasitic-phase sea lampreys was collected from 14 management districts; 265 were attached to lake trout and 2,939 were attached to Chinook salmon.

- Parasitic-phase sea lampreys were attached at a rate of 1.62 per 100 lake trout (n = 16,379) and 1.41 per 100 Chinook salmon (n = 208,596).

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.

- The recapture of spawning-phase sea lampreys released as metamorphosing juveniles during 2005 was completed. Of 750 metamorphosing sea lampreys marked with coded wire tags and released, 31 (4.1%) were recaptured as spawning adults in Lake Michigan during 2007. A total of 34,651 spawning-phase sea lampreys was scanned for coded wire tags in 16 Lake Michigan streams during 2007. The estimated abundance of the 2006 parasitic cohort is 813,238 (95% CI, 607,101-1,226,266).

- A total of 756 metamorphosing sea lampreys was marked with coded wire tags and released into Lake Michigan tributaries during August – November, 2007 to estimate the 2008 parasitic-phase cohort (Cedar River – 73; Ford River – 73, Ogontz River – 72, Betsie River – 81, Jordan River – 72, Pere Marquette River – 158, Muskegon River – 227); fourteen sea lamprey died prior to release). Recapture of these sea lampreys as spawning-phase adults will take place during 2009.

Lake Huron

- While lake trout wounding rate is greater than the target of 5 wounds per 100 fish, it has remained steady at an average of 8.2 wounds per 100 lake trout since 2002, compared with 24.6 from 1990 through 2001.

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

- During the early 1990s, wounding rate and mortality on lake trout were so large that restoration efforts were suspended until the St. Marys River treatments commenced

The Michigan Department of Natural Resources provided data on the frequency of parasitic-phase sea lampreys attached to fishes caught by sport charter fishers during 2007.

- 291 parasitic-phase sea lampreys were collected from 6 management districts; 119 were attached to lake trout and 172 were attached to Chinook salmon.

- Parasitic-phase sea lampreys were attached at a rate of 1.9 per 100 lake trout (n = 6,363) and 9.3 per 100 Chinook salmon (n = 1,850).

Canadian commercial fishers collected parasitic-phase sea lampreys during 2007.

- A total of 2,410 parasitic-phase sea lampreys (Main Basin - 1124, North Channel - 904, Georgian Bay - 0, unknown - 382) were collected from commercial fishermen during 2007 and turned over to researchers.

A lake-wide mark-recapture study using metamorphosing-phase juveniles was initiated during the fall of 1997 and continued through 2007. However, no coded-wire tagged metamorphosing sea lampreys were released into Lake Huron during 2003,2004, or 2006.

- The recapture of spawning-phase sea lampreys released as metamorphosing juveniles during 2005 was completed. Of 768 metamorphosing sea lampreys marked with coded wire tags and released, 22 (2.9%) were recaptured as spawning-phase adults during 2007. A total of 36,598 spawning-phase sea lampreys were scanned for coded wire tags in 17 Lake Huron streams (12 U.S., 4 Canada, 1 international) during 2007. The estimated abundance of the 2005 transformer cohort is 981,133 (95% CI, 658,756-1,770,075; Table 23).

- A total of 667 metamorphosing sea lampreys were marked with coded wire tags and were released into Lake Huron tributaries during August – November, 2007 to estimate the transformer cohort (Cheboygan River – 68; Devils River – 60, East AuGres River – 63, Au Sable River – 70, Rifle – 61, St Marys south – 73, St Marys north – 68, Mississagi – 68, Naiscoot – 68, Nottawasaga - 68; 13 tagged sea lampreys died prior to release). Recapture of these sea lampreys as spawning-phase adults will take place during 2009.

A lake-wide mark-recapture study using animals released as parasitic-phase lampreys was initiated during 1993 and continued through 2005.

Table 22. Lake-wide population estimates (PE) and 95% confidence intervals (CI) of metamorphosing, parasitic, and spawning-phase sea lampreys in Lake Huron during 1992-2007.

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	10,001	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

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

TASK FORCE REPORTS

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.

2007 Membership:

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

Task Force Meetings were held February 12 and September 18, 2007.

Progress:

1. ***Annually submit a lampricide treatment plan designed to reduce sea lamprey abundance to target wounding level.*** PIWG is coordinating efforts by the task forces to develop lake-specific plans to suppress sea lampreys to target. These plans will include tactics previously put in place to improve treatment efficacy. In addition, the Commission has approved two initiatives that will be implemented, beginning in 2008, namely: the LCTF- ATF proposal to transfer assessment staff too treatment crews in the spring to maximise treatment effort during the time when flows are most conducive to treatment and larvae are most vulnerable to lampricides, and; a plan to treat all sea lamprey producing streams in Lake Erie two years in succession with the objective of dramatically suppressing lake-wide sea lamprey abundance.
2. ***Evaluate and prioritize options to optimize kill of sea lampreys and use of TFM.*** Beginning in 2006, tactics have been employed to optimise treatment efficacy, including: increasing the duration of primary lampricide applications, increasing concentrations, and elevating the use of secondary applications to reduce escapement during treatment. These tactics were applied to 48 treatments in 2007. The shift to conducting more spring treatments will take advantage of greater larval susceptibility and lower alkalinities and pH, resulting in effective treatment at lower lampricide concentrations.
3. ***Annually select streams and lentic areas for lampricide control from the ESTR ranked list.*** This process resulted in the selection and treatment of 85 streams, 11 lentic areas and 101 ha in the St. Mary's River in 2007. After review of the FY 2008 ESTR list, control and assessment staff from all field stations reached consensus. A total of 104 Great Lakes streams, 5 lentic areas, and 124 ha in the St. Mary's River are slated for treatment in 2008.
4. ***Develop annual border-blind treatment schedule that maximizes efficiency.*** Tactics have been initiated in recent years to maximize scheduling efficiency. In 2007, this included the treatment of 12 streams based on geographic efficiency by USFWS and the utilization of US and Canadian treatment crews to treat the highly dendritic and complex Manistique and White rivers. In 2008, five geographical efficiency treatments will be conducted and a joint USFWS-DFO treatment of the Rifle 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 proposed by the LCTF will be held to discuss the current temporal constraints on the treatment of US streams adjacent to nesting

habitat of the piping plover. The potential listing of lake sturgeon and northern brook lampreys in Canada were among the topics discussed by the LCTF.

6. ***Annually refine estimates of staff effort, lampricide amount and total costs for inclusion in the ESTR model.*** In 2007, treatment supervisors at each of the field stations refined these estimates to aid in development of the 2008 ESTR list.

7. **Annually update SOPs.** Members of the LCTF met in December 2007 to update SOPs. Revisions will be incorporated into field manuals prior to the commencement of the 2008 field season.

8. ***Annually develop estimates of costs for effort and lampricide for upcoming fiscal year.*** The LCTF developed a budget for FY2008 that estimated effort, including the hiring and equipping of eight additional USFWS treatment staff. The 12 additional personnel that were added to control crews in 2006 have been incorporated into the program's base effort for 2008. Lampricide purchases are based on recent usage patterns, and in 2007, the Commission continued to build lampricide inventories to meet the ongoing requirements of a more aggressive lampricide control program. During 2007, the agents took delivery of:

• TFM (liquid)	85,172 kg A.I.
• TFM (bar)	0
• Bayluscide 3.2% - Granular	75,184 kg product
• Bayluscide 70% - Wettable Powder	900 kg product
• Bayluscide 20% - Emulsifiable Concentrate	508 l

Purchases for 2008 include:

• TFM (liquid)	88,950 kg A.I.
• TFM (bar)	1000
• Bayluscide 3.2% - Granular	30,845 kg product
• Bayluscide 70% - Wettable Powder	0 kg product
• Bayluscide 20% - Emulsifiable Concentrate	500 l

9. ***Assist in the development and refinement of the lampricide control research theme paper.*** The lampricide control white paper was published in 2007, along with the white papers from other project areas.

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 conducted pilot studies to examine the hypothesis that susceptibility of larvae to lampricide is negatively correlated to length. Evidence was inconclusive in one test and supportive of the hypothesis in another. The LCTF has recommended to SLIC that this investigation, as well as an examination of the comparative susceptibility of newly metamorphosed sea lampreys, be conducted by USGS in Lacrosse as an internal research or technical assistance project. In addition, the LCTF is concerned that current lampricide toxicity tables underestimate the concentrations required at low alkalinities and pH. Concern extends to the upper alkalinities and pH ranges as well and the LCTF has identified the refinement of the charts as a research priority.

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. An additional task force was formed in 2007, the Connecting Channels and Lentic Areas Task Force (see page 69), was formed to explicitly address these areas and worked along side the assessment task force.

2007 Membership:

Mike Steeves (Chair), Rod McDonald, Fraser Neave, Paul Sullivan, and Brian Stephens, Department of Fisheries and Oceans; Jessica Doemel, Michael Fodale, Katherine Mullett, and Jeffrey Slade, U.S. Fish and Wildlife Service; Jean Adams, Roger Bergstedt, and Bill Swink, U.S. Geological Survey, Biological Resources Division; Shawn Sitar, Michigan Department of Natural Resources; Michael Jones, Michigan State University; Dale Burkett and Mike Siefkes, Great Lakes Fishery Commission Secretariat.

The task force met during February and September 2007. The larval assessment workgroup met in January and December. The ATF continues to work closely with all of the other Sea Lamprey Integration Committee task forces.

Progress:

1. ***Annually rank streams and lentic areas for lampricide control through use of the ESTR model.*** In cooperation with the Secretariat and an Integrated Management of Sea Lamprey contractor, ATF used transformer production estimates and treatment costs generated by the Empirical Stream Treatment Ranking model (ESTR) to prioritize for treatment all streams expected to produce metamorphosed sea lampreys in 2008. Included in this ranking were the St. Marys River and lentic areas off the mouths of producing streams in lakes Superior and Huron.

2. ***Upon receiving sea lamprey abundance targets from the Sea Lamprey Target Setting Work Group, to annually activate the targets into the control ranking that uses the ESTR model.*** Additional treatment effort for 2008 was weighted towards those lakes exhibiting the greatest sea lamprey wounding ratesresulting in additional treatments being scheduled on lakes Superior, Huron, and Michigan. As well, all sea lamprey producing streams on Lake Erie are being treated in 2008 in the first round of a back-to-back treatment tactic scheduled for 2008 and 2009.

3. ***Annually 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.

4. ***Refine and implement the recommendations of the larval assessment review of 2002.*** The Task Force continues to implement recommendations of the review panel. Activities in 2007 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. We also completed the last year of a study examining a rapid assessment methodology to optimize the allocation of resources among the assessment and control of sea lamprey populations. The rapid assessment methods will be implemented in 2008.

5. ***Annually refine the parameters of the ESTR model for sea lamprey population biology and habitat, effort and costs, and control effectiveness.*** Model refinement is an ongoing process. Wounding rates were used in allocating additional control effort for 2008. Updated models of growth and metamorphosis are being evaluated for inclusion in the ESTR model.

6. ***Optimize the assessments of abundance of adult sea lampreys, fish abundance, and fish survival into the best long-term measure(s) of sea lamprey control success.*** This work is being done by the Sea Lamprey Damage and Target Work Group. This group is attempting to rationalize the relationship among lamprey abundance and lake trout wounding in each of the lakes to better allocate control effort among all lakes.

7. ***Refine and implement the 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. A Rationalization of which streams to trap is on-going using a value-added approach.
    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 task force and the trap work group of the Reducing Reproduction Task Force.

8. ***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 were realized when Canada completed all larval assessment work on the St. Marys River during 2007. Cost-benefit analyses are being completed on other aspects of the assessment programs for the upper lakes in an attempt to improve efficiencies through cross-border cooperation.

9. ***Annually update SOPs.*** Larval and adult assessment SOPs are reviewed annually and updated as changes are made.

10. ***Annually develop estimates of costs for effort for upcoming fiscal year.*** Assessment cost estimates are developed annually for submission to the Program Integration Working Group prior to its fall budget meeting. Several program efficiencies were realized in 2007 during the development of the program budget.

11. ***Assist in the development and refinement of 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.

12. ***Working with internal and external researchers, develop proposals and participate in field research of studies consistent with the assessment research theme paper.*** ATF regularly reviews progress on research priorities and encourages members and colleagues to submit proposals in areas of need. Currently, task force members are actively involved in several research projects.

13. ***Annually review research proposals for relevance to the assessment research theme paper.*** Research pre-proposals are reviewed and their relevance to program needs is evaluated. This evaluation is then passed on to the Sea Lamprey Research Board for consideration during their deliberation process.

Connecting Channel and Lentic Area Task Force

The Connecting Channel and Lentic Area Task Force continued to coordinate with other task forces regarding the combined activities conducted on the St. Marys River and plans for lentic area investigations of Lakes Superior and Ontario during 2007. Citing the completion of most of their charges, the Task Force has requested dissolution and the remaining tasks be administered by the Assessment Task Force.

The Connecting Channel and Lentic Area Task Force was established during June 2003.

Purpose:

Integrate estimates of contribution of sea lamprey transformers from connecting channels and lentic areas into the annual treatment ranking process by development of assessment and control strategies appropriate for those areas.

2007 Membership:

Michael Fodale (Chair), Michael Twohey, and Kasia Mullett (U.S. Fish and Wildlife Service); Paul Sullivan and Mike Steeves (Department of Fisheries and Oceans); Jean Adams and Roger Bergstedt (U.S. Geological Survey, Biological Resources Division); Michael Jones (Michigan State University); James Markham (New York Department of Environmental Conservation); Michael Siekfes and Dale Burkett (Great Lakes Fishery Commission Secretariat).

Task force meetings were held on February 15-16 and September 13, 2007.

Progress:

1. ***Coordinate St. Marys control and assessment strategies, provide summary reports, and assure all tasks are appropriately addressed.*** Report of 2007 activities and results were provided at SLIC and summarized for GLFC annual report. Assessment and alternate control activities for 2007 were planned and are detailed in respective task force reports. Lampricide treatment plans include treating 124 hectares. The construction of a new trap at Sault Edison has been completed and the GLP trap construction project is proceeding, both under auspices of the RRTF.

2. ***Address assessment precision levels needed for the St. Clair, Detroit, and Niagara rivers.*** Summaries of previous work were submitted to the Task Force and reviewed. Members of the TF agreed that historic sampling frequency is adequate with the risk of colonization for these interconnecting waterways. Surveys will continue into the future consistent with the historic sampling pattern until such time as increased densities are observed.

3. ***Using existing data, inventory infested lentic areas and estimate contribution of transformers; where needed, coordinate the development of proposals for consistent, comparable, and efficient assessment of their contribution.*** Inventories completed and estimates of potential larval production based upon historical data compiled during 2004. Plan developed and implemented during 2005-7 for systematic sampling of lentic areas based upon the above using RoxAnn and granular Bayluscide. Funding shortfalls in the Program delayed additional work during FY2006. With funding restored during FY2007, additional locations were surveyed in Lakes Huron and Ontario, however, a catastrophic failure of the RoxAnn device occurred and additional work is still needed. A new device has been obtained and the remainder of work will be completed during FY2008.

4. ***Identify specific research questions or hypothesis on population dynamics to define the contribution to recruitment of lentic areas and connecting channels; advance specific proposals to refine knowledge***

relating to control of sea lampreys in connecting channels and lentic areas. The Task Force supports the specific pre-proposal by Swink to determine lentic parasitic contribution to lakes supported for full proposal solicitation by the SLRB. A proposal to compare two deepwater sampling methods for assessing larval sea lampreys has been funded by the Commission for FY2008. This could affect the way in granular Bayluscide plots are ranked during the stream and lentic area selection process. Results will be delivered to the Assessment Task Force.

5. ***Evaluate current assessment methodologies/technologies toward the development of a "rapid" assessment technique.*** Draft sampling protocol deployed during 2005 uses published information to allow "rapid" assessment of lentic area habitat with RoxAnn and will continue during FY2008.

6. ***Identify treatment options and costs***
The remaining surveys of lentic area habitat and production estimates will continue during 2008 using RoxAnn and other conventional methods for the upper and lower Great Lakes and the Niagara River based upon historical inventories of infested lentic areas, potential for production and assessments completed during 2005. Investigations during 2007 provided data to consider 6 Lake Superior lentic areas for granular bayluscide treatment, 3 of which (19 ha) will be treated during 2008. St. Marys River 2008 funding recommended at an estimated cost of $1,921,700 that includes:

- Larval Assessment and Lampricide Control activities included in respective program targets provides for about 130 staff days of larval assessment effort to estimate population and delineate necessary treatment areas and 130 hectares of granular Bayluscide treatment effort.
- SMRT and Trap activities included in respective program targets of SMRT and Pheromone and Trapping (trapping for SMRT in and outside of St. Marys River and Trapping for Control) provides for collection and release of sterile males, spawning run estimate and removal of female lampreys.
- Cheboygan River trap improvements attributable to trapping for SMRT. This is a one time cost.

7. ***Coordinate with other task forces prior to proposing field actions to SLIC.*** Chairs of Assessment Task Force (formerly the Control Ranking and Evaluation Task Force), Lampricide Control Task Force, Reducing Reproduction Task Force, as well as members from the Research Priorities Working Group, Trap Work Group, Larval Work Group and Program Integration Working Group are part of CCLATF and assist in formulation of proposed field actions and reporting to SLIC. In the future, the Assessment Task Force will coordinate and report St. Marys River related issues.

Table 23. Lentic area and connecting channel investigations planned for 2007 at the recommended funding level of $156,000.

Lake	Source Stream	Lentic Area	Potential Infested Area (ha)	RoxAnn Complete	GB Sampling Complete
Huron	Carp River	Carp River	12.5	No	No
Huron	Mindemoya R.	Providence Bay	20	No	No
Huron	Manitou R.	Michael's Bay	5	No	No
Ontario - Canada	Duffins Cr.	Duffin Cr. Lentic	7.5	No	No
Ontario - NY	Black R.	Black River Bay	14.3	No	No
Ontario	Niagara River	Upper	4231.062	No	No
Ontario	Niagara River	Lower	760.5833	No	No
Superior	Goulais R.	Goulais Bay	310	No	No
Superior	Steel R.	Santoy Bay	14	No	No
Superior	Black Sturgeon R	Black Bay	54.4	No	No
Superior	Wolf R	Black Bay	68.4086	No	No
Huron	Mississagi R.	North Channel	128.9	Yes	No

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.

Purpose of task force:

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

Supporting Great Lakes Fishery Commission Strategic Vision Milestones:

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

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

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

Members in 2007 were:

Michael Twohey (chairperson), Kasia Mullett, and Jessica Doemel, U.S. Fish and Wildlife Service; Weiming Li and Michael Wagner , Michigan State University; Michael Siefkes and Dale Burkett, Great Lakes Fishery Commission; Rod McDonald and Michael Steeves, Department of Fisheries and Oceans; Jane Rivera and Roger Bergstedt, U.S. Geological Survey; Rob McLaughlin, University of Guelph; Ellen Marsden, University of Vermont; Mark Ebner, Chippewa/Ottawa Resource Management Authority. Meetings were held in February and September.

Progress:

1. Develop and periodically refine the pheromone, sterility, and trapping for control research theme papers.

Themes for SMRT, pheromones, and trapping (in the barrier theme) were published in September in the Journal of Great Lakes Research. Progress on theme research was reported to the Sea Lamprey Research Board and reviewed by the task force.

2. Identify application strategies. Solicit or develop field evaluation of the most promising strategies.

The strategy for implementation of a pheromone control technique was further refined. A workshop was scheduled for early 2008 to make additional refinements to the strategy based on current information. Implementation in 2010 was anticipated as an application designed to contribute to control and to be amenable to evaluation. It will likely involve a small number of streams at first, and will require evaluation to ascertain the effect over many years. A field trial of a trapping for control scenario using synthesized mating pheromone is scheduled to begin in 2008.

Evaluations of trapping and sterilization were progressing. Evaluations of traps during 2007 included the effect of water velocity on lamprey funnel entrance and an evaluation of a retention device in the Manistee River. Movement studies were planned to examine lamprey behavior near traps and to facilitate the effective placement of traps. A trap workshop was scheduled for September 2008 to advance applications for control. Finally, a four-year field evaluation of the sterile-female-release technique was started in 2007.

New efforts to trap for control progressed in 2007. Planning and permitting continued for a trap in the St. Marys River on the south side of the Great Lakes Power - Francis H. Clergue hydro plant which should be operational in 2008. A pilot trapping project was initiated in the Mississagi River, a large river in the North Channel of Lake Huron with potential to provide thousands of males for SMRT. Construction on a new trap in the Cheboygan River commenced, and a project on the Manistee River was in design development stage with construction planned for FY09.

3. Evaluate the role of trapping as an alternate control technique.

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. Recent work by Dawson and Jones (2007), Young et al. (manuscript in preparation) and Velez-Espino et al. (2008) supports the concept that reductions in stock size through trapping and other alternative controls leads to reduced parasites in the lakes (see discussion in item 7 below). The task force continued to monitor alternative control efforts in some Lake Champlain tributaries.

The Task Force continued to evaluate variables that affect trap efficiency and conducted evaluations of new and existing trapping technologies. Experimental manipulation of individual traps in the St. Marys River was implemented in 2006 and continued in 2007. Issues of trap retention and funnel design were paramount. Proposals for additional research identified at a trapping workshop in 2006 resulted in several new research proposals funded for 2008. Movement studies using hydo-acoustic technologies are scheduled for 2008 – 10. Effectiveness of portable assessment traps were evaluated in the first of a two year study.

4. Evaluate results of laboratory and field research and revise application strategies accordingly.

The task force, with leadership provided by Dr. Michael Wagner, continued to develop a strategic plan for implementation of a pheromone control technique by 2010 that incorporated recent results of laboratory and field studies. Field evaluations with a synthesized component of the migratory pheromone yielded unexpected results in 2007. Laboratory experiments and behavioural experiments in a maze will be conducted in 2008 to examine formulation issues.

Efforts continue to control the risk of transferring disease and invasive species. The task force working with the Fish Health Committee and lake committees has established 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 have been found that would curtail releases. A proposal to use real options analysis to assess risk of Lake Ontario lamprey transfers for sterilization was funded for 2008. A protocol to minimize risk of transmission of invasive species and disease in the Great Lakes was developed and updated to meet state and provincial requirements.

Trapping technologies continued to be evaluated in the Cheboygan and St. Marys rivers to optimize operations.

Results of sterile-male releases and trapping in the St. Marys River during 1991 – 2007 are presented in Table 7.

5. Mediate a collaborative link between control agencies and research institutions, such that the best available resources are used and the transition from laboratory to field is adequately facilitated.

Pheromone field experiments continued with investigators from MSU and both control agents. The control agent's expertise in trapping was integral to the field studies. Good Laboratory Practices training was provided by the Upper Mississippi Environmental Sciences Center (UMESC) and they continued to coordinate registration issues. Extraction of larval (migratory) pheromone continued at Hammond Bay with support from both control agents. This approach provided a strong interdisciplinary team and built critical expertise for future implementation of a pheromone control strategy.

The task force was collaborating with agents, and internal and external researchers to advance strategies for suppression of reproduction. A workshop was scheduled for 2008 to advance innovation in trap design and operation, and will included many outside experts and academics. Agents, PERM scientists, and outside experts were 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 were members of the Sea Lamprey Research Board.

6. Identify chemical/biochemical registration requirements, coordinate appropriate registration research, and facilitate the registration process with U.S. Environmental Protection Agency and Health Canada through appropriate Commission and U.S. Geological Survey personnel.

An amendment to the sex pheromone experimental use permit was submitted to include all compounds isolated from adult male washings. Good Laboratory Practices training continued to be coordinated by UMESC for field trial workers. Data was reviewed for compliance with Good Laboratory Practices. A report on field trial results was submitted for the State of Michigan. The EPA requires no interim reports as long as we continue under the same experimental use permits. Future registration strategies continued to be evaluated by UMESC. A plan for joint registration under NAFTA was accepted. Timelines and cost projections were updated.

7. Work with the assessment task force on issues of compensatory response of sea lampreys to reduced abundance and behavioural responses to pheromones, sterile-male release, and trapping.

Results of compensatory mechanisms investigations and subsequent modeling exercises suggest that strategies to reduce reproduction can be effective in an integrated strategy that aggressively reduces recruitment to very low larval densities. Recent work by Jones and Dawson suggests that a target of 0.2 females $\cdot 100\ m^{-2}$ is a general reference point that could be applied to all streams to avoid high recruitment events, though high recruitment occurs at all spanner abundances. It is worth noting that female density in the St. Marys River is 0.002 females $\cdot 100\ m^{-2}$. Further work by Young et al. (manuscript in preparation) and Velez-Espino et al. (2008) supports the concept that reductions in stock size leads to reduced parasites in the lakes.

8. Develop annual border-blind schedules that maximize efficiency.

The US and Canadian agents worked on both sides of the border to facilitate effective trapping, processing, and transport of sea lampreys, and are considering options to increase these efficiencies. The US and Canadian agents both provided staffing for pheromone field experiments near Hammond Bay. Protocols were adopted for screening and moving sea lampreys from the lower to upper Great Lakes using

facilities on both sides of the boarder. Some efforts for further cooperation have been hindered by new security requirements.

9. Annually update standard operating procedures.

Field operations continued to be conducted under updated protocols. Standard operating procedures for critical sterilization activities were 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 developed 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.

10. Annually develop estimates of costs for effort for upcoming fiscal year.

Budgets were proposed for 2008 for control trapping, sterilization, and pheromones and presented to the Sea Lamprey Integration Committee in the fall of 2007. Program efficiencies were identified and implemented for the 2007 budget. The task force continued to develop costs and timelines for strategic development and implementation of pheromone strategies.

11. Working with internal and external researchers, develop proposals and participate in field research consistent with pheromone, sterility, and trapping for control research theme papers.

Task force members were engaged in development of research proposals for trapping, SMRT, and pheromones. The task force continued to refine a research strategy to support implementation of a pheromone control technique by 2010. A pheromone strategy workshop was held during 2006, and another was planned for early 2008. Control agents, internal research and external researchers were collaborating on pheromone field trials through 2010. New applications of technology were being investigated to improve trapping efficiencies. A trap workshop was held in 2006 and attended by internal and external experts. Several research proposals resulted. Another trapping workshop is scheduled for September 2008. Efficacy of sterilization, Q/A, and potential for sterile female release continue 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. Additional detail is provided above in items 3, 4, and 5.

12. Annually review pheromone, sterility, and trapping for control research proposals for relevance to pheromone, sterility, and trapping for control research theme papers.

Task force input into research priorities was provided through the research themes and reliance on task force members who serve on the Sea Lamprey Research Board.

Barrier Task Force

Purpose:

Task Force 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 GLFC 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) Ensure sea lampreys are blocked at important or desired de facto barrier sites, in cooperation with partners;
3) Construct new structures in streams where they will:
   - Provide control where other options are not possible or effective,
   - Provide a cost-effective alternative to lampricide control,
   - Improve cost-effective control in conjunction with pheromone-based control methods, trapping, sterile male release, and lampricide treatments, or
   - Be compatible with a system's watershed plan.

Membership:

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

Progress on Objectives:

1. **Coordinate the construction of new sea lamprey barriers that annually eliminates 1% of available habitat for sea lamprey larvae.** At the end of 2007, construction of barriers in the Cedar (FWS) and South Branch Galien (Corps) Rivers were terminated. Progress on Trail Creek was delayed due to lack of Corps funding. Planning of a barrier in Orwell Brook was initiated by the Department. Planning continued on the Manistique River (FWS).

2. **Coordinate the operation of all existing barriers so that they are 100 % effective in blocking spawning-phase sea lampreys.** The barriers that are 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. During 2007, 10 barriers were operated (Canada – Big Carp and Little Carp Rivers, Big and Wesleyville Creeks and Cobourg Brook; U.S. – Pere Marquette, Ocqueoc and Albany Rivers, and Furnace and Greene Creeks).

3. **Coordinate the maintenance of all existing barriers so that they are safe and always in sound condition by the expected arrival of spawning-phase sea lampreys.** During 2007, pre-migration, safety and maintenance inspections were conducted at sea lamprey barrier sites. The results of inspections led to immediate minor repairs or an engineered inspection and remediation plan for major repairs. The environmental assessment required by the National Park Service to repair a breach in the Miners River barrier was finalized and the barrier will be repaired during 2008. Upgrades and power for a back-up system for the Big Creek inflatable barrier were completed. Funds were received to rebuild barriers in Stokely Creek and plan for the rebuild of Gimlet Creek and Still River which had deteriorated and were at risk of failure. Negotiations with the landowner regarding the fate of the Shelter Valley Creek barrier continued and may result in decommissioning of the structure. Water levels were monitored at existing sites to evaluate barrier performance. Other maintenance projects during 2007 included repairs to Venison Creek, Salmon River, Duffins Creek, Graham Creek, Youngs Creek, Wolf River, Echo River, and Sturgeon River.

4. **In consultation with the control ranking task force, annually select new construction projects from the ranked barrier list.** 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 River, Gimlet Creek, Manistique River, Chagrin River, Saugeen River, Grand River and Black Sturgeon, and construction of new barriers in Trail Creek and Orwell Brook

5. **Coordinate to ensure that other barriers either remain complete blocks to adult sea lampreys or if they are proposed for removal then some form of sea lamprey block remains in place.** During 2007, agent staffs consulted and provided mitigation recommendations on fish passage or dam/perched culvert removal projects for Thmpson Creek, Little Calumet River, Bark Creek, Castle Creek, Green River, Boardman River, Stover Creek, Antrim Creek, Dair Creek, McCormick Creek, Shiawassee River, Cass River, Chataqua Creek, Euclid Creek, Ashtabula River and South Sandy Creek. Intensive coordination by the agent continued regarding the Black Sturgeon River Dam and Denny's Dam on the Saugeen River.

6. **Develop protocol to identify and recommend withdrawal of existing nonfunctional barriers from the Commission barrier network.** The criteria for considering withdrawal of existing non-functional barriers will be included in the revised version of the Barrier Strategy and Implementation Plan. The first draft of this revision is scheduled for 2008.

7. **Coordinate the development and maintenance of a GIS data base for all barriers that are relevant to sea lamprey control.** A de facto barrier workgroup was identified at the Spring 2007 Barrier Task Force to coordinate this effort. An Access database was created to store the de facto barrier inventory information and related larval sea lamprey information and a dam inspection report was created based on the fields in the database. For U.S. tributaries, inventories were conducted in all five Great Lakes based on barrier lists created from National and State Inventory lists for which barrier orders were assigned. By the end of 2007, 553 surveys (50 in Superior, 316 in Michigan, 187 in Huron) were completed and entered into the database, which includes ground-truthed GIS coordinates and accurate stream codes for each barrier, which is key to linking this database to historical lamprey data.

8. **Develop annual border-blind schedules that maximize efficiency.** Annual border-blind schedules continued to be developed during 2007.

9. **Annually develop estimates of costs for effort and construction for upcoming fiscal year.** Developed and recommended a fiscal year 2007 budget of $1,158,000 for barrier coordinators, technical staff support, barrier operations, maintenance, planning on Manistique River, South Branch Galien River, Trail Creek, Orwell Brook, and Gimlet Creek repair.

10. **Annually update the cost information for the barrier rank model and provide the information to the Control Ranking and Evaluation Task Force.** In 2007, a barrier program review was completed and the SLIC Core and Commission supported the conclusions of the review. The review resulted in following priorities to guide the barrier program: 1) Operate and maintain existing commission structures; 2) Ensure that sea lampreys are blocked at important or desired de facto barrier sites, in cooperation with partners; and 3) Construct new structures in streams where they will: 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; or d) be compatible with a system's watershed plan. Potential scenarios for selecting barrier projects were discussed during 2007 with a workshop scheduled to convene during 2008 to further discuss the matter.

11. **Annually update SOPs.** Several of the protocols in the Barrier Life Cycle and Operational Protocols document continue to be in need of revision. A schedule to complete these revisions will follow the revision of the Barrier Strategy and Implementation Plan.

12. **Assist in the development and refinement of the barrier research theme paper.** Completed.

13. **Work with internal and external researchers to develop proposals and participate in field research of studies consistent with barrier 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.

14. **Annually review barrier research proposals for relevance to 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.

RISK ASSESSMENT

Risk assessment addresses environmental issues related to the implementation of sea lamprey management activities. This involves participating in sea lamprey related environmental risk management discussions with state, tribal, and Federal regulatory agencies to obtain lampricide application permits, assuring the protection of Federal and state-listed species, and working with others to minimize risk to non-target organisms.

Permits

Issues concerning management of environmental risk during lampricide applications were addressed to fulfill regulatory agency permit requirements for the Indiana Department of Natural Resources, Michigan Department of Environmental Quality, Minnesota Department of Natural Resources, New York Department of Environmental Conservation, Ohio Environmental Protection Agency, Pennsylvania Fish and Boat Commission, Wisconsin Department of Natural Resources, Red Cliff Band of Lake Superior Chippewas and the Bad River Band of Lake Superior Tribe of Chippewa Indians.

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 U.S. Fish & Wildlife Service is the registrant for lampricides and must report unreasonable adverse effects on humans, domestic animals, fish, wildlife, plants, other nontarget 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 1).

Table 1. Summary of 6(a)(2) incidents on non-target organisms during 2007.

Lake	Stream	Mortality	Freq	Comments
Superior	Poplar River	white sucker (*Catostomus commersonii*)	100	Low water conditions
		stonecat (*Noturus flavus*)	50	
		common shiner (*Notropis cornutus*)	100	Low water conditions
Michigan	Beattie Creek	central mudminnow (Umbra limi)	50	Low water conditions
		white sucker (*Catostomus commersonii*)	50	Low water conditions
Ontario	Salmon River	stonecat (*Noturus flavus*)	200	
		mudpuppy (*Necturus maculosus*)	100	
Champlain	Boquet River	brown bullhead (*Ameiurus nebulosus*)	112	Unexpected drop in pH
	AuSable River	logperch (*Percina caprodes*)	604	
	Poultney River	white sucker (*Catostomus commersonii*)	97	

Federal and State Endangered Species

Consultations with Fish and Wildlife Service (Service) offices and state agencies were held to discuss proposed lampricide applications, to assess the potential risk of these applications to Federal (endangered, threatened, and candidate) and state-listed (endangered, threatened, and special concern) species, and develop procedures that protect and avoid disturbance for each listed species. The State of Michigan issued a Threatened/ Endangered Species Permit to allow the incidental take of state-listed species.

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 2007*; and

- *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 2007.*

The protocols provided field personnel with a list of protected Federal- and state-listed species, their known locations, and steps to be taken to avoid and protect. No mortality or disturbance was observed for the 43 Federally- or state-listed species listed in the protocols.

Lake Sturgeon

During 1982, the lake sturgeon (*Acipenser fulvescens*) was being considered for threatened or endangered status in the United States and was listed in the Federal Notices of Review Register as a category 2 (C2) candidate species. The C2 classification was removed within the Service during 1995 and for the public during 1996. The lake sturgeon now has no formal Federal designation.

During 2007, the lake sturgeon was listed as State endangered in Illinois, Indiana, Ohio, and Pennsylvania, threatened in Michigan and New York, and as a special concern species in Minnesota and Wisconsin. Tributaries in these states where lake sturgeon recently have been documented include the Bad, Ontonagon, Sturgeon, and St. Louis rivers (Lake Superior); Fox, Grand, Kalamazoo, Manistee, Manistique, Manitowoc, Menominee, Millecoquins, Milwaukee, Muskegon, Oconto, Peshtigo, and St. Joseph rivers (Lake Michigan); Carp, Cheboygan, Rifle, Saginaw, and St. Marys rivers (Lake Huron); Detroit and St. Clair rivers (Lake Erie); and Black, Genesee, and Niagara rivers (Lake Ontario).

Consensus was achieved with the Michigan and Wisconsin Departments of Natural Resources to manage lampricide treatments to control sea lampreys while minimize the mortality of lake sturgeons in the Manistique (Lake Michigan) and Bad (Lake Superior) Rivers. Assessments during and immediately after treatments of these rivers found no dead lake sturgeons. Some assessments were completed to fulfill requirements specified in the 2007 certifications of approval issued for lampricide treatments by the Michigan Department of Environmental Quality.

Programmatic Review

Because sea lamprey Management (SLM) involves extensive field work, there is the possibility of direct and indirect impacts on Federally-listed threatened, endangered and candidate species and critical habitats. Annually, more than 200 streams are assessed to estimate sea lamprey populations and about 50 streams are treated with lampricides to control sea lamprey populations. Positive streams, containing significant, recurring sea lamprey populations, are treated every three to five years on a rotating basis. Negative streams are periodically surveyed. In addition, SLM traps about 50 streams during the spawning run to estimate adult sea lamprey populations.

The programmatic review (Programmatic) evaluates all SLM activities, identifies potential impacts to protected species and critical habitats, and suggests conservation measures to eliminate or minimize disturbance to listed species and habitat. For the majority of the Federally-listed and candidate species and critical habitats in the action area, SLM activities will have either a "no affect" or "not likely to adversely affect" determination.

Due to this effects determination and the number of streams surveyed, treated and trapped annually, a streamlined review process is being developed. For species and habitats that the SLM is "likely to adversely affect" formal consultation will be initiated. Site specific and project specific information will be provided with these formal consultation requests; the Programmatic will provide the background and preliminary analysis of potential impacts to a species. The analysis will be updated or modified as site specific conditions warrant. If the analysis in the Programmatic does not need to be modified, the formal consultation request will simply reference the Programmatic document.

The initial draft of the Programmatic confined the action area to the State of Michigan. During 2007, the draft was submitted for review by all Region 3 Ecological Services Offices in the SLM action area. Each individual office was asked to add species missing for their respective jurisdictions, and to provide information on the biology, preferred habitat, and geographic location of protected species and any identified critical habitats.

2007 OUTREACH

Table 24. Dates and locations of public outreach performed by agents of the sea lamprey control program in 2007.

DATE	LOCATION	TYPE OF SHOW	AGENCY
January 11-20	Cleveland, OH	Cleveland Boat & Waterfront Lifestyle Expo	USFWS
January 16-20	Chicago, IL	Chicago Boat, RV & Outdoors Show	DFO
February 13 -17	Duluth, MN	Boat & Sport Show	USFWS
February 28 - March 2	Novi, MI	Outdoorama	USFWS
March 12 - 16	Toronto, ON	Toronto Sportsmans Show	DFO
March 21 -24	Ottawa, ON	Landsdown Park	DFO
March 28 - 30	Marquette, MI	Boat Show	USFWS
April (all month)	Duluth, MN	Omni Max Theatre	USFWS
June 7	Buffalo, NY	Lower Great Lakes - FA Office	USFWS
July 19	Minneapolis, MN	Mall Of America	USFWS
August 11-17	Escanaba, MI	UP State Fair	USFWS

PERMANENT EMPLOYEES OF THE 2007 SEA LAMPREY MANAGEMENT PROGRAM

DEPARTMENT OF FISHERIES AND OCEANS CANADA

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

Section Head, Control: W. Paul Sullivan
Biologists, Control:
Brian Stephens
Barry Scotland (Acting)
Technical Staff, Control:
Charlie Boudreau
Glenn Goulay
Peter Grey
Jerome Keen
Mike MacKenna
Shawn Robertson
Chris Sierzputowski
Jamie Smith
Randy Stewart
Jamie Storozuk
John Tibbles
Finance & Administration Officer: Lisa Vine
Administrative Support:
Christine Reid
Melanie McCaig
Maintenance Supervisor: Brian Greene
Maintenance Assistant: Chad Hill

Section Head, Assessment: Mike Steeves
Biologists, Assessment:
Rod McDonald
Fraser Neave
Andrew Treble (Acting)
Gale Bravener (Acting)
Technical Staff, Assessment:
Ed Achtemichuk
Gale Bravener
Chris Cowper
Richard Middaugh
Sean Morrison
Jeff Rantamaki
Kevin Tallon
Andrew Treble
Thomas Voigt
Barrier Co-ordinator: Vacant
Barrier Technologist: Joe Hodgson
LAN Manager & Desktop Support: John Graham (DFO)

UNITED STATES FISH AND WILDLIFE SERVICE

Bob Adair, Sea Lamprey Management Program Manager and Field Supervisor

Marquette Biological Station – Marquette, Michigan

Kasia Mullett, Station Supervisor

Supervisor, Control: Terry Morse

Biologists, Control:
Dorance Brege
Darrian Davis
Joseph Genovese

Chemist: David Johnson

Technical Staff, Physical Science:
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