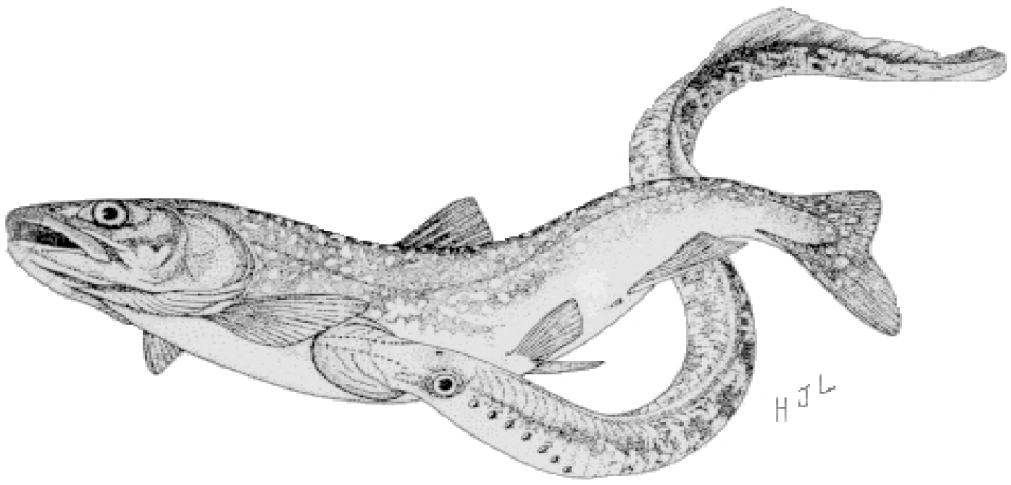
INTEGRATED MANAGEMENT OF SEA LAMPREYS IN THE GREAT LAKES 2001

ANNUAL REPORT TO

GREAT LAKES FISHERY COMMISSION



by

Larry P. Schleen
Department of Fisheries and Oceans
Sault Ste. Marie, Ontario
Canada

Gerald T. Klar
U.S. Fish and Wildlife Service
Marquette, Michigan
United States

GLFC Annual Meeting
June 3-4, 2002

Contents

INTEGRATED MANAGEMENT OF SEA LAMPREYS IN THE GREAT LAKES 2001

Larry P. Schleen
Department of Fisheries and Oceans
Sault Ste. Marie, Ontario P6A 6W4

Gerald T. Klar
United States Fish and Wildlife Service
Marquette, Michigan 49855

EXECUTIVE SUMMARY

This report summarises activities in the integrated management of sea lampreys conducted by the U.S. Fish and Wildlife Service (Service) and the Department of Fisheries and Oceans Canada (Department) in the Great Lakes during 2001. Lampricide treatments were conducted on 72 tributaries (Table 1). Larval assessment crews surveyed 316 Great Lakes tributaries and 7 lentic areas to assess control effectiveness, plan future TFM treatments, and establish production capacity of streams. Assessment traps were operated in 67 tributaries to estimate the spawning-phase population in each Great Lake (Table 2).

This report evaluates sea lamprey populations relative to fish community objectives in each of the lakes. In Lake Superior the management objective for sea lampreys is a level of sea lamprey abundance that accounts for less than 5% of the annual lake trout mortality. Currently, sea lamprey-induced mortality in lake trout is estimated as 16% of the annual total. In Lake Michigan the fish community objectives are generally being met despite an increase in lamprey wounding rates on lake trout in northern waters of the lake. Populations of parasitic lampreys remain higher than the fish community objective in Lake Huron due to continued production of transformers from the St. Marys River. In Lake Erie the fish community objective for sea lampreys has not been met during 1996-2001, although abundance declined by 50% from 2000 levels. The fish community objective for sea lampreys in Lake Ontario was nearly met in 2001, with wounding rates on lake trout at 3% compared to the target of 2%.

The Sterile Male Release Technique Task Force continued to co-ordinate the implementation of the technique in the St. Marys River. The task force is working with the Assessment and Lampricide Control task forces and other researchers on stock recruitment variation and determination of the effectiveness of the technique in the St. Marys River. The task force is also assembling cost estimates for the control strategy in the St. Marys River in preparation of a formal review of the technique. The St. Marys River received 31,459 sterile males, which created a 3.6:1 sterile:untreated male ratio. The theoretical reduction from trapping and sterile male release combined was estimated at 88% during 2001.

The Barrier Task Force continued co-ordination activities with the U.S. Army Corps of Engineers to implement ten barrier projects under Section 1135 of the Water Resources Development Act. The task force revised interim environmental policy and guidelines for the placement of sea lamprey barriers and began to formulate a basin-wide strategy for workplace and public safety in the barrier program.

The Assessment Task Force again utilized the empirical stream treatment-ranking model to rank and select streams for lampricide treatment in 2002. Transformer production predictions were made for all streams quantitatively assessed in 2001 as well as for all other streams treated in the last 3 years. The task force continued to implement recommendations of the adult assessment review by redistributing trapping effort from small to large streams, estimating the parasitic population in Lake Huron by marking and releasing parasitic lampreys into the lake, and estimating the transformer production in Lake Superior by marking and releasing transformers into select tributaries. The task force continued to evaluate control efforts in the St. Marys River by estimating the larval sea lamprey population.

A spawner movement study was done in the St. Marys River in an effort to increase trap efficiency. The task force assisted with several collaborative ventures including the long-term sterile male release, compensatory mechanisms and lampricide treatment efficiency studies. A peer review of the larval program is scheduled for August 2002.

The Lampricide Control Task Force continued to implement options for reducing lampricide use in individual treatments but concurrently co-ordinated an enhanced treatment program in all of the Great Lakes. The task force co-ordinated an ongoing treatment effectiveness study on 14 streams in the basin and continued to implement lake sturgeon treatment protocols in an ever-increasing number of streams.

Risk assessment projects focused on environmental risk management as related to regulatory agency permits for control actions and on co-ordination of issues related to lake sturgeon (Acipenser fulvescens) and other non-target organisms throughout the Great Lakes basin.

The sea lamprey management program conducted 2,630 outreach activities that required 287 staff days.

Table 1. Summary of lampricide applications in tributaries of the Great Lakes, 2001.

Lake	Number of Streams	Flow (m^3/s)	TFM[1,2] (kg)	Bayluscide[1,3] (kg)	Distance (km)
Superior	21	68.1	6,404	38.0	539.1
Michigan	19	90.0	15,680	186.8	597.4
Huron	19	27.5	4,251	241.7	234.5
Erie	4	19.1	4,162	26.3	77.7
Ontario	9	50.2	5,836	4.7	204.0
Total	72	254.9	36,333	497.5	1,652.7

[1]Lampricide quantities are in kg of active ingredient.
[2]Includes 66 TFM bars (13.8kg active ingredient applied in 2 streams).
[3]Includes 272.3kg active ingredient applied as Bayluscide 3.2% granular sea lamprey larvicide.

Table 2. Number and biological characteristics of adult sea lampreys captured in assessment traps in tributaries of the Great Lakes, 2001.

Lake	Number of Streams	Total Captured	Number Sampled	Percent Males	Mean Length (mm)		Mean Weight (g)	
					Males	Females	Males	Females
Superior	21	9,188	1,880	47	443	430	184	186
Michigan	15	29,260	2,225	47	483	482	254	257
Huron	14	38,874	180	58	477	483	236	248
Erie	4	1,214	7	57	514	447	305	237
Ontario	13	4,892	685	51	478	481	247	260
Total	67	83,428	4,977					

INTRODUCTION

Sea lamprey control is a critical fishery management action delivered to support the Fish Community Objectives developed by the lake committees as part of the Strategic Plan for Great Lakes Fishery Management. Objectives for acceptable levels of mortality that allow the establishment and maintenance of self-sustaining stocks of lake trout and other salmonids have been established on all of the lakes. In some cases, the lake committees have established specific targets for sea lamprey populations in the Fish Community Objectives or the lake trout rehabilitation plans. The current control program reflects actions by the U.S. Fish and Wildlife Service (Service) and Department of Fisheries and Oceans Canada (Department) as contract agents of the Great Lakes Fishery Commission (Commission) to meet these targets.

The Commission is working in partnership with the lake committees through their lake technical committees to refine the target statements and to develop common target formats for each of the lakes. The target for each lake will define the abundance of sea lampreys that can be tolerated and the economically viable level of control required to reach the desired suppression. The Commission and co-operators will consider the costs of control along with the benefits to define an optimum control program. The program must support the Fish Community Objectives, be ecologically and economically sound, and be socially acceptable.

This report presents the actions of the Service and Department in the integrated management of sea lampreys in the Great Lakes during 2001. Also presented are actions to meet milestones of the Commission Vision and trends in sea lamprey abundance as related to Fish Community Objectives.

COMMISSION VISION

The Commission established the "Strategic vision of the Great Lakes Fishery Commission for the decade of the 1990s" during 1992 (the document "Strategic vision of the Great Lakes Fishery Commission for the first decade of the new millennium" was published during September 2001, and therefore will apply to 2002) and established the following integrated management of sea lampreys vision statement:

> *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 the vision the Commission set milestones. The following are the milestones and the accomplishments to those milestones:

1) *Establish target levels of sea lamprey abundance by 1994 that maximise net benefits of sea lamprey and fisheries management.*

Beginning in 1993 and ending in 1998 each lake committee had established Fish Community Objectives for sea lamprey abundance that were based on their subjective judgement of levels necessary for lake trout rehabilitation. The sea lamprey portion of the process to set economic injury levels is largely complete. The Commission and lake committees are initiating discussion and planning to focus fish community objectives on economic injury levels.

2) *Suppress sea lamprey populations to target levels through an optimal program of control, assessment and research. This program will be characterised by:*

    a) *maintenance of lampricide registrations with environmental agencies*

The Service is the registrant for all lampricides used in the United States and for Bayluscide products and TFM bars used in Canada. The U.S. Geological Survey-Biological Resources Division (USGS-BRD) has provided technical support for establishment and maintenance of registrations.

b) development and use of alternative control techniques to reduce reliance on lampricides to 50 percent of current levels

Since the beginning of the use of lampricides in the management program in 1958, the Service and Department continually have increased their efficiency in the use of TFM. The combination of improved analytical, application, and assessment techniques and construction of barriers has reduced the use of TFM from an annual average of 55,169 kg active ingredient from 1986 through 1990 to an annual average of 33,310 kg active ingredient from 1997 through 2001, a reduction of 40%. This decrease has occurred through a combination of program efficiencies and implementation of alternative controls, and has occurred despite the addition of streams to the treatment program with higher TFM requirements due to high pH and total alkalinity.

c) development of quantitative assessment and improved control technologies for lentic areas and connecting channels

This has been implemented as two separate milestones: 1) development of quantitative assessment of sea lamprey populations in all areas, and 2) improved control in lentic and connecting channels. Both have been met and further refinements are continuing.

d) improvement of information gathering and research through program co-ordination among sea lamprey control agents, fish management agencies, other agencies and private groups, and researchers

Research primarily has been met through delivery of outstanding work products of the internal research team of USGS-BRD centers (Great Lakes Science Center and its Hammond Bay Biological Station, and Upper Midwest Environmental Sciences Center) and the Partnerships in Environmental Research and Management (PERM) scientists at Michigan State University, and of the external research through alternative control and Integrated Management of Sea Lampreys (IMSL) research contracts. Information gathering has been met through Service and Department representation on lake technical committees, the Sea Lamprey Integration Committee (SLIC) organisation of task forces and working groups, and outreach activities with private groups.

FISH COMMUNITY OBJECTIVES

Lake Superior

In the 2001 Fish Community Objectives, the Lake Superior Committee established the target for sea lamprey management in Lake Superior as:

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

The management objective for sea lampreys defines 'insignificant mortality' as a level of sea lamprey abundance that accounts for less than 5% of the annual lake trout mortality in Lake Superior. Currently, sea lamprey-induced mortality on lake trout is estimated as 16% of the annual total. No significant trend was detected from a linear regression of spawner abundance on year from 1982 to 2001 (Fig. 4).

The desired level of sea lamprey abundance is unlikely to be achieved through the increased use of TFM, as all sea lampreys producing tributaries to Lake Superior are currently being treated. A cost-benefit analysis indicates that an increase in the number of stream treatments will result in a relatively small decline in lake-wide lamprey abundance.

Instead, efforts are being directed towards an increase in assessment and control of lentic populations, an increase in number of lamprey barriers, and investment in new technologies, such as pheromone-based control. These additional methods will be combined with continued TFM treatment to further suppress sea lamprey populations in Lake Superior.

Lake Michigan

During 1995, the Lake Michigan Committee established the following specific targets for sea lamprey populations in their Fish Community Objectives:

> *Suppress the sea lampreys to allow the achievement of other fish-community* objectives.

In general, treatment of Lake Michigan tributaries over the years has provided sufficient control of sea lampreys, yet increases in lamprey wounding rates on lake trout in northern waters of the lake are a concern. The long-term trend of sea lamprey abundance is a significant linear increase from 1982-2001 (Fig. 5).

The sea lamprey objective was developed to support the other fish community objectives for Lake Michigan, specifically those for lake trout and other salmonids.

> *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.*

Control of sea lamprey populations and fishery exploitation is necessary to meet these objectives. The lake-wide management plan specifies four areas where the chances of successful lake trout rehabilitation exist: refuges, primary, secondary, and deferred rehabilitation zones. The refuges and primary zones where priority should be given to control sea lamprey populations include the mid-northern region of the lake, the mid-lake reef zone, and an offshore reef area in the southwest portion of the lake.

Lake Huron

In 1995 the Lake Huron Committee established the following specific targets for sea lamprey populations in their 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 in parasitic-phase sea lampreys by the year 2010 from present levels.*

While the lake-wide abundance has been relatively stable throughout the 1990s, at least twice as many lampreys remain in Lake Huron than in any of the other Great Lakes (Fig. 6). Estimated abundance of spawning-phase sea lampreys in 2001 was one of the measures used to determine success of the granular Bayluscide treatments in the St. Marys River of 1998-1999. This sea lamprey target supports the objectives for the other species groups in the fish community including, for example, the salmonine community objective:

> *Establish a diverse salmonine community which can sustain an annual harvest of 5.3 million pounds, with lake trout the dominant species and anadromous species also having a prominent place.*

Lake Erie

The Lake Erie Committee developed a draft “Guiding Principles for Determination of Fish Community Objectives” during 1999. The draft recognised sea lampreys as a pest species requiring control.

A specific management plan for sea lampreys in Lake Erie was developed prior to the implementation of stream treatments during 1986. The plan defined an experimental program of control to reduce sea lamprey populations to levels where wounding on lake trout would be less than 5%, assessment trap catches of lampreys would be less than 10% of pre-treatment levels, and nest densities would be less than 2 nests per km of spawning habitat.

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 would be controlled through management of fishery exploitation and continued suppression of sea lampreys.

The fish community objective for sea lampreys was not met during 2001, and has not been met during 1996-2001. This is in contrast to the period during 1988-1995, when wounding rates were low and stable.

During 1980-2001, the Service and Department annually have trapped spawning-phase sea lampreys in an average of 6 tributaries, and have estimated lake-wide abundance of spawning lampreys with multiple regression analysis of 6 interrelated variables (Fig. 7). Lampricide control began during 1986 and first showed effect in the spawner population during 1989. Estimated lake-wide abundance averaged 17,000 during 1980-1988, was reduced to an average of 4,000 during 1989-1994, and has since increased to over 8,000 during 1995-2001, although abundance declined in 2001.

Lake Ontario

The Lake Ontario Committee during 1988 supported the continuation of sea lamprey control and defined a specific target for sea lamprey populations in terms of mortality to lake trout in the 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.*

This specific objective was developed to support the salmonine community including a lake trout population that shows significant reproduction in the near term.

The Lake Ontario Committee has revised its Lake Ontario Lake Trout Rehabilitation Plan from the original plan developed during 1983. The goal of the plan is to rehabilitate the population of lake trout to a self-sustaining level as defined in the Fish Community Objectives. The plan includes the fundamental premise that the continued control of sea lampreys is necessary for lake trout rehabilitation. The plan includes the specific objective for sea lampreys:

> *Controlling sea lampreys so that fresh wounding rates (A1) of lake trout larger than 432 mm is less than 2 marks/100 fish.*

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

The fish community objective for sea lampreys was nearly met during 2001 with 3 marks per 100 lake trout. Wounding rates in Lake Ontario have been remarkably stable during 1985-2001, ranging from 1-3 marks per 100 fish.

During 1981-2001, the Service and Department annually have trapped spawning-phase sea lampreys in an average of 15 tributaries, and have estimated lake-wide abundance of spawning lampreys with multiple regression analysis of 6 interrelated variables (Fig. 8). Estimated lake-wide abundance averaged 72,000 during 1981-1990, and was reduced to an average of 33,000 during 1991-2001. During 1981-2001, abundance of spawners has shown a significant negative linear trend.

LAMPRICIDE CONTROL

Tributaries harbouring larval sea lampreys periodically are treated with lampricides to eliminate or reduce the populations of larvae 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 the 70% wettable powder formulation of Bayluscide, to scheduled tributaries. Specialised equipment and techniques are employed to provide concentrations of TFM that eliminate about 95% of the lamprey larvae and minimise the risk to non-target species. During recent years the combination of improved analytical and predictive techniques has allowed treatment crews to reduce the amount of lampricide use (kg/yr.) in the Great Lakes by 40%.

The Lampricide Control Task Force was established during December 1995 with charges to improve the efficiency of lampricide control, to maximise sea lampreys killed in stream and lentic treatments while minimising lampricide use, costs, and impacts on stream/lake ecosystems, and to define lampricide control options for near and long-term stream selections and target setting. The report of progress on the charges during 2001 is presented on page 47.

Lake Superior

Tributary Information:

- Lake Superior has 1,566 (733 U. S., 833 Canada) tributaries.

- 136 (89 U. S., 47 Canada) tributaries have historical records of production of sea lamprey larvae.

- 70 (41 U. S., 29 Canada) tributaries have been treated with lampricides at least once during 1992-2001.

- Of these, 58 (30 U. S., 28 Canada) tributaries are treated on a regular 3-5 year cycle.

Table 3 provides details on the application of lampricides to tributaries treated in 2001 and Fig. 1 shows the locations of the tributaries. The following statements highlight the lampricide control program in Lake Superior during 2001:

- Treatments with TFM were completed in 20 scheduled tributaries (16 U.S., 4 Canada).

- Bayluscide 3.2% granular sea lamprey larvicide was applied to selected areas in Batchawana Bay. Moderate numbers of larvae were observed during these treatments.

- A treatment effectiveness study was conducted in the Big Carp River, Ontario.

- The protocol for application of lampricides to streams with populations of young-of-year lake sturgeon was followed in treatments of the Ontonagon, Bad, and Sturgeon rivers. Lampricide concentrations were restricted to 1.0 times the minimum lethal concentration (MLC) (MLC: concentration required to kill 99.9% of sea lampreys in a 12 hour treatment), in the lower reaches of the Ontonagon and Bad rivers and 1.2 times the MLC in the Sturgeon River.

- A written agreement was reached with the Bad River Band of Lake Superior Chippewa Indians that allowed access to Tribal lands for treatment of the Bad River. Treatment was completed successfully under stipulations of the agreement.

- The Potato and Cranberry rivers, treated during 2000, were retreated during 2001. Treatments were complicated by low discharge, beaver dams, and intermittent rain.

- Excessive stream discharge complicated work on the Ontonagon River. Two ten-day periods were required to complete treatment of the system.
- Treatment was deferred on about 2.5 km of the upper Traverse River. Low discharge produced abnormal water chemistry conditions and lengthy times of flow between applications points.
- Treatment of the Tahquamenon River was postponed due to high stream discharge.
- Department personnel treated the Waiska River in Michigan.
- Mortality of non-target organisms was not significant in any of the tributaries treated.

Table 3. Details on the application of lampricide to tributaries of Lake Superior, 2001. (Number in parentheses corresponds to location of stream in Fig. 1)

Stream	Date	Flow (m^3/s)	TFM[1] (kg)	Bayluscide[1,2] (kg)	Distance Treated (km)
Canada					
Agawa R. (2)	Jul-17	0.1	8	0.0	1.0
Steel R. (1)	Jul-18	9.0	617	0.0	6.7
Batchawana Bay (3)	Aug-07	-	-	30.6[2]	-
Little Carp R. (5)	Sep-11	0.3	13	0.0	8.0
Big Carp R. (4)	Sep-17	0.2	11	0.0	9.7
Total		9.6	648	30.6[2]	25.4
United States					
Rock R. (8)	May-03	0.5	24	0.0	3.2
Ontonagon R. (15)	May-28	27.8	2422	0.0	157.7
Potato R. (16)	Jun-07	0.2	77	0.0	19.3
Cranberry R. (17)	Jun-08	0.3	48	0.0	24.1
Amnicon R. (21)	Jun-21	4	258	0.0	9.7
Red Cliff Cr. (19)	Jun-22	0.1	9	0.0	1.6
Brule R. (20)	Jun-25	5.1	420	0.0	9.7
Iron R. (10)	Jul-03	1.6	98	0.0	3.2
Carp R. (9)	Jul-05	2.4	233	0.0	4.8
Huron R. (11)	Jul-13	0.3	51	0.0	14.5
Traverse R. (13)	Jul-14	0.6	29	0.0	11.3
Silver R. (12)	Aug-23	0.3	67	0.0	8.0
Sturgeon R. (14)	Aug-25	7.1	497	7.4	61.1
Waiska R. (6)	Sep-05	0.3	21	0.0	10.1
Au Train R. (7)	Sep-09	3.1	505	0.0	12.9
Bad R. (18)	Sep-21	4.8	997	0.0	162.5
Total		58.5	5755	7.4	513.7
Grand Total		68.1	6404	38.0	539.1

[1]Lampricides are in kg of active ingredient.
[2]Includes 30.6kg active ingredient applied as Bayluscide 3.2% granular sea lamprey larvicide.

FIG. 1. – LAMP. APP. MAP

Lake Michigan

Tributary Information:

- Lake Michigan has 511 tributaries.

- 121 tributaries have historical records of sea lamprey larvae production.

- 65 tributaries have been treated with lampricide at least once during 1992-2001.

- Of these, 35 tributaries are treated on a regular 1-5 year cycle.

Table 4 provides details on the application of lampricide to tributaries treated during 2001 and Fig. 1 shows the locations of the tributaries. The following statements highlight the lampricide control program for Lake Michigan during 2001:

- Treatments were completed in all 19 scheduled tributaries.

- The interim protocol for application of lampricides to streams with populations of young-of-year lake sturgeon was followed in treatments of the Peshtigo, Oconto, Whitefish, Manistique, Cedar, and White rivers. The protocol limits the concentrations of TFM and Bayluscide 70% Wettable Powder to 1.2 times minimum lethal concentration (MLC: concentration required to kill 99.9% of sea lampreys in a 12 hour treatment), to protect young-of-year lake sturgeon in the tributaries.

- Treatments with Bayluscide 70% wettable powder in the Whitefish and Cedar rivers produced baseline data that are now available to aid in future treatments of these streams.

- Treatment of the Cedar River was complicated by extremely low discharge. Treatment effectiveness may have been compromised by the large volume of standing water in downstream reaches.

- The Days River was treated for the fourth consecutive year to prevent recruitment of larval sea lampreys into offshore areas in Lake Michigan.

- Areas in Manistique Harbor were treated with Bayluscide 3.2% granular sea lamprey larvicide after completion of the mainstream treatment. The Bayluscide granules were applied by boat to 13 hectares in the harbor area. Numerous large sea lamprey larvae were observed after the applications.

- No significant mortality of non-target organisms occurred during any treatment.

Table 4. Details on the application of lampricide to tributaries of Lake Michigan, 2001. (Number in parentheses corresponds to location of stream in Fig. 1)

Stream	Date	Flow (m^3/s)	TFM[1,2] (kg)	Bayluscide[1,3] (kg)	Distance Treated (km)
Little Fishdam R. (38)	May 14	0.2	23	0.0	3.2
Paw Paw R. (31)	May 25	19.2	4,079	19.7	147.5
Black R. (30)	Jun 24	3.0	508	0.0	25.7
Gurney Cr. (27)	Jul 5	0.3	61	0.0	1.9
Platte R. (26)	Jul 13	8.1	1,902	7.0	20.5
Pentwater R. (28)	Jul 29	1.1	247	0.0	23.4
Peshtigo R. (33)	Jul 26	8.2	1,043	17.7	12.9
Oconto R. (32)	Jul 31	9.9	1,046	16.3	19.3
Boardman R. (24)	Aug 10	5.7	1,392	0.0	7.3
Poodle Pete Cr. (39)	Aug 11	0.2	17	0.0	1.6
Whitefish R. (37)	Aug 11	2.9	992	3.6	112.9
White R. (29)	Aug 24	9.6	2,094	24.9	124.0
Manistique R. (40)	Sep 7	19.3	1,069	94.6[3]	1.6
Days R. (36)	Oct 4	0.2	47	0.0	8.0
Cedar R. (35)	Oct 4	0.5	711	3.0	80.5
Goodharbor Cr. (25)	Oct 5	0.8	269	0.0	4.3
Porter Cr. (23)	Oct 8	0.3	75	0.0	0.3
Horton Cr. (22)	Oct 8	0.4	103	0.0	0.9
Beattie Cr. (34)	Oct 10	0.1	2	0.0	1.6
Total		90.0	15,680	186.8[3]	597.4

[1]Lampricide quantities are in kg of active ingredient.
[2]Includes a total of 66 TFM bars (13.8kg active ingredient) applied in 2 streams.
[3]Includes 75.5kg active ingredient applied as Bayluscide 3.2% granular sea lamprey larvicide.

Lake Huron

Tributary Information:

- Lake Huron has 1,761 (427 United States, 1,334 Canada) tributaries.

- 117 (62 United States, 55 Canada) tributaries have historical records of production of sea lamprey larvae.

- 70 (34 United States, 36 Canada) tributaries have been treated with lampricide at least once during 1992-2001.

- Of these, 40 (22 United States, 18 Canada) tributaries are treated on a regular 3 to 5 year cycle.

Table 5 provides details on the application of lampricides to tributaries during 2001 and Fig. 1 shows the locations of the tributaries. The following statements highlight the lampricide control program in Lake Huron during 2001:

- Lampricide treatments with TFM were completed on 18 of 20 Lake Huron tributaries (10 of 11 U.S., 8 of 9 Canada) scheduled for treatment.

- H-267, a small tributary on Manitoulin Island, was deferred due to lack of time at the end of the field season. This tributary will be treated in 2002.

- A total of 42 hectares in the St. Marys River was treated with Bayluscide 3.2% granular sea lamprey larvicide. These areas had been deferred from the 1998/99 treatment effort in the St. Marys River.

- Treatment of the Shiawassee River was deferred twice in 2001. The first postponement resulted from high discharge and the second from unfavorable pH levels. Treatment has been rescheduled for the spring of 2002.

- Department personnel treated Black Mallard, Greene, Nunns, Albany, McKay, and Carlton creeks in Michigan. Beaver dams reduced the effectiveness of treatment in sections of Black Mallard Creek.

- Heavy rain negated treatment effectiveness on a portion of the Bar River, a marginal producer of sea lamprey larvae.

- Lampricide concentrations were reduced on the Garden River to avoid mortality of juvenile lake sturgeon. Larval lake sturgeon were found in the Garden River two days before treatment, but no dead lake sturgeon were observed during or immediately after lampricide application. Treatment effectiveness for sea lamprey larvae was estimated to be 88%.

- Mortality of non-target organisms was minimal in all treated tributaries. This includes an assessment of lampricide-induced lake sturgeon mortality during the Garden River treatment.

Table 5. Details on the application of lampricide to tributaries of Lake Huron, 2001. (Number in parentheses corresponds to location of stream in Fig. 1)

Stream	Date	Flow (m^3/s)	TFM[1] (kg)	Bayluscide[1,2] (kg)	Distance Treated (km)
Canada					
Brown's Cr. (46)	May-03	0.4	14	0.0	1.3
Gordon Cr. (45)	May-03	0.3	10	0.0	1.2
Timber Bay Cr. (49)	May-15	0.2	29	0.0	2.8
Garden R. (42)	Jul-04	3.9	402	0.0	72.2
Thessalon R. (47)	Jul-24	4.0	369	0.0	33.6
St. Marys R. (41)	Jul-31	-	-	241.7[2]	-
Two Tree R. (44)	Oct-10	0.4	83	0.0	8.1
Sand Cr. (48)	Oct-23	0.4	43	0.0	1.1
Bar R. (43)	Oct-24	4.4	116	0.0	8.6
Total		14.0	1,068	241.7[2]	128.9
United States					
East AuGres R. (50)	May-03	2.1	405	0.0	17.4
Prentiss Cr. (56)	May-04	0.3	83	0.0	3.2
Trout Cr. (57)	May-11	0.3	22	0.0	1.6
Carlton Cr. (59)	Sep-07	0.1	8	0.0	1.3
Cheboygan R.					
Pigeon R. (53)	Sep-25	7.1	2,288	0.0	53.6
Nunns Cr. (54)	Sep-24	0.6	91	0.0	3.9
McKay Cr. (55)	Sep-25	1.3	120	0.0	8.5
Albany Cr. (58)	Sep-27	0.4	66	0.0	7.4
Black Mallard Cr. (51)	Oct-02	1.1	85	0.0	6.2
Greene Cr. (52)	Oct-03	0.2	14	0.0	2.5
Total		13.5	3,183	0.0	105.6
Grand Total		27.5	4,251	241.7[2]	234.5

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

[2]Includes 241.7kg active ingredient applied as Bayluscide 3.2% granular sea lamprey larvicide.

Lake Erie

Tributary Information:

- Lake Erie has 842 (317 United States, 525 Canada) tributaries.

- 21 (10 United States, 11 Canada) tributaries have historical records or production of sea lamprey larvae.

- Nine (5 United States, 4 Canada) tributaries have been treated with lampricide at least once during 1992-2001.

- Of these, five (3 United States, 2 Canada) tributaries are treated on a regular basis (every 3-5 years Lampricide treatments are systematically scheduled for tributaries harbouring larval sea lampreys to eliminate or reduce the populations of larvae before they recruit parasitic juveniles to the lake. Service and Department treatment units administer and monitor doses of the lampricide TFM, sometimes augmented with Bayluscide 70% Wettable Powder formulation, to scheduled tributaries. Specialised equipment and techniques are employed to provide concentrations of TFM that eliminate most of the lamprey larvae and minimize the risk to non-target organisms.

Table 6 provides details on the application of lampricide to tributaries treated during 2001 and Fig. 1 shows the locations of the tributaries. The following statements highlight the lampricide control program for Lake Erie during 2001.

- Treatments were successfully completed on four streams (2 U. S., 2 Canada).

- Treatment of Raccoon Creek was the first since 1990.

- Cattaraugus Creek was treated for the first time from the Springville Dam, approximately 30km upstream from the previous site at Gowanda. A crew comprised of personnel from the Service and the Department performed the treatment. The Seneca Nation of Indian Conservation Department provided permission to access Tribal lands.

- Mortality of non-target organisms was insignificant during the treatments.

Table 6. Details on the application of lampricide to tributaries of Lake Erie, 2001. (Number in parentheses corresponds to location of stream in Fig. 1)

Stream	Date	Flow (m^3/s)	TFM[1] (kg)	Bayluscide[1] (kg)	Distance Treated (km)
Canada					
Big Otter Cr. (60)	May 10	5.7	1,255	0.6	66.6
Young's Cr. (61)	May 13	0.5	155	0	4.7
Total		6.2	1,410	0.6	71.3
United States					
Cattaraugus Cr. (62)	May 8	12.8	2,731	25.7	75.3
Raccoon Cr. (63)	May 8	0.1	21	0	2.4
Total		12.9	2,752	25.7	77.7
Grand Total		19.1	4,162	26.3	149.0

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

Lake Ontario

Tributary Information:

- Lake Ontario has 659 (254 United States, 405 Canada) tributaries.

- 59 (29 United States, 30 Canada) tributaries have historical records or production of sea lamprey larvae.

- 39 (19 United States, 20 Canada) tributaries have been treated with lampricide at least once during 1992-2001.

- Of these, 31 (16 United States, 15 Canada) tributaries are treated on a regular basis (every 3-5 years).

Lampricide treatments are systematically scheduled for tributaries harbouring larval sea lampreys to eliminate or reduce the populations of larvae before they recruit parasitic juveniles to the lake. Service and Department treatment units administer and monitor doses of the lampricide TFM, sometimes augmented with Bayluscide 70% wettable powder formulation, to scheduled tributaries. Specialised equipment and techniques are employed to provide concentrations of TFM that eliminate most of the lamprey larvae and minimize the risk to non-target organisms.

Table 7 provides details on the application of lampricides to the tributaries treated during 2001 and Fig. 1 shows the locations of the tributaries. The following statements highlight the lampricide control program in Lake Ontario during 2001.

- Treatments were conducted on nine tributaries (5 U.S., 4 Canada).

- All treatments were considered successful with the exception of Eight Mile Creek, which was treated for the first time during 2001. Low discharge and impounded water reduced treatment effectiveness in a portion of this stream.

- Mortality of non-target organisms was insignificant in the tributaries treated.

Table 7. Details on the application of lampricide to tributaries of Lake Ontario, 2001. (Number in parentheses corresponds to location of the streams in Fig. 1)

Stream	Date	Flow (m^3/s)	TFM[1] (kg)	Bayluscide[1] (kg)	Distance Treated (km)
Canada					
Bronte Cr. (64)	April 20	4.5	1,402	0.0	30.6
Duffins Cr. (66)	April 22	2.6	427	4.7	6.2
Bowmanville Cr. (67)	April 24	1.8	549	0.0	12.3
Rouge R. (65)	April 26	1.2	253	0.0	10.3
Total		10.1	2,631	4.7	59.4
United States					
Little Sandy Cr. (68)	June 7	0.6	94	0.0	10.3
Salmon R. (69)	June 8	23.7	1,630	0.0	55.5
Oswego R. (Fish Cr.) (70)	June 15	15.6	1,430	0.0	69.3
Eight Mile Cr. (71)	June 20	0.1	28	0.0	7.3
Sodus Cr. (72)	June 20	0.1	22	0.0	2.2
Total		40.1	3,205	0.0	144.6
Grand Total		50.2	5,836	4.7	204.0

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

ALTERNATIVE CONTROL

Sterile Male Release Technique

Research on the use of the sterile male release technique (technique) in sea lamprey control began during 1971. The technique was experimentally implemented in Lake Superior and in the St. Marys River during 1991-1996. Releases of sterile males have been enhanced in the St. Marys River since 1997. Sterile males are no longer released in Lake Superior tributaries (except for select study streams). Male sea lampreys are captured during their spawning migrations in tributaries of 4 Great Lakes, and transported to the sterilisation facility at the Hammond Bay Biological Station. At the facility, lampreys are sterilised with the chemosterilant bisazir, decontaminated, and then released into the St. Marys River. Laboratory and field studies have shown that treated male sea lampreys are sterile, sexually competitive, and the number of larvae that hatch in streams is reduced.

The Sterile Male Release Technique Task Force was established during 1984 to refine the long-term strategy for application of the technique and to co-ordinate a large-scale research program for evaluating the technique in Lake Superior and the St. Marys River. The report of progress of the task force is presented on pages 40 to 42.

Technique-related highlights for 2001:

Lake Superior

- A total of 1,507 spawning-phase male sea lampreys were transported to the sterilization facility during May 8-June 12 from trapping operations on the Rock (365), Misery (202), Brule (621), and Middle (319) rivers.

Lake Michigan

- A total of 11,568 spawning-phase male sea lampreys were transported to the sterilization facility during May 8-June 10 from trapping operations on the Manistique (10,879) and Peshtigo (689) rivers.

Lake Huron

- A total of 21,788 spawning-phase male sea lampreys were trapped and transported to the sterilization facility during April 27 - July 23 for sterilization and release into the St. Marys River. Sources of sterile males were: Cheboygan River (5,371), Ocqueoc River (2,802), Black Mallard Creek (159), Echo River (1,873), Thessalon River (2,187), Koshkawong River (54), Tittabawassee River (805), AuSable River (351), East Au Gres River (486), Carp Lake Outlet (611), and St. Marys River (7,089).

- A total of 31,459 sterilized male sea lampreys were released in the St. Marys River (19,261 Lake Huron males; 12,198 lakes Superior, Michigan, and Ontario males) during May 12 - July 20. The estimated resident population of spawning-phase sea lampreys in the St. Marys River was 25,311 (16,037 males). Assessment traps removed 11,779 sea lampreys, of which 7,463 were male sea lampreys. The ratio of sterile male to resident male sea lampreys remaining in the St. Marys River was estimated at 3.6:1 (31,459 sterile males released: 8,752 estimated untreated males extant).

- The theoretical reduction in the spawning sea lamprey population from trapping and sterile male release was estimated at 88% in 2001, an increase from an average of 87% during 1997-2000. The theoretical reduction in reproduction from sterile male release combined with the number of lampreys removed by traps averaged 58% from 1991 through 1996.

- The combined effects of sterile male release and trapping reduced the theoretical number of effective fertile females in the river from about 9,300 to 1,100 during 2001.

- Egg viability of nine nests sampled in the St. Marys River rapids averaged 15%. This is an improvement compared to data collected from 1993 to 1997, when the average egg viability (weighted by nests per year) for all nests was 31.6%.

- All four male lampreys observed on nests in 2001 were sterile.

Lake Ontario

- A total of 442 spawning-phase male sea lampreys collected during trapping operations on the Humber River and Duffins Creek were transported to the sterilization facility.

Barriers

The Commission is committed to reducing the use of TFM through the implementation of alternative lamprey control strategies, which include the use of barriers to sea lamprey migration. This was the second year of a 2-year transition phase initiated by the Commission to advance the barrier program from a developmental program to a fully operational program. The Barrier Transition Team, consisting of agent barrier program staff, a Commission Secretariat representative, and consultants M. S. Millar and Ian Ross, developed a final draft of a barrier protocol document which includes standard operating procedures for site selection, design, administration, environmental assessment, identification of research needs, and operation and maintenance of sea lamprey barriers. The new program draws on engineering and biological expertise from both agents in a fully bi-national context.

A total of 58 barriers have been constructed or modified to stop sea lampreys on tributaries of the Great Lakes (Fig. 2; 14 on Lake Superior, 12 on Lake Michigan, 14 on Lake Huron, 7 on Lake Erie, 11 on Lake Ontario). The Barrier Task Force was established during 1991 to co-ordinate optimized implementation and establish research priorities for the barrier program throughout the Great Lakes. The report of progress of the task force is presented on page 43.

The following statements highlight the barrier projects on each lake during 2001:

Lake Superior

- The sea lamprey management program benefits substantially from a number of dams built and operated for other purposes. A geo-referenced inventory of these “de-facto” barriers has been initiated. A preliminary screening of approximately 400 dams identified four barriers as being important to sea lamprey management in Lake Superior. This inventory will be an essential tool in identifying additional dams with value to the sea lamprey management program and tracking a growing number of barrier mitigation proposals that could affect sea lamprey production.

- Black Sturgeon River: The Ontario Ministry of Natural Resources is assessing alternatives for passing non-jumping fish at their dam on the Black Sturgeon River with the specific goal of improving walleye stocks in Black Bay. The cost of treating the entire Black Sturgeon River has been estimated at $306,000 (U.S.) if lampreys were allowed upstream of the current dam.

- Betsy River: Shelldrake Dam was repaired under a partnership between the Michigan Department of Natural Resources and the Commission. The dam was previously proposed for removal, but was retained based in part on its value as a lamprey barrier.

- Iron River: After a lengthy legal process that began in 1993, Orienta Dam was removed and replaced with a lamprey/fish barrier. Removal of the dam was funded by the owner, Xcel Energy. The barrier was constructed under a partnership between the Wisconsin Department of Natural Resources and the Commission.

- Little Carp River: A feasibility study, final design report, and fisheries assessment were completed for construction of a barrier.

- Cash Creek: Automatic water level recorders were installed and operated to support barrier design.

- Bad River: The U.S. Army Corps of Engineers completed a Section 1135(b) Water Resources Development Act Preliminary Restoration Plan for a proposed barrier. The Commission agreed to fund a pre-barrier environmental study scheduled to begin in 2002.

- Misery River: An automatic water level recording station was installed at the barrier to help evaluate the performance of the barrier after the widening of a narrow bridge just downstream of the barrier.

Lake Michigan

- Kids Creek (Boardman R.): The U.S. Army Corps of Engineers (Corps) barrier project under Section 206 of the Water Resources Development Act (WRDA) of 1996 (Aquatic Ecosystem Protection and Restoration) continued with initiation of the Planning, Design and Analysis phase.

- Pere Marquette River: The electrical weir with its pumped-source pool and weir fishway was operated for the second season. A total of 11,044 fish (4,805 steelhead, 3,205 white suckers, 2,857 redhorse suckers and 177 brown trout) were counted, identified and returned to the river upstream of the barrier. An evaluation completed by Michigan State University personnel estimated the efficiency of steelhead passage at $\geq$67%.

- Rapid River, Carp Lake River, South Branch Galien River and Trail Creek: The Corps completed Section 1135(b) WRDA Preliminary Restoration Plans for proposed barrier projects on each of these streams. Also, DLZ, an environmental consulting firm under contract to the Corps, completed hydraulics and hydrology studies on the South Branch Galien River and Trail Creek preparatory to selection of crest heights for these barriers. Automatic water level recording devices were set on all four streams by the Department and Service barrier coordinators.

- Paw Paw River: The Corps, the State of Michigan, and the Commission began to negotiate terms of the Project Construction Agreement for the inflatable barrier and fishway.

- Cedar River: A barrier project was initiated under administration of the Service. Barr Engineering, a consulting firm under contract to the Service, completed field surveys and initial hydrologic modeling. Data from automatic water level recording devices, placed two years ago, were downloaded.

- Days River: An automatic water level recording device was installed on the Days River barrier as part of an effort to evaluate performance of existing barriers relative to crest height and barrier design. The Days River barrier appears to have a low crest height but has successfully blocked lampreys since construction in 1983.

- Jordan River: Fieldstone was placed around the abutments of the existing electrical barrier to alleviate bank erosion.

Lake Huron

- The sea lamprey management program benefits substantially from a number of dams built and operated for other purposes. A geo-referenced inventory of these “de-facto” barriers has been initiated. A preliminary screening of approximately 400 dams identified 15 barriers as being important to sea lamprey management in Lake Huron. This inventory will be an essential tool in identifying additional dams with value to the sea lamprey management program and tracking a growing number of barrier mitigation proposals that could affect sea lamprey production.

- Manitou River: The Ontario Ministry of Natural Resources (OMNR) is developing stream enhancement projects on streams on Manitoulin Island. One project involves removal of a natural falls that acts as a barrier to non-jumping fish on Manitou River, previously modified in 1983 to block sea lamprey migration and improve passage for jumping fish species.

- Saugeen River: OMNR conducted a dam safety review on the Denny's Dam. Repair, modification or removal were alternatives presented at a site meeting held during 2001. Due to the high cost of treating the Saugeen River with lampricides (>$1 M U.S.), the Department recommended against decommissioning the Denny's Dam. The dam was built in 1970 under formal agreement between Ontario and Canada for the purpose of controlling sea lampreys.

- Beaver River: Subsequent to a dam safety review of the Thornbury Dam, the OMNR has found that modifications to the spillways were necessary to meet dam safety guidelines. The Department has been working with OMNR to develop a fishway on the Thornbury Dam to replace a poorly functioning fish elevator, while maintaining the structure as a barrier to lampreys. The cost of treating the Beaver River has been estimated at $250K (U.S.) if lampreys are allowed upstream of the Thornbury Dam.

- Timber Bay and Blue Jay creeks (Manitoulin Is.): These creeks were surveyed for potential low-head barrier sites. No suitable location was found on Timber Bay Creek, and the feasibility of the Blue Jay Creek site is under review.

- Black Mallard and Schmidt creeks: The U.S. Army Corps of Engineers completed a Section 1135(b) Water Resources Development Act Preliminary Restoration Plan for a proposed barrier project on these creeks.

- Thessalon River: Water level gauges were installed on the Thessalon River to collect data in support of future barrier design.

- Ocqueoc River: The experimental combination low-head electrical barrier constructed in 1999 was operated for the second year. Traps captured 73% of the lamprey spawning run. Surveys showed that there has been no successful lamprey reproduction upstream of the barrier since its construction.

  Environmental Assessment

  - A five-year assessment (2 years pre- and 3 years post-construction) of the fish community in Browns Creek, in conjunction with the construction of a low-head barrier in September 1998, was completed in 2001.

  - Twenty-eight species of fish were collected from the stream over the course of the study.

  - Five species previously found above the barrier site were not found in the post-construction surveys, although these species remained abundant below the barrier.

  - Three species were found above the barrier that were not found in pre-construction sampling.

  - No species were eliminated from the stream following barrier construction.

  - Common white suckers successfully reproduced above the low-head barrier in 2001. In 1999 and 2000, migration of common white suckers was blocked by beaver dams downstream of the low-head barrier.

Lake Erie

- The Sea Lamprey Control Program benefits substantially from a number of dams built and operated for other purposes. A GIS inventory of these "de-facto" barriers has been initiated. This will be an essential tool in identifying dams of value to sea lamprey management and tracking a growing number of barrier mitigation proposals that have potentially serious consequences to the Great Lakes fishery.

- Humphrey Drain: The Department contributed to the Fisheries Act review of the proposed installation of a rocky ramp fishway at the Clarke Wright Dam. It was determined that removal of this barrier will not adversely effect the program.
- Grand River (Ontario): The Ontario Ministry of Natural Resources, Grand River Conservation Authority and Environment Canada are seeking to improve passage for non-jumping fishes at the Caledonia Dam. This is the last barrier to a significant amount of habitat, and alternatives are being investigated ranging from fishway modification to dam removal. The Department contributed to the Fisheries Act review of the project.

- Grand River (Ohio): A multi-agency effort led by the Grand River Partnership, Harpersfield Dam Subcommittee continued to evaluate alternatives for repair of the Harpersfield Dam. The U. S. Army Corps of Engineers is currently exploring options for funding.

- Conneaut Creek: The Corps of Engineers assembled data for a Section 1135(b) WRDA Preliminary Restoration Plan for a proposed barrier project. The Ohio Department of Natural Resources and Ohio Environmental Protection Agency collected data on spring anadromous fish movements. Commission-sponsored researchers collected data on resident fishes and other aquatic species for an evaluation of environmental criteria.

Lake Ontario

- A GIS inventory of dams built and operated for other purposes has been initiated. Approximately 17 barriers on Lake Ontario tributaries were identified as being potentially important to the sea lamprey control program.

- Rouge River: The Department contributed to the Fisheries Act review of the proposed installation of a Denil fishway at the Milne Dam, the last sea lamprey barrier to the upper Rouge.

- Etobicoke Creek: Based on review of upstream sea lamprey habitat quantity and quality it was concluded that removal of an existing dam would not result in significant sea lamprey production.
- Stream gauges were operated in Bronte Creek in Ontario and on Grindstone Creek and the Little Salmon River in New York. Gauge data will be used in the design of future barriers on these streams.

- Fish Creek: The McConnellsville Dam was inspected by the Department Barrier Coordinator. It was concluded that modification to the McConnellsville Dam would not result in significant reduction in sea lamprey control costs on this stream.

- A public and workplace safety evaluation of dams and traps was conducted on Duffins Creek, and the Humber and Salmon rivers. A detailed dam safety review was initiated at the Duffins Creek barrier, and will conclude in 2002.

- Lakeport Creek: Bank stabilization work was completed at the barrier.

FIG. 2. BARRIER MAP

ASSESSMENT

Larval

Tributaries to the Great Lakes are systematically assessed for abundance and distribution of sea lamprey larvae. Sampling information is used to determine when and where lampricide treatments are required and to measure the effectiveness of past treatments. Surveys are conducted with backpack electrofishers in waters that are <1m deep. Waters >1m in depth are surveyed with deepwater electrofishers or the granular formulation of Bayluscide. Data collected from these surveys are used to estimate the number of metamorphosed sea lampreys that will leave individual tributaries the following year and to define the upstream and downstream distribution of the larvae.

Streams that might require treatment in 2002 were surveyed in 2001 to estimate larval abundance. Samples of larvae were randomly collected in each stream, catches were adjusted for gear efficiency, and lengths were standardized to the end of the growing season. The total number of sea lamprey larvae in each tributary was estimated by multiplying the mean density by estimated area of suitable habitat. The number of transforming sea lampreys produced in each tributary was estimated based on the probability that larvae collected during 2001 would metamorphose during 2002. The probability of metamorphosis was developed from historical relations of the proportion of metamorphosed sea lampreys to larval sea lampreys of the same length collected during lampricide applications.

The Assessment Task Force was established during 1996 to develop an optimal assessment program through the review of established protocols and the development of new techniques for assessment in the control program. The report on progress of the task force is presented on pages 44 to 46.

Lake Superior

- Assessments of populations of sea lamprey larvae were conducted in 106 tributaries (48 U.S., 58 Canada) and offshore of three U.S. tributaries. The status of larval sea lamprey populations in tributaries treated within the past 10 years is presented in Table 8.

- Assessments were conducted in five U.S. tributaries to establish stock recruitment relations as part of a Great Lakes basin-wide study to determine if sea lamprey populations compensate in response to the effects of control actions.

- Pre- and post-treatment quantitative assessments were conducted in 11 tributaries (7 U.S., 4 Canada) to determine the effectiveness of lampricide treatments in 2001.

Lake Michigan

- Assessments of populations of sea lamprey larvae were conducted in 55 tributaries and offshore of 4 tributaries. The status of larval sea lamprey populations in streams treated during the past 10 years is presented in Table 9.

- Assessments were conducted in 5 U.S. tributaries to establish stock recruitment relations as part of a Great Lakes-wide study to determine if sea lamprey populations compensate in response to the effects of control actions.

Table 8. Status of Lake Superior tributaries that have been treated for sea lamprey larvae between 1992 and 2001, and sea lamprey population estimates for tributaries surveyed during 2001.

Stream	Last Treated	Last Surveyed	Residual Found	Oldest Reestablished Year-Class	2001 Estimate of Larval Population	2002 Metamorphosing Estimate	On 2002 Treatment Schedule
Canada							
Little Carp R.	Sep-01	[1]	-	-	-	-	-
Big Carp R.	Sep-01	2001	Yes	None	2,555	67	No
Goulais R.	Jul-99	2001	Yes	2000	1,488,050	25,063	Yes
Stokely Cr.	Sep-00	2001	Yes	None	4,706	4	No
Chippewa R.[3]	Jul-98	2001	No	1999	6,751	0	No
Batchawana R.[3]	Oct-98	2001	Yes	1999	208,758	128	No
Batchawana Bay	Aug-01	[1]	-	-	-	-	-
Carp R.	Sep-00	2001	Yes	2001	5,088	287	No
Pancake R.	Jul-98	2001	Yes	1999	60,205	42	No
Agawa R.	Jul-01	[1]	-	-	-	-	-
Gargantua R.	Aug-99	2001	Yes	2000	9,050	-	No
Michipicoten R.	Aug-99	2001	Yes	2000	753,392	1,272	No
Pic R.	Sep-97	2001	No	1998	60,104	265	No
Little Pic R.	Sep-94	2001	Yes	1995	0	0	No
Prairie R.	Jul-94	2001	Yes	1998	-	-	-
Steel R.	Jul-01	[1]	-	-	-	-	-
Pays Plat R.	Jul-97	2001	Yes	1997	221,362	1,629	Yes
Little Pays Plat R.[2]	never	2001	No	1998	10,889	21	No
Gravel R.[3]	Aug-98	2001	Yes	1999	354,333	71	No
Mountain Bay-Gravel R.	Jul-00	[1]	-	-	-	-	-
Little Gravel R.[3]	Jul-95	2001	No	1995	22,391	43	No
Cypress R.	Aug-99	2001	Yes	2000	-	-	-
Jackfish R.	Jul-00	[1]	-	-	-	-	-
Nipigon R.:							
Upper[3]	Sep-99	2000	Yes	None	-	-	-
Cash Cr.	Jul-96	2000	No	1996	-	-	-
Stillwater Cr.	Jul-96	2000	No	1996	-	-	-
Black Sturgeon R.	Aug-99	2000	Yes	None	-	-	-
Wolf R.:							
Above Barrier	Sep-00	2001	Yes	None	6,568	288	No
Below Barrier	Sep-00	2001	Yes	2001	3,301	15	No
Neebing-McIntyre Floodway:							
McIntyre R.	Aug-97	2001	Yes	1998	13,697	172	No
Neebing R.	Jul-94	2001	No	None	0	0	No
Kaministikwia R.	Aug-97	2001	Yes	1998	1,962,201	16,352	Yes
Cloud R.	Jul-94	2001	No	1998	-	-	-
Pigeon R.	Aug-99	2000	Yes	None	-	-	-
United States							
Waiska R.	Sep-01	[1]	-	-	-	-	-
Grants Cr.[2]	Jul-63	2000	No	1997	-	-	-
Roxbury Cr.[2]	Never	2001	No	1998	1,642	1	No
Galloway Cr.	Jun-92	[1]	No	1997	-	-	-
Tahquamenon R.							
Upper pools	Jun-97	2000	Yes	1997	-	-	Yes
Betsy R.	Jul-00	[1]	-	-	-	-	-
Little Two Hearted R.	Jul-00	[1]	-	-	-	-	-
Two Hearted R.	Sep-99	[1]	-	-	-	-	-
Sucker R. (Alger) - Lower	May-98	2001	Yes	1998	70,203	722	Yes
Chipmunk Cr.	May-98	2000	-	-	-	-	-

Table 8. continued

Stream	Last Treated	Last Surveyed	Residual Found	Oldest Reestablished Year-Class	2001 Estimate of Larval Population	2002 Metamorphosing Estimate	On 2002 Treatment Schedule
Carpenter Cr.	May-98	2000	-	-	-	-	-
Sullivans Cr.[2]	Jul-87	2001	No	1998	3,893	4	No
Miners R.	Jun-98	2001	Yes	1998	9,670	6	No
Furnace Cr.[3]	Aug-93	2001	No	1996	568	0	No
Five Mile Cr.	Oct-98	2001	No	None	-	-	-
Au Train R. - Lower R.	Aug-97	2001	No	None	0	0	No
Au Train R. - Upper R.+ tribs.[3]	Sep-01	[1]	Yes	1996	-	-	-
Rock R.	May-01	2001	-	-	14,047	1,478	Yes
Laughing Whitefish R.	Jun-98	2001	No	1998	3,622	142	No
Chocolay R.	Jun-98	2001	Yes	1998	830,065	14,354	Yes
Carp R.	Jul-01	[1]	-	-	-	-	-
Harlow Cr.	Aug-97	2001	Yes	1997	51,344	1,259	Yes
Little Garlic R.	Aug-00	2001	Yes	2000	57,667	3,015	Yes
Big Garlic R.	Aug-00	2001	Yes	2000	497	0	No
Iron R.	Jul-01	[1]	-	-	-	-	-
Salmon Trout R. (Marquette)	Jul-00	2001	Yes	None	132,767	0	No
Pine R.[2]	Oct-87	2001	No	1998	7,938	0	No
Huron R.	Jul-01	2001	Yes	None	-	-	-
Ravine R. – Lentic[3]	Never	2001	Yes	1997	0	0	No
Silver R.	Aug-01	[1]	Yes	None	-	-	Yes
Silver R. - Lentic[3]	Never	2001	Yes	1997	0	0	No
Falls R.	Sep-97	[1]	No	None	-	-	-
Sturgeon R.	Aug-01	2001	Yes	None	99	1	No
Trap Rock R.	Sep-98	2001	Yes	1999	96,280	2,000	Yes
Traverse R. - Upper	Jul-01	[1]	-	-	3,222	73	Yes
Salmon Trout R. (Houghton)	Aug-92	[1]	No	1999	-	-	
Misery R.	Sep-00	2001	Yes	2000	1,396	132	No
East Sleeping R.	Oct-99	[1]	Yes	1999	-	-	
Firesteel R.	Jun-00	2001	Yes	2000	83,497	7498	Yes
Ontonagon R.	May-01	2001	Yes	None	54,798	2,294	No
Potato R.	Jun-01	[1]	Yes	None	-	-	-
Cranberry R.	Jun-01	[1]	Yes	2000	-	-	-
Bad R.	Sep-01	[1]	Yes	None	-	-	-
Red Cliff Cr.	Jun-01	[1]	Yes	1999	-	-	-
Brule R.	Jun-01	2001	Yes	1997	7,039	0	No
Poplar R.	Oct-96	1999	No	1999	-	-	-
Middle R.	Sep-00	2001	Yes	1996	4,548	1,260	Yes
Amnicon R.	Jun-01	2001	Yes	2000	378	0	No
Nemadji- South Fork & Net R.[2]	May-90	2001	No	1997	0	0	No
Nemadji R. - Black R.	Sep-00	[1]	-	-	-	-	-

[1]Not quantitatively assessed since last treatment.
[2]Not treated during the past 10 years, but quantitative larval surveys were conducted during 1999-2001.
[3]Stream has a known lentic population.

Table 9. Status of Lake Michigan tributaries that have been treated for sea lamprey larvae during 1990-2001 and sea lamprey population estimates for tributaries surveyed during 2001.

Stream	Last Treated	Last Surveyed	Residual Found	Oldest Reestablished Year-Class	2001 Estimate of Larval Population	2002 Metamorphosing Estimate	On 2002 Treatment Schedule
Brevort R. (lower)[1]	May-89	2001	No	1997	1,507	342	No
Black R.	Jun-99	2001	No	1999	-	-	No
Hog Island Cr.	Jun-96	2001	-	-	36,928	30	No
Millecoquins R.	May-00	2001	Yes	2000	1,077	211	No
Rock R.	Aug-00	2000[2]	Yes	None	2	1	No
Crow R.	Aug-00	2000[2]	-	-	295	37	No
Cataract R.[1]	Sep-75	2001	No	1997	4,668	49	No
Hudson Cr.	May-98	2001	Yes	1998	519	122	No
Swan Cr.	Jul-92	2001	No	None	-	-	No
Milakokia R.	Jun-99	1999	-	-	-	-	No
Bulldog Cr.	Jun-97	2000	-	-	-	-	No
Gulliver Lake Outlet	May-00	1999[2]	-	-	63	15	No
Marblehead Cr.	May-00	1999[2]	-	-	33	22	No
Manistique R. (Above dam)[1]	Aug-74	2001	No	1998	734,450	10,892	No
Manistique R. (Below dam)	Sep-01	1999[2]	-	-	4,154	1,973	No
Manistique R. (Lentic)[3]	Sep-01	2000[2]	No	1998	14,582	8,764	Yes
Johnson Cr.[1]	Aug-81	2000[2]	No	1998	134	9	No
Deadhorse Cr.[1]	May-91	2001	No	1997	1,339	149	No
Bursaw Cr.	May-97	2000[2]	-	-	660	0	No
Parent Cr.[1]	Jun-91	2000[2]	No	1998	13,428	56	No
Poodle Pete Cr.	May-01	2000[2]	-	-	183	57	No
Valentine Cr.	Jun-97	2001	No	1997	49	30	No
Little Fishdam R.	May-01	1999[2]	-	-	201	98	No
Big Fishdam R.	May-99	1998	-	-	-	-	No
Sturgeon R.	Oct-98	1998	-	-	-	-	No
Ogontz R.	Oct-96	2001	No	1997	43,149	251	No
Squaw Cr.	Aug-00	2001[2]	Yes	None	4	4	No
Whitefish R.	Aug-01	2001[2]	-	-	5,204	343	No
Rapid R.	May-99	1999	-	-	-	-	No
Tacoosh R.	May-00	2001[2]	No	None	387	164	No
Days R.[4]	Oct-01	2001[2]	Yes	2000	0	0	Yes
Portage Cr.	Jun-97	2000[2]	-	-	0	0	No
Ford R.	Sep-00	2001	Yes	2001	118,112	5,408	Yes
Bark R.	May-99	2000	Yes	1999	-	-	No
Cedar R.	Oct-01	2000[2]	-	-	5,674	1,575	No
Arthur Bay Cr.[1]	Apr-70	2000[2]	-	-	4	4	No
Bailey Cr.	May-98	2001	Yes	1998	274	130	Yes
Beattie Cr.	Oct-01	2001[5]	No	1997	33	3	No
Springer Cr.	May-99	1999	-	-	-	-	No
Peshtigo R.	Jul-01	2001[2]	Yes	2001	247	123	No
Oconto R.	Jul-01	2001[2]	No	None	381	286	No
Hibbards Cr.	May-98	2001	No	1998	26,397	776	Yes
Door Co. # 23[1]	May-79	2001	No	1998	15	0	No
East Twin R.	Jul-00	2000[2]	-	-	41	69	No
Carp Lake R.	Sep-94	2001	No	1998	283,139	35	No
Big Stone Cr.	May-97	2001	-	-	-	-	No
Wycamp Lake Outlet	May-00	1999[2]	-	-	15	14	No
Horton Cr.[3]	Oct-01	2001[2]	-	-	2	1	Yes
Boyne R.[3,4]	Sep-97	2001	No	1998	161,576	946	Yes
Porter Cr.[3]	Oct-01	2001	-	-	-	-	Yes
Jordan R.	Aug-97	2001	Yes	1998	152,837	5,766	Yes

Table 9. continued

Stream	Last Treated	Last Surveyed	Residual Found	Oldest Reestablished Year-Class	2001 Estimate of Larval Population	2002 Metamorphosing Estimate	On 2002 Treatment Schedule
McGeach Cr.	Sep-99	1998	-	-	-	-	No
Elk Lake Outlet	May-97	2001	-	-	-	-	No
Mitchell Cr.	May-99	2000	-	-	-	-	No
Boardman R.:							
Hospital Cr.	Aug-01	1999[2]	-	-	172	165	No
Lower	Aug-01	1999[2]	-	-	193	192	No
Goodharbor Cr.	Oct-01	2000[2]	-	-	296	77	No
Platte R.	Jul-01	2001	Yes	2001	19,920	1,432	No
Betsie R.	Jul-99	2000[2]	Yes	1999	474,291	7,723	Yes
Big Manistee R.:	Aug-98	2001	Yes	1999	298,256	1,339	No
Bear Cr.	Aug-98	2001	Yes	1999	505,984	4,332	Yes
L. Manistee R.	Jul-98	2001	Yes	1999	614,518	4,219	Yes
Gurney Cr.	Jul-01	2001[5]	No	-	3	0	No
Lincoln R.	Jun-98	2001	No	1998	81,134	14,111	Yes
Pere Marquette R.	Aug-99	2001	Yes	1999	247,676	18,534	Yes
Pentwater R.	Jul-01	2000[2]	-	-	764	598	No
White R.	Aug-01	2001[2]	Yes	None	678	225	No
Muskegon R.:	Aug-00	2001	Yes	2000	34,996	11,182	Yes
Brooks Cr.	Aug-00	1999[2]	-	-	37	35	No
Cedar Cr.	Aug-00	1999[2]	-	-	475	402	No
Bridgeton Cr.	May-95	2001	-	-	-	-	No
Minnie Cr.	Aug-00	2001[2]	-	-	4	4	No
Bigelow Cr.	Aug-00	1999[2]	-	-	562	558	Yes
Black Cr.[1]	Aug-70	2001	No	1999	3,335	0	No
Grand R.							
Norris Cr.	Jun-00	1999[2]	-	-	27	25	No
Sand Cr.	Sep-96	2000[2]	No	1997	429	326	Yes
Crockery Cr.	Jun-00	1999[2]	-	-	774	767	No
Kalamazoo R.:							
Bear Cr.	Jun-98	2001	No	1998	3,337	11	No
Sand Cr.	May-00	1999[2]	-	-	0	0	No
Mann Cr.	Aug-97	2001	Yes	1998	4,378	1,069	Yes
Black R.	Jun-01	2000[2]	-	-	1,616	633	No
Rogers Cr.	May-98	2000	-	-	-	-	No
St. Joseph R.:							
Paw Paw R.	May-01	2001[2]	-	-	225	179	No
Mill Cr.	May-01	2000[2]	-	-	446	217	No
Brandywine Cr.	May-97	2000[2]	Yes	None	0	0	No
Brush Cr.	May-01	2001[2]	-	-	41	30	No
Blue Cr.	May-01	2001[2]	-	-	53	28	No
Galien R.	Jun-99	2001	Yes	1999	12,796	3,716	Yes
Trail Cr.	Apr-00	2000[2]	-	-	24	24	No
Burns Ditch	Jul-99	2001	-	-	-	-	No

[1]Not treated during the past 10 years, but quantitative larval surveys were conducted during 1999-2001.
[2]Estimates of larvae and transformers developed from 1999 or 2000 data.
[3]Stream has a known lentic population.
[4]Lentic population was assessed during 2001.
[5]Quantitative assessment conducted prior to treatment in 2001.

Lake Huron

- Assessments of populations of sea lamprey larvae were conducted in 87 tributaries (32 U.S., 55 Canada). The status of larval sea lamprey populations in tributaries treated within the past 10 years is presented in Table 10.

- Surveys were conducted in five tributaries (3 U.S., 2 Canada) to establish stock recruitment relations as part of a Great Lakes basin-wide study to determine if sea lamprey populations compensate in response to the effects of control actions.

- The monitoring of the long-term effectiveness and subsequent recruitment after the 1998-1999 granular Bayluscide treatments in the St. Marys River continued in 2001. Following a stratified-random survey design, approximately 750 sites were sampled with the deepwater electrofisher and an additional 150 adaptively-located sites were sampled in areas of higher larval density, both in and outside of the treated areas.

- Two of 13 index stations established during 1994-1996 were sampled in 2001. Sampling at these index sites has now been replaced by stratified-random sampling as the long-term measure of larval density in the St. Marys River.

- As part of a Great Lakes basin-wide study of treatment effectiveness, pre- and post-treatment quantitative assessments were conducted in the East Au Gres River. No lamprey larvae were collected in the post-treatment sampling, which suggests that the treatment was effective.

Lake Erie

- Assessments of larval populations were conducted in 24 tributaries (12 U.S., 12 Canada). The status of larval sea lamprey populations in tributaries treated during the last 10 years is presented in Table 11.

- Populations of larvae were estimated in 5 tributaries (4 U.S., 1 Canada).

- High cost-per-transformer estimates from re-established populations in Big and Canadaway creeks and residual populations detected in Conneaut and Cattaraugus creeks exclude them from treatment in 2002. These streams will be quantitatively assessed again this year.

- No larval sea lampreys were captured during intensive assessment of the Grand River (Ontario) and its tributaries.

Table 10. Status of Lake Huron tributaries that have been treated for sea lamprey larvae during 1990-2001, and sea lamprey population estimates for tributaries surveyed during 2001.

Stream	Last Treated	Last Surveyed	Residual Found	Oldest Reestablished Year-Class	2001 Estimate of Larval Population	2002 Metamorphosing Estimate	On 2002 Treatment Schedule
Canada							
Root R.	Sep-99	2001	-	-	-	-	-
Garden R.	Jul-01	2001	Yes	2001	427,134	37	No
Echo R. - Upper	Oct-99	2001	No	None	0	0	No
Bar Cr.	Jun-99	2001	Yes	1999	124	16	No
Bar R.	Oct-01	[1]	-	-	-	-	-
Sucker Cr.	May-00	[1]	-	-	-	-	-
Two Tree R.	Oct-01	[1]	-	-	-	-	-
Richardson Cr.	Aug-96	2000	No	None	-	-	-
Watson Cr.	Jul-98	2001	Yes	1999	3,167	1,127	Yes
Gordon Cr.	May-01	[1]	-	-	-	-	-
Browns Cr.	May-01	2001	Yes	None	-	-	-
Koshkawong R.	May-00	2001	No	None	-	-	-
Thessalon R. - Upper	Jul-98	2001	Yes	1999	30,731	6,142	Yes
- Lower	Jul-01	[1]	-	-	-	-	-
Livingstone Cr.	Jun-00	[1]	-	-	-	-	-
Mississagi R.							
Main	Aug-00	2001	Yes	2001	54,981	36	No
Pickerel Cr.	Jun-98	2001	No	None	-	-	-
Blind R.[2]	May-84	2001	No	1999	96	0	No
Lauzon R.	Sep-97	2001	No	1998	64	26	No
Spragge Cr.	Oct-95	2001	No	None	-	-	-
Unnamed (H-114)	Sep-97	2001	Yes	1998	10,667	512	Yes
Serpent R. - Main	Jun-00	[1]	-	-	-	-	-
- Grassy Cr.	Oct-99	2001	Yes	2000	-	-	-
Spanish R.	Jun-98	2001	Yes	1998	461,652	14,794	Yes
Unnamed (H-267)[2]	never	2001	No	-	1,629	1,359	Yes
Silver Cr.	May-94	2001	Yes	[4]	421	37	No
Sand Cr.	Oct-01	[1]	-	-	-	-	-
Mindemoya R.	Jun-98	2001	Yes	1998	92,450	2,546	Yes
Timber Bay Cr.	May-01	[1]	-	-	-	-	-
Manitou R.	Sep-99	2001	No	2000	-	-	-
Blue Jay Cr.	Sep-99	[1]	-	-	-	-	-
Chikanishing R.	Jun-95	2000	Yes	1997	-	-	-
French R.							
O.V. Channel	Jun-92	1999	No	1992	-	-	-
Wanapitei R.	Jun-00	[1]	-	-	-	-	-
Still R.	Jun-96	2001	No	1999	-	-	-
Magnetawan R.	Jul-99	2001	No	1999	-	-	-
Shebeshekong R.[2]	never	2001	No	[4]	475	445	No
Naiscoot R.	Jul-99	2001	Yes	1999	179,829	74	No
Boyne R.	Jun-99	2001	Yes	1999	12,806	143	No
Musquash R.	Aug-96	1999	Yes	1998	-	-	-
Sturgeon R.	May-99	2001	Yes	1999	2,187	7	No
Nottawasaga R.							
Main (inc. Boyne and Bear creeks)	Jun-97	2001	Yes	1997	14,950	3,768	Yes
Pine R.	Sep-98	2001	Yes	1999	298,493	362	Yes
Bighead R. - Main	May-00	2001	Yes	2000	197,932	89	No
- Rocklyn Cr.	never	2001	No	[4]	112	3	No
Sauble R.	Jun-96	2000	No	1996	-	-	-

Table 10. continued

Stream	Last Treated	Last Surveyed	Residual Found	Oldest Reestablished Year-Class	2001 Estimate of Larval Population	2002 Metamorphosing Estimate	On 2002 Treatment Schedule
United States							
Little Munuscong R.	Jun-99	2001	Yes	1999	4,998	34	No
Big Munuscong R.	Jun-99	[1]	Yes	1999	-	-	-
Carlton Creek	Sep-01	[1]	-	-	-	-	-
Caribou Cr.[2]	May-91	2001	No	1996	2,944	101	No
Joe Straw Cr.[2]	May-75	2000	No	-	-	-	-
Huron Point Cr.[2]	Never	2000	No	-	-	-	-
Albany Cr.	Sep-01	[1]	-	-	-	-	-
Trout Cr.	May-01	[1]	-	-	-	-	-
Beavertail Cr.	Oct-00	[1]	-	-	-	-	-
Prentiss Cr.	May-01	[1]	Yes	1996	-	-	-
McKay Cr.	Sep-01	[1]	-	-	-	-	-
Ceville R.	Oct-00	[1]	-	-	-	-	-
Steeles Cr.[2]	May-84	2001	No	1997	10,146	3	No
Nunns Cr.	Sep-01	[1]	-	-	-	-	-
Pine R.	May-98	2001	Yes	1998	178,785	1,024	No
Carp R.	Oct-00	[1]	-	-	-	-	-
Martineau Cr.	Oct-93	[1]	-	-	-	-	-
Cheboygan R.[3]				-			
Maple R.	Oct-98	2001	-	-	-	-	-
Pigeon R.	Sep-01	2001	Yes	-	16,951	318	No
Little Pigeon R.	Aug-98	2000	-	-	-	-	-
Sturgeon R.	Sep-99	2001	Yes	2000	1,502	788	No
Laperell Cr.	May-00	[1]	-	-	-	-	-
Meyers Cr.	Sep-99	[1]	-	-	-	-	-
Elliot Cr.	May-96	2001	No	1996	33,342	93	No
Greene Cr.	Oct-01	[1]	-	-	-	-	-
Mulligan Cr.	May-94	2001	-	-	-	-	-
Black Mallard Cr.	Oct-01	[1]	-	-	-	-	-
Ocqueoc R. - Lower[3]	Sep-97	2001	Yes	1998	25,016	22	Yes
- Upper	Aug-98	2001	Yes	1999	19,325	7,523	Yes
Schmidt Cr.	Sep-98	2001	Yes	1999	3,873	177	No
Trout R.	May-00	2001	Yes	2000	31,233	717	No
Swan R.	May-96	2000	No	1997	-	-	-
Devils R.	May-00	2000	-	-	-	-	-
Black R.	Jun-98	2001	No	1998	35,831	557	No
Au Sable R.	Jul-98	2001	Yes	1998	314,446	14	No
Tawas Lake Outlet	Jul-96	2000	-	-	-	-	-
Silver Cr.	Jul-00	2000	-	-	-	-	-
Cold Cr.	Jul-00	[1]	-	-	-	-	-
Sims Cr.	Jul-98	2000	-	-	-	-	-
East Au Gres R.	Oct-01	2001	No	None	-	-	-
Au Gres R.	Jun-00	2001	-	-	-	-	-
Rifle R.	Jul-00	2001	Yes	2000	59,746	8,520	Yes
Saginaw R.							
Juniata Cr.	Sep-98	2000	-	-	-	-	-
Chippewa R.	Sep-99	2001	Yes	2000	80,085	1,477	No
Little Salt Cr.	Sep-99	2001	Yes	2000	7,102	588	Yes
Big Salt Cr.	May-96	2001	No	1996	1,198	0	No
Carroll Cr.[2]	May-88	2001	No	1999	1,316	184	Yes
Big Salt R.	May-93	2001	No	[4]	81,393	5,689	Yes
Bluff Cr.	Sep-98	2001	-	-		-	-
Shiawassee R.	Jun-97	2001	Yes	1998	13,779	5,538	Yes

[1]Not quantitatively assessed since last treatment.
[2]Not treated during the past 10 years, but quantitative larval surveys were conducted during 1999-2001.
[3]Stream has a known lentic population.
[4]Larval sea lampreys present, but unable to determine age of older cohorts.

Table 11. Status of Lake Erie tributaries that have been treated for sea lamprey larvae during 1990-2001, and sea lamprey population estimates for tributaries surveyed during 2001.

Stream	Last Treated	Last Surveyed	Residual Found	Oldest Reestablished Year-Class	2001 Estimate of Larval Population	2002 Metamorphosing Estimate	On 2002 Treatment Schedule
Canada							
Silver Cr.	Never	2000	No	1998	-	-	No
Big Otter Cr.	May-01	2000	Yes	-	-	-	No
Big Cr.	June-99	2001	No	1999	1,097	993	No
Young's Cr.	May-01	2001	No	-	-	-	No
United States							
Buffalo R.[1]	Never	1999[2]	No	None	-	-	No
Cattaraugus Cr.	May-01	2001	Yes	2001	652	220	No
Canadaway Cr.[1]	Oct-86	2001	No	1998	759	70	No
Crooked Cr.	May-99	2001	Yes	1999	2,090	591	Yes
Raccoon Cr.	May-01	2000[2]	-	-	4	1	No
Conneaut Cr.	May-00	2001	Yes	2000	14,665	1629	No
Grand R.	May-99	2001	No	1999	-		No

[1]Not treated during the past 10 years, but quantitative larval surveys were conducted during 1999-2001.
[2]Estimates of larvae and transformers developed from 1999 or 2000 data.

Lake Ontario

- Assessments were conducted in 44 tributaries (22 U.S., 22 Canada). The status of larval sea lamprey populations in tributaries treated during the last 10 years is presented in Table 12.
- Larval populations were estimated in 22 tributaries (13 U. S., 9 Canada).
- Residual populations were quantitatively assessed in seven tributaries (5 U.S., 2 Canada), none of which is scheduled for treatment during 2002.
- Sea lamprey larvae were captured for the first time in Eight Mile Creek.
- Spring quantitative surveys indicated potentially significant transformer production from Eight Mile and Sodus creeks in 2001, which were subsequently treated with lampricide.
- *Ichthyomyzon sp.* larvae were captured during surveys of South Sandy Creek. Larvae from this genus were previously unknown in Lake Ontario streams.

Table 12. Status of Lake Ontario tributaries that have been treated for sea lamprey larvae during 1990-2001, and sea lamprey population estimates for tributaries surveyed during 2001.

Stream	Last Treated	Last Surveyed	Residual Found	Oldest Reestablished Year-Class	2001 Estimate of Larval Population	2002 Metamorphosing Estimate	On 2002 Treatment Schedule
Canada							
Bronte Cr.	Apr-01	2001	No	2001	-	-	-
Credit R.	Jun-99	2001	Yes	1999	9,366	5,512	Yes
Rouge R.	Apr-01	2001	No	2001	-	-	-
Duffins Cr.	Apr-01	2001	No	None	0	0	No
Lynde Cr.	May-99	2001	Yes	1999	6,070	709	Yes
Oshawa Cr.	May-00	2001	No	2000	-	-	-
Farewell Cr.	Apr-00	2001	No	2000	-	-	-
Bowmanville Cr.	Apr-01	2001	No	None	0	0	No
Wilmot Cr.	May-00	2001	No	2000	-	-	-
Graham Cr.	May-96	2001	No	None	-	-	-
Unnamed (O-140)[1]	Never	2001	-	-	7,908	1,409	Yes
Port Britain Cr.[2]	Apr-00	2001	No	1997	2,198	1,726	Yes
Cobourg Br.	Sep-96	2001	No	None	-	-	-
Covert Cr.	May-99	2001	No	1999	45,881	6,365	Yes
Grafton Cr.[2]	Sep-96	2001	No	1997	8,801	249	Yes
Shelter Valley Cr.	Sep-96	2001	No	1998	-	-	-
Colborne Cr.	Jun-95	2001	No	2000	-	-	-
Salem Cr.	Aug-98	2001	No	1999	46,096	1,279	Yes
Proctor Cr.	Aug-98	2001	No	None	-	-	-
Trent R. – Mayhew Cr.	Jun-00	2001	No	None	-	-	-
Salmon R.	Jun-00	2001	Yes	None	-	-	-
United States							
Black R.	Jun-99	2001	No	1999	339,904	4,967	Yes
South Sandy Cr.	Apr-99	2001	No	1999	345,787	3,690	Yes
Skinner Cr.	May-93	2001	-	1998	470	452	Yes
Lindsey Cr.	May-99	2001	Yes	1999	38,740	2,646	Yes
Little Sandy Cr.	Jun-01	2001	No	2001	-	-	-
Deer Cr.	May-99	2001	Yes	1999	36,776	1,352	Yes
Salmon R.	Jun-01	2001	Yes	2001	31,681	2,978	No
Grindstone Cr.	May-99	2001	Yes	1999	227,358	2,204	Yes
Snake Cr.	May-99	2001	Yes	1999	32,497	442	Yes
Little Salmon R.	Jun-00	2001	No	2000	132,594	0	No
Catfish Cr.	May-00	2000	No	2000	-	-	-
Oswego R.							
Big Bay Cr.	Sep-93	1999	No	None	-		-
Fish Cr.	Jun-01	2001	Yes	2001	1,051	0	No
Carpenter's Br.	May-94	1998	No	None	-	-	-
Putnam Br.	May-96	1999	Yes	None	-	-	-
Eightmile Cr.	June 01	2001	Yes	2001	1,884	0	No
Nine Mile Cr.	May-98	2001	No	1999	81,338	10,077	Yes
Sterling Cr.	May-00	2001	No	2000	-	-	-
Red Cr.	May-94	2001	-	1999	-	-	-
Sodus Cr.	Jun-01	2001	No	None	52	17	No
Salmon Cr.	May-96	2001	-	None	-	-	-
First Cr.	May-95	2001	-	None	-	-	-

[1] Never treated, but quantitatively assessed in 2001.

[2] Research population, established upstream of barrier.

Spawning Phase

The long-term effectiveness of the control program is measured by assessing the population of spawning-phase and parasitic-phase sea lampreys. Traps are used to monitor sea lamprey spawning migrations during spring and early summer. Traps are portable (rectangular steel or aluminum mesh, hoop or fyke nets) or permanent (generally concrete or steel plate) and usually associated with a physical or electrical barrier. Total catch of sea lampreys is a measure of relative abundance. Biological characteristics (sex, weight, length) are recorded from sea lampreys captured from some streams.

Mark/recapture studies are conducted in most streams to estimate the spawning population for the year. These estimates are computed using a model that will be published in the Journal of Great Lakes Research. Lake estimates are computed based on a relation (y = ax) of discharge (x) to the estimated number of adult sea lampreys that enter tributaries (y)."

Lake Superior

- 9,188 sea lampreys were trapped in 21 tributaries during 2001 (Table 13, Fig. 3).
- The estimated population of spawning-phase sea lampreys for 2001 was 82,229 (33,737 western U.S. and 48,492 eastern U.S. and Canada; $r^2 = 0.43$).
- No significant trend (Fig. 4) was detected from a linear regression of spawner abundance on year from 1982 through 2001 (p=0.094).
- Spawning runs were monitored in the Amnicon, Middle, Bad, Firesteel, Misery, and Silver rivers and Red Cliff Creek through a cooperative agreement with the Great Lakes Indian Fish and Wildlife Commission; 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.

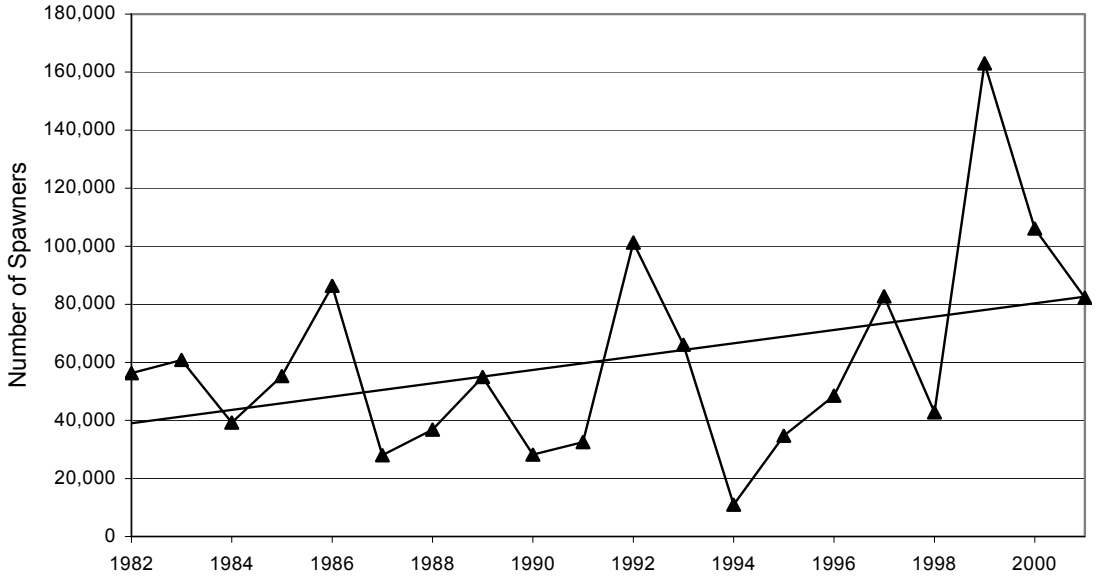


Fig. 4. Trend line of the linear regression of spawner abundance for Lake Superior, 1982 - 2001.

FIG 3 TRAPS MAP

Lake Michigan

- 29,260 sea lampreys were trapped at 17 sites in 15 tributaries during 2001 (Table 14, Fig. 3).
- Estimated population of spawning-phase sea lampreys in Lake Michigan for 2001 was 91,310 (67,549 north and 23,761 south; $r^2 = 0.76$).
- A significant positive trend (Fig. 5) was detected from a linear regression of spawner abundance on year during 1982 – 2001 ($p=0.008$, $r^2=0.33$).
- Spawning runs were monitored in the Boardman and Betsie rivers through a co-operative agreement with the Grand Traverse Band of Ottawa and Chippewa Indians, in the Little Manistee River through a co-operative agreement with the Little River Band of Ottawa Indians, and in the Carp Lake River through an agreement with the Little Traverse Bay Bands of Odawa Indians.

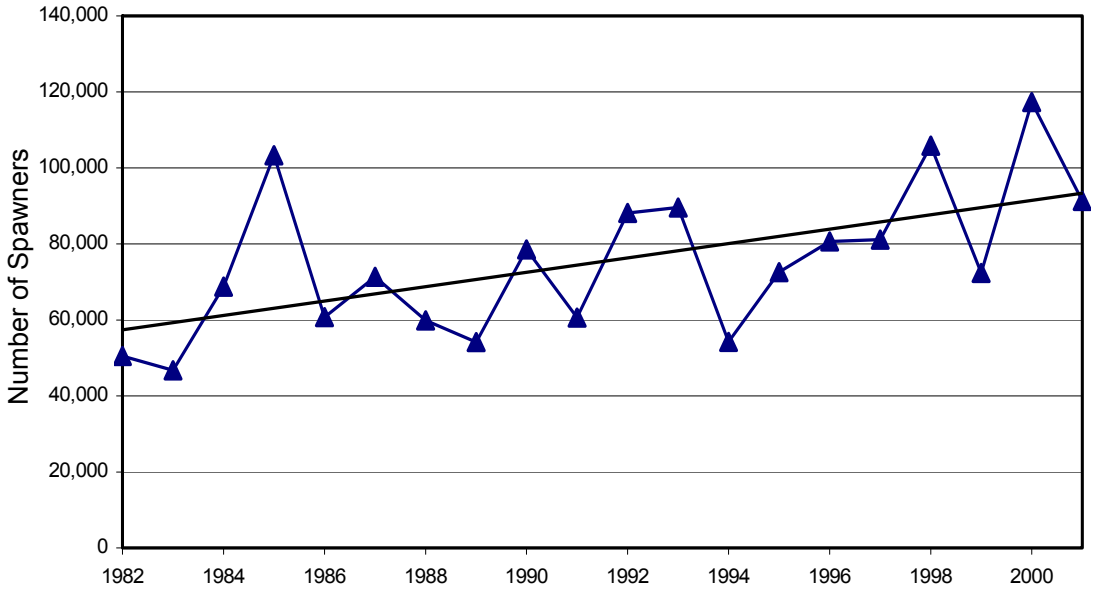


Fig. 5. Trend line of the linear regression of spawner abundance for Lake Michigan, 1982-2001.

Table 13. Stream, number caught, estimated spawner population, trap efficiency, number sampled, percent males, and biological characteristics of adult sea lampreys captured in assessment traps in tributaries of Lake Superior, 2001. (Number in parentheses corresponds to location of stream in Fig. 3)

Stream	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males[2]	Mean Length (mm)		Mean Weight (g)	
						males	females	males	females
Canada									
Neebing-McIntyre Floodway									
Neebing R. (1)	722	1,234	59	0	-	-	-	-	-
McIntyre R. (1)	128	877	15	0	-	-	-	-	-
Wolf R. (2)	422	791	53	0	-	-	-	-	-
Nipigon R. (3)	2	-	-	0	-	-	-	-	-
Carp R. (4)	186	370	50	0	-	-	-	-	-
Stokely Cr. (5)	42	56	75	0	-	-	-	-	-
Big Carp R. (6)	10	-	-	0	-	-	-	-	-
Total or Mean (North Shore)	1,512			0					
United States									
Tahquamenon R. (7)	501	2,230	22	92	67	446	456	194	210
Betsy R. (8)	369	662	56	184	49	430	424	183	183
Miners R. (9)	64	183	35	13	35	421	395	194	166
Furnace Bay Cr. (10)	20	27	74	6	17	380	434	127	198
Rock R. (11)	1,329	2,221	60	370	45	424	447	149	196
Chocolay R. (12)	48	165	29	1	100	500	-	320	-
Big Garlic R. (13)	38	75	51	1	100	485	-	268	-
Silver R. (14)	7	-	-	-	-	-	-	-	-
Misery R. (15)	1,228	1,975	62	379	47	426	429	160	179
Firesteel R. (16)	7	-	-	-	-	-	-	-	-
Bad R. (17)	536	8,679	6	27	31	424	417	182	170
Red Cliff Cr. (18)	12	-	-	1	100	354	-	119	-
Brule R. (19)	1,383	3,257	42	0	61	-	-	-	-
Middle R. (20)	2,012	2,327	86	621	40	444	445	208	212
Amnicon R. (21)	122	904	13	10	-	489	443	250	193
Total or Mean (South Shore)	7,676			1,880	47	443	430	184	186
Total or Mean (for lake)	9,188			1,880	47	443	430	184	186

[1]The number of sea lampreys from which all length and weight measurements were determined.
[2]Percent males generally determined from internal body examination of the number sampled.

Table 14. Stream, number caught, estimated spawner population, trap efficiency, number sampled, percent males, and biological characteristics of adult sea lampreys captured in assessment traps in tributaries of Lake Michigan, 2001. (Number in parentheses corresponds to location of stream in Fig. 3).

Stream	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males[2]	Mean Length (mm)		Mean Weight (g)	
						Males	Females	Males	Females
Carp Lake R. (22)	1,594	3,943	40	301	52	480	475	219	233
Jordan R. (23)	74	153	48	18	39	468	498	241	274
Deer Cr. (23)	97	241	40	25	36	481	504	265	292
Boardman R. (24)	128	663	19	11	36	482	480	250	248
Betsie R. (25)	272	2,824	10	10	-	442	463	166	222
Big Manistee R. (26)	182	2,035	9	5	40	481	504	265	292
L. Manistee R. (26)	89	426	21	15	47	468	498	241	274
Pere Marquette R. (27)	329	737	45	129	-	486	478	268	268
Muskegon R. (28)	173	1,125	15	9	43	-	-	247	281
St. Joseph R. (29)	143	903	16	0	-	-	-	-	-
East Twin R. (30)	92	274	34	17	36	467	464	240	224
Oconto R. (31)	9	-	-	0	-	-	-	-	-
Peshtigo R. (32)	2,079	2,322	89	593	43	-	507	-	317
Menominee R. (33)	240	1,767	14	23	68	491	472	243	247
Ogontz R. (34)	29	135	21	3	67	473	550	312	422
Manistique R. (35)	23,552	47,276	50	976	46	-	-	-	-
Hog Island Cr. (36)	178	434	41	73	49	498	489	272	258
Total or Mean	29,260	65,258		2,225	47	483	482	254	257

[1]The number of lampreys from which all length and weight measurements were determined.
[2]Percent males generally determined from internal body examination of the number sampled.

Lake Huron

- 38,874 sea lampreys were trapped in 14 tributaries during 2001 (Table 15, Fig. 3).
- The estimated population of spawning-phase sea lampreys in Lake Huron for 2001 was 196,596 (168,946 north and 27,650 south; $r^2 = 0.76$).
- No significant trend (Fig. 6) was detected from a linear regression of spawner abundance on year between 1982 and 2001 ($p = 0.079$)
- Spawning runs were monitored in the Carp River and Albany and Trout 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 facility captured 11,779 spawning-phase sea lampreys. The estimated population of spawning-phase lampreys in the river was 25,311 and trap efficiency was 47%.
- A radio-telemetry study was conducted in the St. Marys River. A total of 126 tagged specimens were tracked from 2 release sites on the Canadian and U.S. shorelines to the 4 power plants and the rapids where their movement was observed in detail. Preliminary results from this first year of a two-year study have re-directed plans for trapping to further enhancement at the Great Lakes Power plant and consideration of trapping at the Edison Sault power facility.

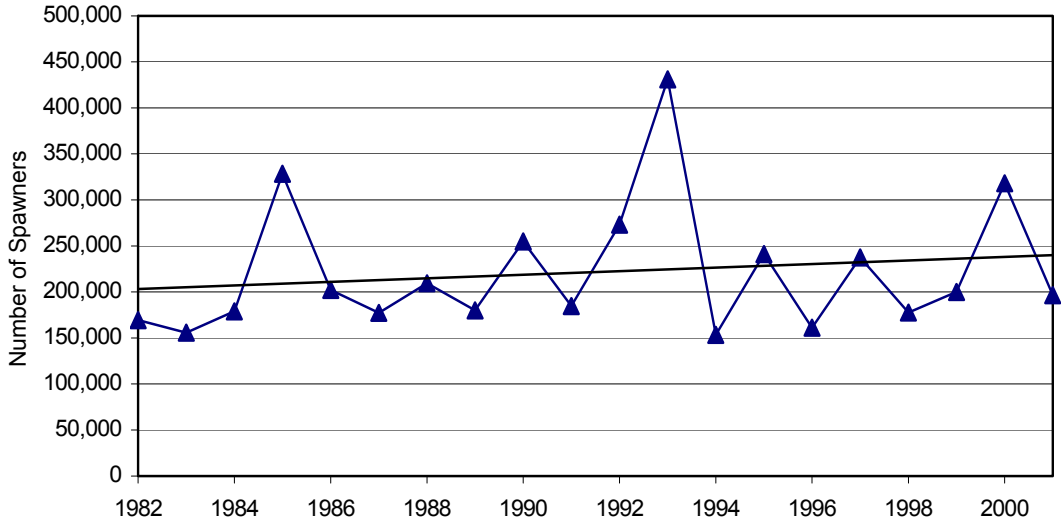


Fig. 6. Trend line of linear regression of spawner abundance for Lake Huron, 1982-2001.

Table 15. Stream, number caught, estimated spawner population, trap efficiency, number sampled, percent males, and biological characteristics of adult sea lampreys captured in assessment traps in tributaries of Lake Huron, 2001. (Number in parentheses corresponds to location of stream in Fig. 3)

Stream	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males[2]	Mean Length (mm) Males	Mean Length (mm) Females	Mean Weight (g) Males	Mean Weight (g) Females
Canada									
St. Marys R. (37)	7,844	25,311	47	0	63	-	-	-	-
Echo R. (38)	3,590	6,581	55	0	60	-	-	-	-
Koshkawong R. (39)	346	-	-	0	54	-	-	-	-
Thessalon R. (40)	4,039	6,101	66	0	63	-	-	-	-
Spanish R. (41)	18	-	-	0	-	-	-	-	-
Total or Mean	15,837			0	63				
United States									
Tittabawassee R. (42)	879	4,395	20	0	-	-	-	-	-
East Au Gres R. (43)	1,513	9,589	16	54	46	487	490	255	257
Au Sable R. (44)	1,419	5,627	25	103	56	477	479	234	245
Devils R. (45)	32	-	-	3	67	488	480	305	300
Ocqueoc R. (46)	5,167	7,094	73	0	55	-	-	-	-
Cheboygan R. (47)	9,877	13,101	75	0	54	-	-	-	-
Carp R. (48)	122	946	13	7	71	467	507	253	280
Trout Cr. (49)	42	171	25	3	67	489	482	215	210
Albany Cr. (50)	51	116	44	10	50	418	479	141	207
St. Marys R. (37)	3,935	See Canada	See Canada	0	-	-	-	-	-
Total or Mean	23,037			180	54	477	483	236	248
Total or Mean (for lake)	38,874				58	477	483	236	248

[1]The number of sea lampreys from which all length and weight measurements were determined.
[2]Percent males generally determined from internal body examination of the number sampled

Lake Erie

- 1,214 sea lampreys were trapped at 5 sites in 4 tributaries during 2001 (Table 16, Fig. 3).
- The estimated population of spawning-phase sea lampreys in Lake Erie for 2001 was 8,092.
- A significant positive trend (Fig. 7) was detected from a linear regression of spawner abundance on year during post-treatment years, 1989 – 2001 ($p=0.049$, $r^2=0.31$)

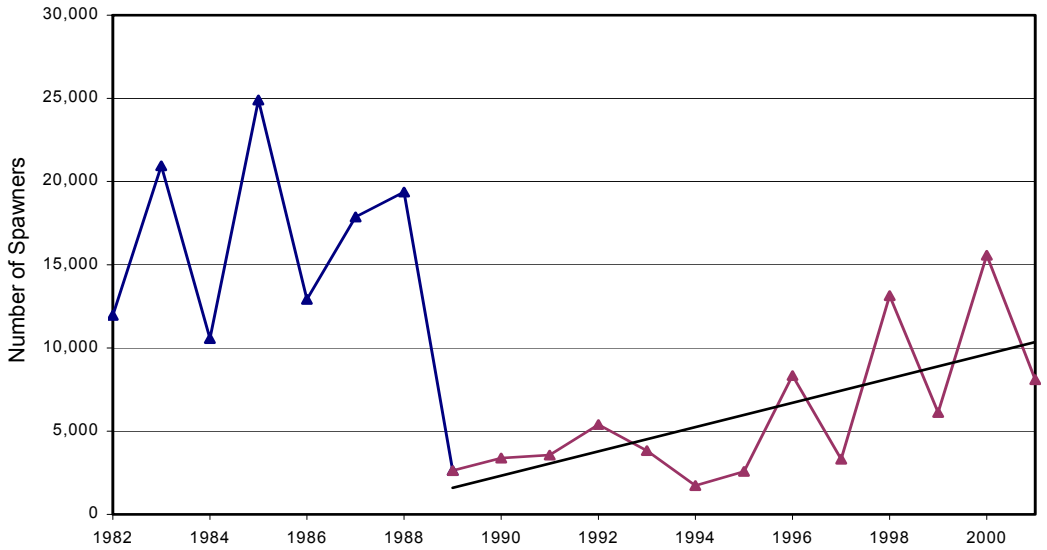


Fig. 7. Trend line of the linear regression of spawner abundance for Lake Erie, 1982-2001.

Lake Ontario

- 4,892 sea lampreys were trapped at 14 sites in 13 tributaries (Table 17, Fig. 3).
- The estimated population of spawning-phase sea lampreys in Lake Ontario for 2001 was 34,005.
- A significant negative trend (Fig. 8) was detected from a linear regression of spawner abundance on year during 1982–2001 ($p=0.001$, $r^2=0.44$).

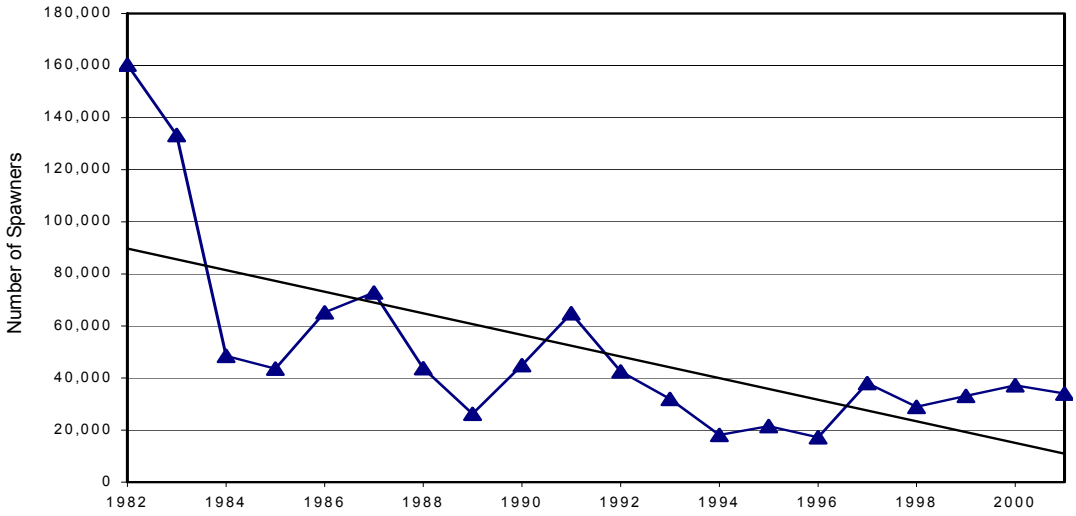


Fig. 8. Trend line of the linear regression of spawner abundance for Lake Ontario, 1982-2001.

Table 16. Stream, number caught, estimated spawner population, trap efficiency, number sampled, percent males, and biological characteristics of adult sea lampreys captured in assessment traps in tributaries of Lake Erie, 2001. (Number in parentheses corresponds to location of stream in Fig. 3)

Stream	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males[2]	Mean Length (mm) Males	Mean Length (mm) Females	Mean Weight (g) Males	Mean Weight (g) Females
Canada									
Big Cr. (51)	999	2,354	42	0	-	-	-	-	-
Young's Cr. (52)	10	-	-	0	-	-	-	-	-
Total or Mean	1,009			0					
United States									
Cattaraugus Cr. (53)	169	789	21	7	57	514	447	305	237
Spooner Cr. (53)	26	-	-	0	-	-	-	-	-
Grand R. (54)	10	-	-	0	-	-	-	-	-
Total or Mean	205			7	57	514	447	305	237
Total or Mean (for lake)	1,214			7	57	514	447	305	237

[1]The number of sea lampreys from which all length and weight measurements were determined.
[2]Percent males generally determined from internal body examination of the number sampled.

Table 17. Stream, number caught, estimated spawner population, trap efficiency, number sampled, percent males, and biological characteristics of adult sea lampreys captured in assessment traps in tributaries of Lake Ontario, 2001. (Number in parentheses corresponds to location of stream in Fig. 3)

Stream	Number Caught	Spawner Estimate	Trap Efficiency	Number Sampled[1]	Percent Males[2]	Mean Length (mm) Males	Mean Length (mm) Females	Mean Weight (g) Males	Mean Weight (g) Females
Canada									
Humber R. (55)	2,036	6,919	29	200	52	475	482	248	271
Duffins Cr. (56)	764	1,869	41	79	47	462	484	234	268
Bowmanville Cr. (57)	393	1,754	22	131	52	463	460	225	232
Graham Cr. (58)	61	79	77	17	41	479	469	249	235
Port Britain Cr. (59)	90	137	66	29	52	441	450	220	234
Cobourg Br. (60)	168	286	59	59	59	475	459	260	252
Grafton Cr. (61)	36	64	56	0	-	-	-	-	-
Shelter Valley Cr. (62)	595	992	60	162	51	510	506	269	274
Salmon R. (63)	71	-	-	6	17	556	504	369	289
Total or Mean	4,214			683	51	478	481	247	260
United States									
Black R. (64)	583	-	-	0	-	-	-	-	-
Grindstone Cr. (65)	9	15	60	1	-	-	450	-	195
Little Salmon R. (66)	11	-	-	0	-	-	-	-	-
Sterling Cr. (67)	8	-	-	0	-	-	-	-	-
Sterling Valley Cr. (67)	67	583	11	1	-	510	-	296	-
Total or Mean	678			2		510	450	296	195
Total or Mean (for Lake)	4,892			685	51	478	481	247	260

[1] The number of sea lampreys from which all length and weight measurements were determined.
[2]Percent males generally determined from internal body examination of the number sampled.

Parasitic Phase

Lake Superior

The Michigan Department of Natural Resources provided data on the frequency of parasitic-phase sea lampreys attached to fish caught by sport charter boats during 2001.

- 31 sea lampreys attached to lake trout were collected from 3 management districts.

- Lampreys were attached at a rate of 0.65 per 100 lake trout (n = 4,760).

- The recapture of spawning-phase sea lampreys that were released as metamorphosing lampreys in 1999 was completed. A total of 9,020 (7,508 U.S.; 1,512 Canada) spawning-phase sea lampreys were scanned for coded wire tags in 18 (11 U.S.; 7 Canada) Lake Superior streams in 2001. Of 2,213 metamorphosing lampreys marked with coded wire tags and released in 1999, 51 (2.3%) were recaptured as spawning adults in 2001. The estimated abundance of metamorphosing sea lampreys during 1999 was 390,161 (95% C.I. 308,161-537,161).

- A total of 1,046 metamorphosing sea lampreys were marked with coded wire tags and released into Lake Superior tributaries in September and October 2001 (Brule River-141, Misery River-141, AuTrain River-93, Two Hearted River-94, Harlow Creek-122, Little Garlic River-10, Chippewa River-89, Michipicoten River-89, Nipigon River-89, Wolf River-88, and McIntyre River-90). Recapture of these lampreys as spawning-phase adults will take place in 2003.

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 2001.

- 519 sea lampreys were collected from 12 management districts; 292 were attached to lake trout and 227 were attached to chinook salmon.

- Lampreys were attached at a rate of 1.05 per 100 lake trout (n = 27,885) and 0.3 per 100 chinook salmon (n = 74,407).

Lake Huron

- 1,839 sea lampreys (U.S.: sport-506, commercial-216; Canada: commercial-1,117) were collected from 9 management districts (6 U.S.; 3 Canada) during 2001.

- Of the 506 sea lampreys captured in the sports fishery, 146 were attached to lake trout and 360 were attached to chinook salmon.

- Lampreys were attached at a rate of 2.0 per 100 lake trout (n = 7,219) and 4.4 per 100 chinook salmon (n = 8,153).

- A total of 63,988 (48,151 U.S.; 15,837 Canada) spawning-phase sea lampreys trapped in 14 Lake Huron streams (8 U.S., 5 Canada, 1 international) and 2 Lake Michigan streams were scanned for coded wire tags in 2001. A total of 147 (7.5%) of 1,953 metamorphosing lampreys previously marked with coded wire tags and released in 1999 were recaptured. The estimated abundance of metamorphosing sea lampreys in Lake Huron in 1999 was 578,000 (95% C.I. 491,000-702,000). Of 442 parasitic-phase sea lampreys marked and released in 2000, 8 (1.8%) were recaptured as spawning adults in 2001.

- Continuing with the study initiated in 1999, 601 metamorphosing sea lampreys were marked with coded wire tags and released into Lake Huron (Elliot Creek-200, Ocqueoc River-200, Devils River-201). Recapture of these lampreys as spawning-phase adults will take place in 2003. A total of 563 parasitic-phase sea lampreys (captured by the commercial fisheries, the Chippewa/Ottawa Resource Authority, and USGS-Hammond Bay Biological Station) were tagged with coded wire and released at several locations in northern Lake Huron (Hammond Bay-123, Nunns Creek-169, and the North Channel-271). Recapture of the spawning-phase adults will take place in 2002.

TASK FORCE REPORTS

The Commission, through its Sea Lamprey Integration Committee (SLIC), has established task forces to recommend direction and co-ordinate actions in several focus areas: Sterile Male Release Technique, Barriers, Assessment, and Lampricide Control. The progress and major actions of the task forces for 2001 are outlined below.

Sterile Male Release Technique Task Force

- Task force established April 1984.

- Purpose of Task Force:

  - Continue to refine the long-term strategy for application of sterile male release in an integrated program of sea lamprey control.

  - Co-ordinate the current large-scale research program into the effectiveness of the sterile male release technique in Lake Superior and the St. Marys River and include operational and research studies to test all required hypotheses.

- Members were Michael Twohey (chair), John Heinrich, and Dennis Lavis, U.S. Fish and Wildlife Service; Rod McDonald and Doug Cuddy, Department of Fisheries and Oceans, Canada; Gavin Christie and Jeff Slade, Great Lakes Fishery Commission Secretariat; Gerald McKibben (outside expert), U.S. Department of Agriculture (retired); Roger Bergstedt, U.S. Geological Survey; Dr. Weiming Li, Michigan State University; and Lloyd Mohr (Lake Huron Technical Committee representative), Ontario Ministry of Natural Resources.

- A task force meeting was held during October 1-2.

- Progress On Charges:

  Strategic Long-term Integrated Management of Sea Lamprey (IMSL) Planning:

  - The theoretical number of reproducing females remaining in the St. Marys River during 1997-2001 (after trapping and technique application) has averaged 1,100, an average reduction in spawning success of about 88%.

  - The task force is working with the Assessment Task Force to find alternatives to the current practice of releasing 5% of captured lampreys into the St. Marys River to conduct the annual mark/recapture estimate. During 2001, about 225 females were released and 56 of those were recaptured. The 169 females that remained extant represent about 30 theoretically reproducing females (number reduced through application of the technique).

  - A manuscript by Bergstedt et al. suggests that sea lampreys are successfully sterilized, compete with other males, mate with females, and reduce the production of larvae from nests and in streams. Further, data from a St. Marys River study indicates that sterile males are having an observable effect in nests that is within 5% of the theoretically expected effect.

- Recent studies suggest that density-dependent effects are not strong at current population levels and that reduction in reproduction should result in fewer recruits, but there is risk of periodic high recruitment. Recruitment variation is reduced when low densities of reproducing females are achieved.

- Decision analysis indicates that alternative methods are essential to long-term control in the St. Marys River and that target levels of control can be achieved through enhanced alternative techniques. However, when uncertainty is considered, alternative techniques result in greater variability than the combination of Bayluscide applications and alternative methods.

- A 3 year investigation on recruitment variation continues. This study will provide data on the long-term effectiveness of strategies to reduce reproduction.

- Analysis of sampling in two index plots showed insufficient power to discern an effect on larval recruitment. The assessment plan and the review panel noted that variability in the abundance of individual year classes of sea lamprey larvae makes observation of an effect unlikely. It is possible that larvae are saturating the sites, which are located near the primary spawning grounds. The best long-term evaluation will be the population trend observed through stratified random sampling.

- Long-term suppression targets and technique effectiveness continued to be evaluated in conjunction with the St. Marys River decision analysis workshops, St. Marys River Assessment Plan, and nest monitoring in the St. Marys River.

- The task force has been working with researchers to identify strategies to reduce reproduction through the use of pheromones.

Tactical/Operational Planning:

- Cost estimates and operational plans for 2002 – 2004 have been prepared.

- The task force is currently working with the trapping work group of the Assessment Task Force to plan and implement cost effective enhancements to trapping, and to refine cost estimates. Estimates of the cost-effectiveness of additional trapping in the St. Marys River and other Great Lakes sites were evaluated and ranked by the cost per effective female removed from the St. Marys River. Additional trapping options with costs similar to the current operation have been identified in the St. Marys and Cheboygan rivers.

- The task force is working with the Assessment and Lampricide Control task forces to assemble costs for all elements of the control strategy in the St. Marys River and present them in a comparable format.

Research Planning:

- Research priorities of the task force are in the broad areas of:
    - Determination of effectiveness of application levels in the St. Marys River
    - Examination of processes and methods that add to the existing supply of lampreys for use in the technique
    - Examinations to improve safety and effectiveness of the current industrial technique

- The study, *Genetic assignment of larval parentage as a means of assessing mechanisms underlying adult reproductive success and larval dispersal* was completed. The majority of stocked adults in the study streams contributed progeny with considerable variation in male and female reproductive success. There was evidence of polygyny and polyandry. Male and female success was related to number of mates.

- Female sterilization remains a research priority. Evidence of extensive polygamy suggests the Male Mating Potential (MMP) must be determined to predict effectiveness of sterile females. The MMP is the number of eggs that a male can fertilize (not necessarily the same as polygamy). This will determine the potential effectiveness of sterile female release ratios.

- The task force will await results of female sterilization studies before proposing a study of MMP. If females cannot be successfully sterilized, then studies of MMP become less important.

- Under the direction of the task force, researchers continue to evaluate the efficacy of bisazir to sterilize female sea lampreys and to develop a quality assurance procedure for the current industrial process of male sterilization.

- Sea lampreys from the Connecticut and Farmington rivers were evaluated at the U.S. Fish and Wildlife Service, Lamar Fish Health Unit in the year 3 of a 4-year investigation of diseases and parasites of Atlantic origin sea lampreys. *Aeromonas salmonicida*, the causative agent of furunculosis in salmonids, was isolated from a single late run lampreys in the Connecticut River. This disease is already present in the Great Lakes. No other obligate bacterial fish pathogens or viral agents were identified in samples collected during 1999 – 2001.

- Positive results have been reported in a 3 year project funded by the Great Lakes Protection Fund to develop procedures that will determine the potential of sex pheromone release, and the mating competitiveness of sterile male sea lampreys.

- The task force is working with the U.S. Geological Survey, Upper Midwest Environmental Sciences Center to confirm the identity of bisazir degradation products produced at pH 2. Investigation of hydrolysis products has yielded the mass weights of several products and the probable identities of others.

- The task force participated in preparing new ranked priorities for the Research Priorities Work Group. Also, the task force reviewed proposed research titles for relevance to Commission research priorities and provided specific ranking for titles that were relevant to the Sterile Male Release Technique program.

Sea Lamprey Barrier Task Force

- Task Force established April 1991.

- Purpose of Task Force:

  - Refine the long-term strategy for the application of barriers in an integrated program of sea lamprey control including the decision model, resulting rank-order list of projects, and rules for the order in which to build the priority barriers.

  - Evaluate the potential for barriers to contribute to meeting targets for sea lamprey suppression on all lakes and to meeting targets for reducing the amount of lampricides used in the sea lamprey program; and evaluate effectiveness of barriers relative to lampricide control.

  - Co-ordinate the implementation of an accelerated program of barrier construction, including development of detailed plans and accurate cost estimates, meeting all environmental assessment requirements, and supporting the Commission decision process.

  - Establish research priorities and recommend research direction into barrier technology, efficacy and ecosystem impacts.

- Members were Dennis Lavis (Chair) and Ellie Koon, U.S. Fish and Wildlife Service; Andrew Hallett, Department of Fisheries and Oceans Canada; Bill Swink, U.S. Geological Service, Biological Resources Division, Hammond Bay Biological Station; John Schrouder (represented by Kurt Newman), Michigan Department of Natural Resources; Les Weigum and Dave Gesl, U.S. Army Corps of Engineers, Detroit District; Rob McLaughlin and Gordon McDonald, University of Guelph PERM Scientists; Gavin Christie, Great Lakes Fishery Commission Secretariat.

- The task force met once during 2001 to develop program budget, discuss research proposals, and evaluate progress toward charges.

- Progress On Charges:

    - Continued co-ordination with the U.S. Army Corps of Engineers (USACE) to implement ten barrier projects under Section 1135 and other Corps authorities; seven of the projects are within jurisdiction of the Detroit Michigan District and one is within jurisdiction of the Buffalo New York District. The USACE designated a project manager to oversee all project management and interaction with the Commission and Barrier Co-ordinators.

    - Revised interim environmental policy and guidelines for the placement of sea lamprey barriers in Great Lakes tributaries based upon comment and recommendation of the SLIC and Commission.

    - Provided oversight to the barrier operational program conducted by the Barrier Co-ordinators. Detailed descriptions of completed and ongoing Canadian and United States barrier activities in 2001 are provided in the barrier section of this report.

    - Began to formulate basin-wide strategy for workplace and public safety in the barrier program and to incorporate this strategy into the barrier protocol document. This strategy will be built upon a framework resulting from a review of workplace and public safety at three sea lamprey barriers in Ontario in 2001.

    - The task force continued to work with the Assessment, and Sterile Male Release Technique task forces to refine understanding of the stock recruitment relationship and compensatory mechanisms in sea lamprey populations and the potential impact on barrier effectiveness.

    - Developed and recommended a fiscal year 2002 barrier program budget of $1,121,100. These funds are to include barrier construction, planning, operations, health and safety implementation, environmental assessment, and research in support of the interim policy for the placement of sea lamprey barriers in Great Lakes tributaries. Included in this budget were funds to initiate an environmental assessment for construction of a barrier in the Bad River, Wisconsin designed to meet the requirements of the Bad River Band of Chippewa Indians.

Assessment Task Force

- Task Force established April 1996.

- Purpose of Task Force:

  - Develop strategic and long-term IMSL plans for projecting transformer production, developing summary databases, reviewing and improving key life history parameters, developing a habitat inventory, estimating efficacy of control options, evaluating the uncertainty in assessment parameters, and evaluating the role of trapping as a control strategy.

  - Create tactical and operational plans for developing cost-effective protocols for assessment, co-ordinating training among Agents to ensure standardisation of techniques, and modifying current sampling protocols.

  - Establish internal and external research priorities, review research titles for relevance against priorities, and recommend research approaches.

- Members were Doug Cuddy (Chair) and Paul Sullivan, Department of Fisheries and Oceans Canada; Michael Fodale, John Heinrich, Katherine Mullett and Jeffrey Slade, U.S. Fish and Wildlife Service; Bill Swink and Jean Adams, U.S. Geological Survey, Biological Resources Division; Bill Mattes, Great Lakes Indian Fish and Wildlife Commission; Michael Jones, Michigan State University; Gavin Christie and Dale Burkett, Great Lakes Fishery Commission Secretariat.

- The task force met twice on April 4, 5 and again October 4, 5. The trap work-group met twice and the larval work-group once.

- Considerable effort has gone into preparations for the larval review, now scheduled for the summer of 2002.

- A St. Marys River decision analysis workshop was held in conjunction with the Sea Lamprey Integration Committee meeting in October. Decision options ranging from “do nothing” to a full program of trapping, sterile male release and Bayluscide treatment were examined in light of several key sources of uncertainty. It is believed that the Lake Huron fish community objectives are attainable using a combination of enhanced trapping and sterile male release to control recruitment in the St. Marys River.

- Members continued writing and editing papers for publication following the second Sea Lamprey International Symposium (SLIS II) that was held in August 2000.

- The task force co-operated with the Lampricide Control Task Force on the treatment efficiency study and with the Sterile Male Release Task Force on the sterile male long-term study.

- The remaining St. Marys River larval population was estimated at 1.6 million following the 2001 treatment with Bayluscide of the 42 hectares that were withheld from large-scale treatment in 1999. This represents a 69% reduction from the 5.2 million estimated in 1996.

- Progress On Charges:

  - *Produce long term projection of transformer production using empirical data and Lampricide Control Selection System (LCSS).* In co-operation with the Secretariat and IMSL contractor, continued the development of the Empiric Stream Treatment Ranking model (ESTR). ESTR pulls together annual assessment catch and habitat data as well as stream specific growth and transformation models from the agent's data bases to estimate transformer production and uses these estimates along with treatment cost and resource data to rank streams for lampricide treatment. ESTR is now capable of using pre-treatment assessment data and estimates of treatment efficiency to predict transformer production from residual populations.

  - *Assessment Summary Database.* The summary database is an integral part of ESTR.

  - *Review key life history parameters.* Several of the papers delivered at SLIS II in August 2000 addressed lamprey life history parameters. Ongoing studies including the Compensatory Mechanisms study and habitat preferences study are also addressing informational needs that will assist with the assessment and management of sea lamprey populations. In 2001, the task force co-operated with PERM research scientists on the compensatory mechanisms study by conducting intense sampling of the larval populations in 16 streams with known spawning runs.

  - *Stream habitat inventory.* Larval sea lamprey habitat is routinely measured in those streams that are quantitatively assessed each year. Habitat has been quantified at least once for all regular-producing streams and for many streams, two or more times.

  - *Develop estimates of the efficacy of treatment (chemical and non-chemical) options.* Estimates of the residual populations of larval sea lampreys are made following a treatment for those streams that are thought to have the potential to rank for another lampricide treatment.

  - The task force is continuing to assess the efficacy of the St. Mary's control strategy that utilises a combination of Bayluscide granular treatment, trapping and sterile male release. Working with its statistical experts, the task force developed and implemented a sampling plan that utilises a stratified adaptive design to assess abundance of larval sea lampreys in the St. Marys River and evaluate control efforts.

  - The task force is also supporting a lampricide treatment effectiveness study (Swink et al.), by conducting pre- and post-treatment larval abundance assessments.

  - *Evaluate the level of uncertainty in transformer estimates.* This was identified as a major informational need by the larval assessment sub-group of the "How to design an optimal sea lamprey control program" breakout group at SLIS II. It will also be a key component of the larval assessment review scheduled for August 2002. Measures of uncertainty are incorporated in the decision analysis model developed for the St. Marys River control strategy by the PERM office at Michigan State University.

  - *Evaluate the information value of adult assessment.* The adult assessment review panel did this. The task force has acted on most of the recommendations made in their report. Significant changes in adult assessment included the assessment of spawning runs in more large rivers and the implementation of a multi-year lake-wide parasitic estimate for Lake Huron and multi-year transformer estimates for Lake Superior.

  - *Develop a strategy for allocating effort among categories of larval assessment.* The larval assessment protocols currently provide a guide for prioritising stream assessment activities. We anticipate that the upcoming larval review will critically evaluate the current allocation of effort and make recommendations to guide us in the future.

- *Evaluate the role of trapping as a control strategy.* The combination of trapping and sterile male release plays a major role in the St. Marys River control strategy. Trapping for control is likely to become more important when the use of pheromones becomes part of the control program.

- *Produce summary data to reflect status of lamprey populations.* The agents publish annually in the lake reports and Commission annual report, lake wide estimates of spawning populations for each of the lakes as well as larval and transformer estimates in each stream sampled using the Quantitative Assessment Survey (QAS) protocol. The secretariat of the Commission has established a joint database that will store assessment summary data of both control agents.

- *Develop cost-effective sampling protocols.* Protocols have been developed and are used by both agents for sampling larval sea lampreys in wadable and non-wadable waters of streams and lentic areas. These protocols are modified as new scientific findings are accepted. We anticipate that there may be significant changes following the upcoming larval review.

- *Produce estimates of transformer production for stream selection.* This is done annually for all streams that may warrant treatment the following year. Estimates are published yearly in the Commission annual report.

- *Co-ordinate training between agents.* Efforts are made to ensure interagency data consistency. Joint habitat classification training occurs annually for larval assessment staff prior to the start of the field season. Joint training in the tagging of lampreys has also been done.

- *Develop plans for adult and larval assessment programs.* Program plans and assessment budgets for FY 2002 were roughed out at the Oct, 4, 5 meeting. New initiatives were presented, discussed and prioritised. The task force identifies program needs and delivers recommendations that cannot be accommodated within the base program to SLIC via the Program Integration Working Group (PIWG). Evaluation of the control strategy in the St. Marys River is ongoing.

- *Develop assessment research priorities.* The task force has a research priority list that was developed in 1998. The list will be revisited following the larval review exercise.

- *Review internal research.* Several ongoing and new proposals were discussed and subsequently ranked by task force members. Some proposals are in the pre-proposal stage conceptual stage only and need further development before the task force can give final support.

- *Recommend approaches for external research.* No action.

- *Review external research*. External research pre-proposals are reviewed at the research priorities working group of which the task force chairs are members.

Lampricide Control Task Force

- Task Force established during December 1995.

- Purpose of Task Force:

  - Improve the efficiency of lampricide control to maximize the numbers of sea lampreys killed in stream and lentic area treatments while minimizing lampricide use, costs, and impacts on stream and lake ecosystems.

  - Define lampricide control options for near and long-term stream selection and target setting.

- Members were Terry Morse (Chair), Dorance Brege, David Johnson, Dennis Lavis, Alex Gonzalez and John Weisser, U.S. Fish & Wildlife Service; Larry Schleen, Rob Young, Brian Stephens and Wayne Westman, Department of Fisheries and Oceans Canada; Gavin Christie and Jeff Slade, Great Lakes Fishery Commission Secretariat; Terry Bills and Ron Scholefield, U.S. Geological Survey; and Dr. Weiming Li, Michigan State University.

- The task force met April 3 and October 2-3, 2001 in Marquette, Michigan.

- Progress On Charges:

  - *2001 Treatments.* The allocation of effort for the enhanced treatment program in 2001 involved streams in all the Great Lakes. Lake Michigan streams received the greatest amount of additional treatment effort. Treatments were successfully completed on all planned streams except the Tahquamenon River (Lake Superior), H-267 and the Shiawassee River (Lake Huron). These streams were deferred due to undesirable discharge.

  - *Border-blind Treatments.* The Canadian treatment staff treated 8 Michigan streams in 2001 and assisted U.S. crews in treatments of 4 others, 3 in Michigan and 1 in New York.

  - *Treatment Effectiveness Studies*. In 2000 and 2001, lampricide treatments were conducted on 6 streams at a normal concentration (1.2 - 1.6 times MLC), 6 streams at a reduced concentration (1.0 - 1.2 times MLC), and 2 streams with the sturgeon protocol (TFM:1% Bayluscide, 1.0 – 1.2 times MLC). Seventy-five percent of post-treatment larval assessments have been completed; the second post-treatment larval assessment on the 7 streams treated in 2001 (25% of post-treatment data) will be completed in summer 2002. Preliminary results from comparisons of pre- and post-treatment larval surveys show that 17% of the 6 normal concentration treatments, 33% of the 6 reduced concentration treatments, and neither of the 2 sturgeon protocol treatments were less than 95% effective. Treatment effectiveness ranged from 90.6 to 100% for the normal concentration streams, from 64.4 to 100% for the reduced concentration streams, and from 99.7 to 100% for the sturgeon protocol streams. A second treatment effectiveness estimate was also determined for the seven streams treated in 2000 through a second post-treatment larval survey conducted up to one year after the treatment. Change in treatment effectiveness on these streams ranged from a 6.0 percentage point decline to a 1.6 percentage point increase from the values determined immediately after treatment. Substituting the second-year data where available, 17% of the 6 normal concentration treatments were still less than 95% effective, but 50% of the 6 reduced concentration treatments were now less than 95% effective. The data from the sturgeon protocol treatments are inadequate to draw conclusions. Preliminary observations also show (1) a variability of up to 0.5 pH units across the stream in some transects, (2) lampricide concentrations determined by high performance liquid chromatograph generally were similar to concentrations measured by spectrophotometer, and (3) a failure to reach the MLC predicted by the pH-alkalinity charts or maintain the MLC for adequate time at some sites. This failure to reach or maintain the predicted MLC was noted on some streams where larval surveys indicated a high level of treatment effectiveness. However, treatment effectiveness among streams generally appeared to be related to the length of stream receiving lampricide concentrations less than MLC and the magnitude of the concentration deficit from MLC.

- *Standard Operating Procedures Manual*. A manual titled "Standard operating procedures for application of lampricides in the Great Lakes Fishery Commission integrated management of sea lampreys (*Petromyzon marinus*) control program" was issued to all co-operators and select program representatives in May 2000. The document was revised in 2001 and revisions were distributed.

- *Sturgeon Protocol-effects on the costs of stream treatments*. Expenditures of TFM and labour costs were compared for treatments of 19 streams under normal and reduced-concentration treatment protocols. The estimates indicated an average cost increase of about 9% for reduced-concentration treatments. However, it was acknowledged that calculations corrected for stream discharge at time of treatment would provide a more accurate cost comparison. These treatments will be re-examined and corrected for differences in discharge and the results will be reported in the 2002 SLIC meeting.

- Long-term Planning:

  - Projected lampricide purchase 2002: 110,000 pounds (Clariant)
    60,000 pounds (Kinetics)

  - *New research needs.* Study proposals strongly supported by the task force are: "*Establish and evaluate pH depression when treating a stream with TFM"* by Ron Scholefield and Bill Swink and "*Determine the effect of alkalinity and pH on the toxicity of granular Bayluscide to target and non-target organisms"* by Ron Scholefield. Two additional concerns were identified as new research needs. These are: "*Effects of rising and falling pH on MLC" and "Effects of using long blocks of low TFM concentrations during treatment".* A group of research and treatment personnel will meet to bring these related topics under a single title and to prepare a research proposal for 2002.

- Tactical/Operational Planning:

  - *2001 Treatment Concerns.* An ever-increasing number of streams that support populations of lake sturgeon has produced a burdensome concentration of treatments in the latter part (after August 1) of the treatment schedule and reduced scheduling flexibility. A total of 10 streams were scheduled for treatment under the Sturgeon Protocol after August 1 in 2001. Cross-border treatments with less than three weeks prior notice have created a hardship for the Canadian agent in filing required paperwork with customs in a timely fashion.

RISK ASSESSMENT

Priority projects included 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 the risk to non-target organisms.

Permits

Issues concerning environmental risk management were addressed for regulatory agency permit requirements for applications of lampricides for the following: letters of approval from the Wisconsin Department of Natural Resources (January 24 and June 7), Michigan Department of Environmental Quality (March 21, April 27, and June 25), Pennsylvania Department of Environmental Protection (April 4), New York State Department of Environmental Conservation (April 16, 2001), and Minnesota Department of Natural Resources (July 9). Permission for access was granted by the Bad River Band of Lake Superior Tribe of Chippewa Indians (February 21), Red Cliff Band of Lake Superior Chippewas (April 5), and Seneca Nation of Indians (April 10).

During 2001, no reports were required for compliance 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. This section of the Act requires pesticide registrants to report to the EPA information concerning unreasonable adverse effects of their products. The Service is the registrant for lampricides and must report unreasonable adverse effects on humans, domestic animals, fish or wildlife, plants, other non-target organisms, water, and property damage. Incident reports are required if the death a single organism of a federally listed endangered, threatened, or candidate species or more than 50 individuals of any species or taxa is observed during a lampricide application.

Federal and State Endangered Species

Consultations with Service offices and state agencies were held to discuss proposed lampricide stream treatments, assess the risk to federal (endangered, threatened, and candidate) and state-listed (endangered, threatened, and special concern) species, and determine procedures that protect or avoid disturbance for each listed species. The State of Michigan issued a Threatened/Endangered Species Permit on April 2 to allow the incidental take of state-listed species.

A "Protocol to protect and avoid disturbance to federal and state-listed endangered, threatened, candidate, or special concern species in streams of the Great Lakes in the United States during 2001" was implemented. This protocol provides to field personnel a list of protected federally- and state-listed species, known locations, and steps to assure avoidance. No mortality or disturbance was observed for the 34 federal- or state-listed species and 1 special concern community listed in this protocol.

Lake Sturgeon

During 1982, the lake sturgeon 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 2001, the lake sturgeon was listed as state endangered in Illinois, Indiana, Ohio, and Pennsylvania, as 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, Menominee, Millecoquins, Muskegon, Oconto, Peshtigo, and St. Joseph rivers (Lake Michigan), Carp, Cheboygan, Saginaw, and St. Marys rivers (Lake Huron) and Detroit and St. Clair rivers (Lake Erie), and Black and Niagara rivers (Lake Ontario).

The Michigan Department of Natural Resources expressed concern for the impact of lampricide treatments to suspected populations of lake sturgeon in the Sturgeon River (Lake Superior) and Cedar, Manistique, White and Whitefish rivers (Lake Michigan). Assessments by dip net during and immediately after treatments of these rivers found no dead lake sturgeon. The assessments were completed to fulfil requirements specified in the 2001 certification of approval issued for lampricide treatments by the Michigan Department of Environmental Quality.

OUTREACH 2002

Activity or Event	Number of Occurrences		Staff Days	
	U.S.	Canada	U.S.	Canada
School Presentations	18	5	27	9
Sports Shows	4	4	56	54
Youth Fishing	4	-	4	-
Civic Groups	5	2	6	2
Media Interviews	9	5	1	1
Media Mailings/E-mail	1,211	300	10	8
Station Public Displays	3	5	30	20
SLCC Public Aquarium	N/A	60	N/A	20
Landowner Notification	684	300	4	30
Job Outreach	5	N/A	8	N/A
Miscellaneous	8	3	13	4
Total Outreach	1,951	679	159	128
Combined Outreach	**2,630**		**287**	

PERMANENT EMPLOYEES OF THE SEA LAMPREY MANAGEMENT PROGRAM 2001

DEPARTMENT OF FISHERIES AND OCEANS CANADA

Sea Lamprey Control Centre – Sault Ste. Marie, Ontario Canada
Larry P. Schleen, Division Manager

Control Supervisor: Robert J. Young
Fisheries Biologist , Control:
- Treatment Supervisor: R. Wayne Westman
- Assistant Treatment Supervisor: Brian Stephens

Technician, Control:
- Randy Stewart
- Peter Grey
- Jerome Keen
- Barry Scotland
- Jamie Smith

Property & Contract Manager: David J. Haight
Accounts Clerk: Lisa Vine
Informatics: John Graham

Assessment Supervisor: Douglas W. Cuddy
Fisheries Biologist, Assessment:
- Adult Assessment Supervisor: Rod McDonald
- Upper Lakes Larval Assessment: Fraser Neave
- Lower Lakes Larval Assessment: Paul Sullivan
- Environmental Studies: Jerry Weise

Technician, Assessment:
- Ed Achtemichuk
- Mike MacKenna

Barrier Co-ordinator: Andrew Hallett
Maintenance Supervisor: Dave Reid
Storesperson: William Greene

U. S. FISH AND WILDLIFE SERVICE

Marquette Biological Station
Gerald T. Klar, Field Supervisor

Control Supervisor: Terry J. Morse
Chemist: David Johnson
Biologist, Control:
- Treatment Supervisor: Dorance Brege
- Darrian Davis
- Joseph Genovese

Lead Physical Science Technician: Robert Wootke
Physical Science Technician:
- Timothy Peiffer
- Michael St. Ours
- Kelley Stanley

Administrative Supervisor: Nadine Seeke
- Mary Jo Buckett
- Steven Dagenais
- Pauline Hogan
- Gloria Hoog
- Betty L'Huillier

Assessment Supervisor: John W. Heinrich
Biologist, Assessment:
- Larval Assessment Supervisor: Michael Fodale
- Adult Assessment Supervisor: Katherine Mullett
- Sterile Male Supervisor: Michael Twohey
- Risk Assessment Supervisor: John Weisser
- Mary Henson
- Cheryl Kaye
- Dale Ollila
- Jessica Richards

Biological Science Technician:
- Gregg Baldwin
- Gregory Klingler
- Kyle Krysiak
- Mark McNeill
- Deborah Winkler
- Michelle Zastrow

ADP Supervisor: Larry Carmack
- Robert Kahl
- Deborah Larson

Ludington Biological Station
Dennis S. Lavis, Station Supervisor

Biologist, Control:
- Treatment Supervisor: Alex Gonzales
- Kathy Hahka

Lead Physical Science Technician: Jeffrey Sartor
Physical Science Technician:
- Kevin Butterfield
- Ken Chaltry
- Tim Sullivan

Biologist, Assessment:
- Larval Assessment Supervisor: Jeffrey Slade

Biological Science Technician: Lois Mishler
Administrative Support:
- Robert Anderson
- Tana Reimer

Barrier Co-ordinator: Ellie Koon
Computer Assistant: Barry Matthews