Lake Champlain Sea Lamprey Assessment Program

Results of Sea Lamprey Assessment Activities 2008

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Prepared For:
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Summary

Sea lamprey assessment activities conducted during the spring and summer of 2008 included the trapping of migrating adult sea lamprey and electrofishing surveys of larval populations. Traps were installed on eleven streams during the spawning migration to limit reproduction or assess spawner abundance in these tributaries. Trapping of migratory phase sea lamprey was identified as a primary control method for seven streams and as part of an integrated approach on one stream in the supplemental EIS.

A Quantitative electrofishing survey (QAS) was conducted on the Lamoille River currently scheduled for lampricide treatment in the fall of 2009.

The Poultney and Hubbardton rivers were surveyed in the summer of 2008 to determine the effectiveness of the November 2007 lampricide treatment. Mount Hope Brook was surveyed within weeks of its 2008 lampricide treatment.

Presence absence surveys were conducted on a number of tributaries in southern Vermont.

The Saranac and Mill Brook deltas were treated with bayluscide in fall of 2008. The Ausable delta was surveyed in spring of 2008 to confirm the effectiveness of its 2007 delta treatment.

1.0 Adult Trapping

The primary reason for trapping sea lamprey in Lake Champlain is to prevent them from reproducing. Small streams that lend themselves to trapping and may possess species of concern which preclude other forms of control are trapped annually. On occasion, trapping is conducted to determine if adults are using specific areas of a stream or enlisting a new stream in their migrations. These detection efforts help guide our decisions in where and how to control existing or emerging populations. Every year, the Lake Champlain Fish and Wildlife Cooperative gives trapped adult sea lamprey to researchers to help them learn more about the biology and behavior of sea lamprey. Their innovative research benefits universities by developing students and publishing research and benefits our control program by developing new techniques which may enhance the control of sea lamprey and reduce our reliance on pesticides.

1.1 Control Program

Sea lamprey spawning runs were monitored in six streams during the spring of 2008 using portable assessment traps. A permanent trap associated with the Frog Pond Dam on the Great Chazy River has been operated since 1995 and is part of an integrated control approach. Lamprey pots were used in the Boquet River to assess sea lamprey abundance and migration patterns during the spawning migration (Figure 2). Sea lamprey were removed from the traps every 2-4 days. Captured non-target species were identified, recorded, and released. Any mortality was recorded and reported to state permitting agencies.

Streams where traps were deployed included three streams in Vermont where trapping was identified as the primary control method in the supplemental EIS. A more substantial sea

lamprey trap was constructed by the New York Department of Environmental Conservation in Beaver Brook, Westport, NY during the summer of 2007. The trap consists of a large box trap with removable panels extending across the stream mounted to a hardened site consisting of a permanent, pressure treated sill and reinforced banks. The trap was put into operation for the first time during the spawning run of 2008. Beaver Brook has been problematic for lampricide treatments due to low discharge and the perceived low number of lamprey killed per cost of treatment. The new trap site will hopefully at least function as a lamprey barrier during the spawning run which would reduce the length of stream exposed to lampricide, as well as simplify the treatment that is required. Results of trapping operations are listed in Table 1.

Table 1. Results of migratory phase sea lamprey trapping 2006.

Stream	**Trap Set Date**	**Last Checked**	**# Lamprey 2008**	**# Lamprey 2007**	**% change from 07**
Beaver Brook	9-Apr	9-Jun	26	230	-88.70%
Trout Brook	17-Apr	16-Jun	33	37	-10.81%
Stonebridge Brook	17-Apr	16-Jun	73	128	-42.97%
Boquet River Pots	21-Apr	4-Jun	4		
Malletts Creek	22-Apr	16-Jun	159	237	-32.91%
Boquet River Fishway	24-Apr	4-Jun	0	0	0
Great Chazy River	30-Apr	10-Jun	217	383	-43.34%
Total			**513**	1015	-49.46%

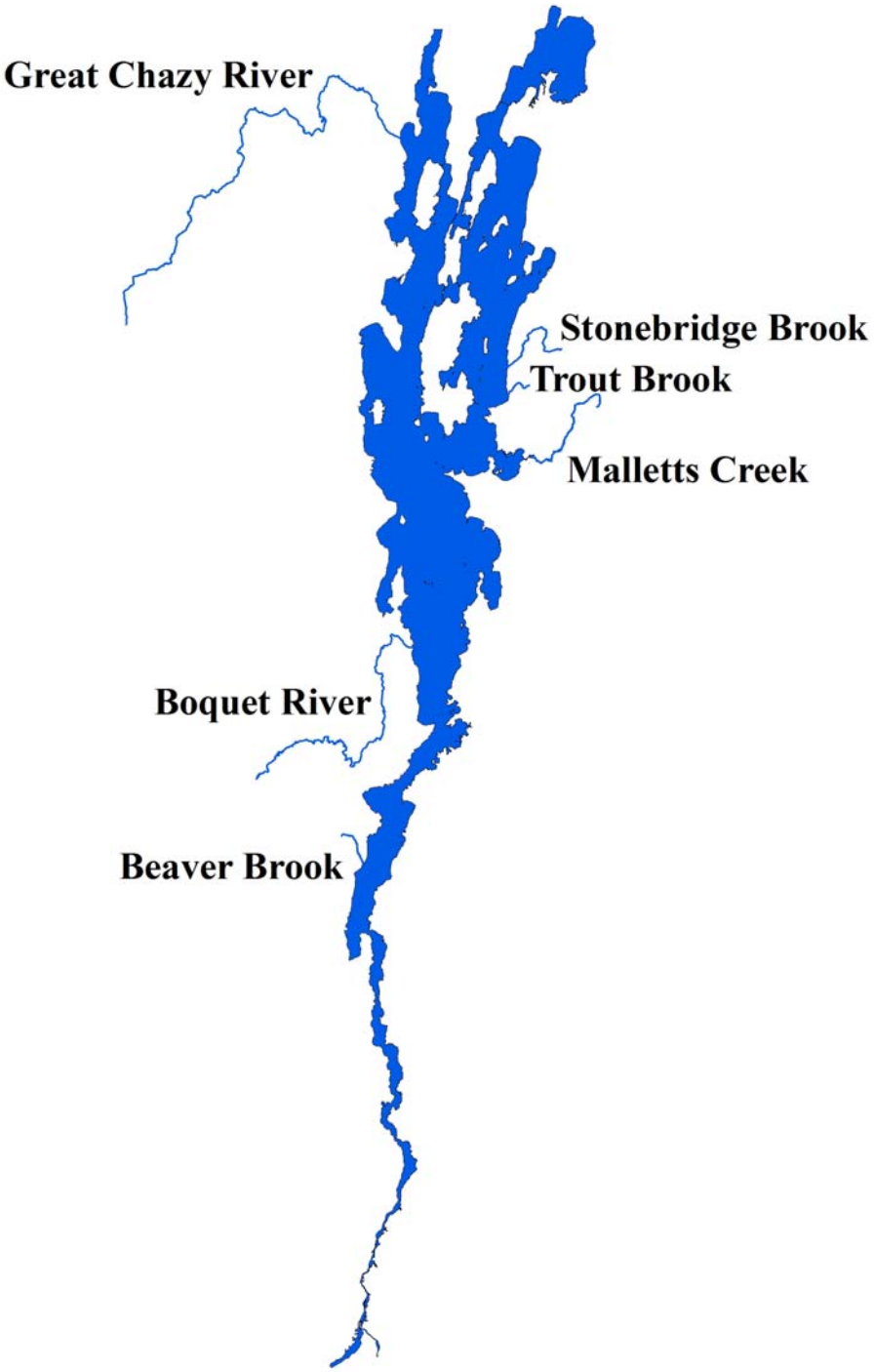

Figure 1. Location of trapping sites operated during the spring of 2008 to capture migrating adult sea lamprey.

1.2 Detection of spawning runs

Removal of the Boquet River dam in Willsboro, NY is under consideration. Removal of this dam may allow sea lamprey to access a new reach of the river. Two traps were set in the Boquet River fishway in the town of Willsboro, NY to determine if sea lamprey are able to negotiate the falls immediately downstream of the dam. No sea lamprey were captured.

Lamprey pots were deployed in the Boquet River at the base of the cascades as well as in a pool approximately half way up the cascades (Figure 2). This effort was an attempt to determine if lamprey were able to negotiate the lower section of the cascades. No lamprey were collected in the pots located half way up the cascades, however the pots deployed in the pool at the base of the cascades captured four lamprey. While this does not prove lamprey could not negotiate the falls in the absence of the dam, successive years of data and physical gradient comparisons to other streams in the basin suggest that the falls do and would limit the ability of lamprey to migrate upstream of the falls under most conditions.

Figure 2. Location of sea lamprey traps and pots in the Boquet River.

1.3 Providing lampreys to researchers

Sea lamprey that are trapped are either killed on site or given to researchers. In 2008, the USFWS coordinated with Dr. Rejean Dubuc's laboratory at the Département de Physiologie, Université de Montréal, to provide sea lamprey for research. A total of 183 lamprey were given to the university, collected from the trap on the Great Chazy River.

2.0 Larval Assessment

Larval populations assessments include determining spatial distribution throughout the basin and estimating population sizes within streams based on densities among quantified habitats. These assessments are a tool used for selecting where and how to control sea lamprey in the Lake Champlain Basin. Areas of known colonization are assessed quantitatively following the Great Lakes Fishery Commission's (GLFC) Quantitative Assessment Sampling (QAS) protocol. Surveys are also conducted post-treatment to determine treatment effectiveness. Streams being monitored for signs of new colonization are sampled using a detection protocol designed to locate larvae in areas they are most probable to inhabit. Larval assessment is also done to verify the effectiveness of our adult trapping program. Surveys are done below our trapping sites to determine how many (if any) larvae were produced by spawning sea lamprey despite our trapping efforts. If larval populations are being suppressed to acceptable levels, trapping is continued. If larval populations are unacceptably high, alternative methods to trapping are considered.

2.1 Stream quantitative assessment sampling (QAS)

The larval sea lamprey population of the Lamoille River was surveyed during the summer of 2008 in preparation for a lampricide treatment scheduled for the fall of 2009 (Figure 3; Table 2). This survey was needed to confirm the need for treatment and provide pre-treatment population data. Reach 1 of the Lamoille River extends from its mouth to the Peterson Dam in the town of Milton, VT. A QAS survey was also initiated on the LaPlatte River upstream of the falls in Shelburne to quantify the population in that reach, however weather conditions prevented that survey's completion.

Table 2. Results of quantitative assessment surveys conducted on the Lamoille River in 2008.

Stream	Population Estimate-Ammocoetes	Population Estimate-Transformers
Lamoille River	6,696	0

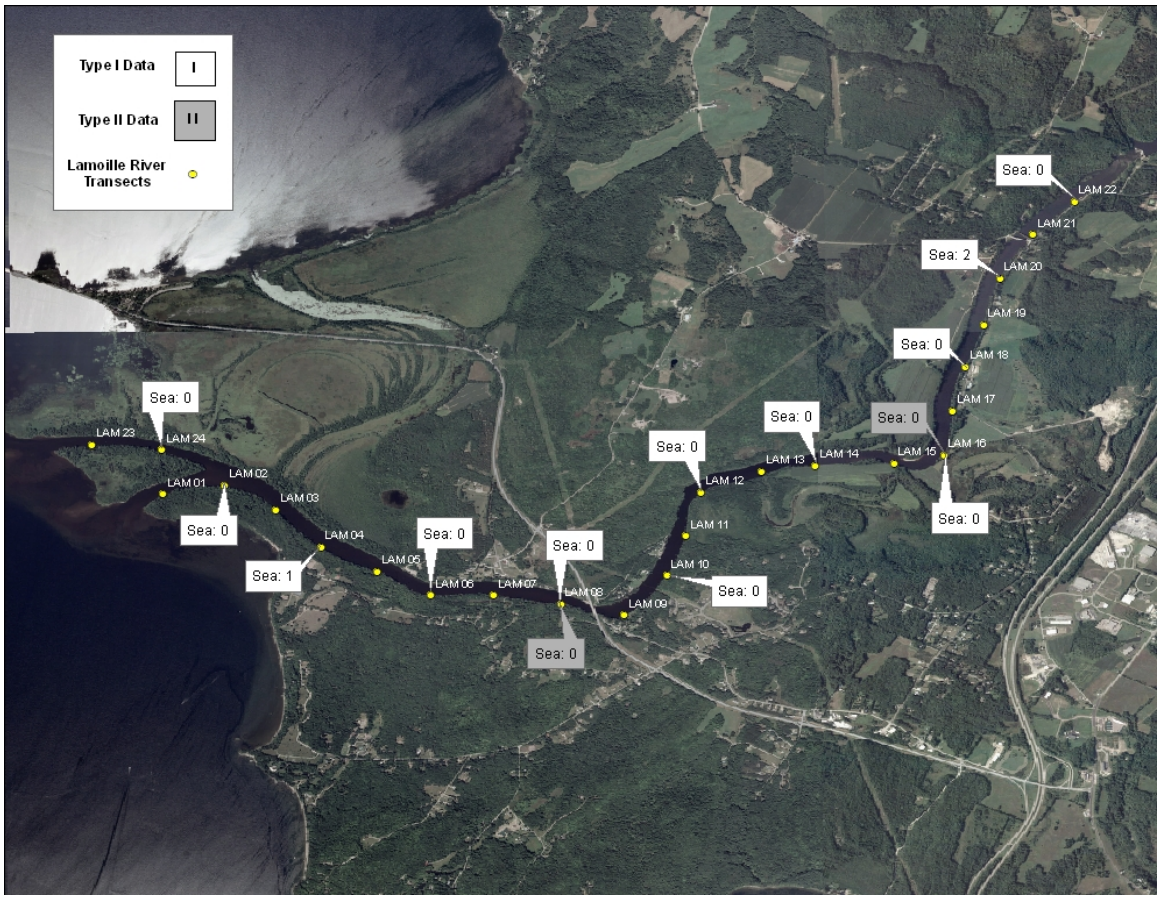

Figure 3. Lamoille River sampling locations and number of sea lamprey collected in Type I and Type II habitats.

2.2 Detection sampling

Annually the Service investigates "negative streams" where sea lamprey populations are not known to exist, but where there may be suitable habitat. The lake basin is divided into quadrants which are rotated annually so that all streams are surveyed on a four year cycle. Investigations consist of a site visit to determine if there is the potential for a sea lamprey population and electrofishing sampling if conditions are favorable. Many of these streams are seasonal in nature and dry at the time of site visits. If there is available habitat, electrofishing samples are taken to determine presence / absence of sea lamprey larvae. In 2008, presence absence surveys were conducted in the southern Vermont quadrant and several other streams of interest. Sea lamprey were collected from two streams where populations are known to occur. No sea lamprey were collected from any new streams during the surveys. Table 3 contains the results of site visits and electrofishing surveys where they were conducted.

Table 3. List of Southern Vermont negative streams investigated in 2007. Also includes sampling above dam in Mooers, NY.

Date	Location	Habitat Type Sampled	Area Collected (m^2)	Positive or Negative	Notes
5/13/2008	Pond Brook, Field west of Rt 7.	I	25.3	Negative	No lamprey found, some suitable larval habitat
5/13/2008	Pond Brook, at Rt 7 south of Elm Hill Farm	I	24.0	**Positive**	Found 2 sea lamprey, suitable larval habitat
5/13/2008	Indian Brook, at Creek Farm Rd	I	24.0	Negative	Found northern brook lamprey. Suitable larval habitat.
5/13/2008	Indian Brook, at Rt 7 downstream of waterfall	I	24.0	Negative	Found northern brook lamprey. Suitable larval habitat.
5/13/2008	Sunderland Brook, at Malletts Bay Ave.	I	24.0	Negative	No lamprey, limited larval habitat
6/17/2008	Sunderland Brook, farm Rd in field off Malletts Bay Ave	I	24.3	**Positive**	Water a little fast and turbid. Suitable larval habitat. 1 sea lamprey escaped –large ammo.
7/8/2008	Hospital Creek, Rt 17 crossing, across from marina	N/A	N/A	N/A	Lake backwater. Deep water, surface covered with duckweed. Didn't sample at this location.
7/8/2008	Wards Creek at Jersey St crossing	N/A	N/A	N/A	Stagnant on both sides of road. Unsuitable larval habitat. Didn't sample at this location.
7/8/2008	Wards Creek at Townline Rd crossing	N/A	N/A	N/A	No water body present. Didn't sample at this location.
7/8/2008	Braisted Brook at Crown Point Rd	N/A	N/A	N/A	Unconnected pool. Didn't sample at this location.
7/8/2008	Braisted Brook, downstream of Lake St at Middle Rd	I	15.9	Negative	Limited larval habitat, very limited spawning habitat. Culvert at Lake St acts as upstream barrier.
7/8/2008	Unnamed tributary flows into Stony Cove. Lake St crossing	N/A	N/A	N/A	Stagnant. Marshy lake backwater. Didn't sample at this location.
7/8/2008	Unnamed tributary near boat launch. Rt73 crossing	N/A	N/A	N/A	Very large backwater. Didn't sample at this location.
7/8/2008	North Fork of East Creek at Foundry Rd.	I	17.0	Negative	Limited larval habitat. Low flow.
7/8/2008	South Fork of East Creek below dam on Rt73	N/A	N/A	N/A	Long series of ledges and cascades. No larval habitat in proximity to road. Didn't sample at this location.

2.3 Post-treatment larval assessment

During the summer of 2008, post treatment surveys were conducted on three streams to determine treatment effectiveness (Table 4). The Poultney River (Figures 4 and 5) and the Hubbardton River (Figure 6) were surveyed to assess the success of the treatment conducted in the fall of 2007. Surveys were also conducted on Mt. Hope Brook which was treated during the fall of 2008 (Figure 7).

Table 4. Pre-treatment and post-treatment population estimates, numbers of lamprey collected, and percent reduction in ammocoetes levels for streams where post-treatment assessments were conducted during 2008.

	Pre-treatment		Post-treatment		
River/Reach	**Pop est.**	**n**	**Pop est.**	**n**	**% reduction**
Poultney R1	53,681	57	2,027	2	96.22%
Poultney R2	97,802	202	4,849	13	95.04%
Hubbardton	8,850	96	4,611	38	47.90%
Hubbardton *	11,824	95	4,611	38	61.00%
Mt Hope	15,849	29	2,412	3	84.78%
Mt Hope **	15,849	29	5,426	8	65.76%

* uses pre-treatment population estimate for area below t-14
** assumes 5 yoy captured at t-20 post-treatment were sea lamprey

Post-treatment surveys on the Poultney River indicated that the treatment was successful at eliminating over 95% of the larval population throughout the 2 reaches extending from the Carver's Falls dam downstream to the Whitehall Bridge. Surveys were not conducted below the Whitehall Bridge either before or after the treatment. All of the lamprey collected on the Hubbardton River were estimated to be age 1 larvae, meaning that they were young-of-year during the 2007 treatment. The application point for the Hubbardton River treatment was located near transect 14, and it is likely that the larvae collected were upstream of the application point during the treatment and drifted downstream following the treatment. The effectivness of the Mount Hope Brook treatment was likely compromised by the influx of groundwater throughout the treatment area. The collection of 5 young-of-year larvae, which were not able to be positively identified as sea lamprey, had a large impact on the estimated treatment effectiveness. Post-treatment surveys in Greenland Brook and 'Dump Brook' indicated that some sea lamprey had survived treatment in those side tributaries, although no population estimates could be generated from the data (Figure 7).

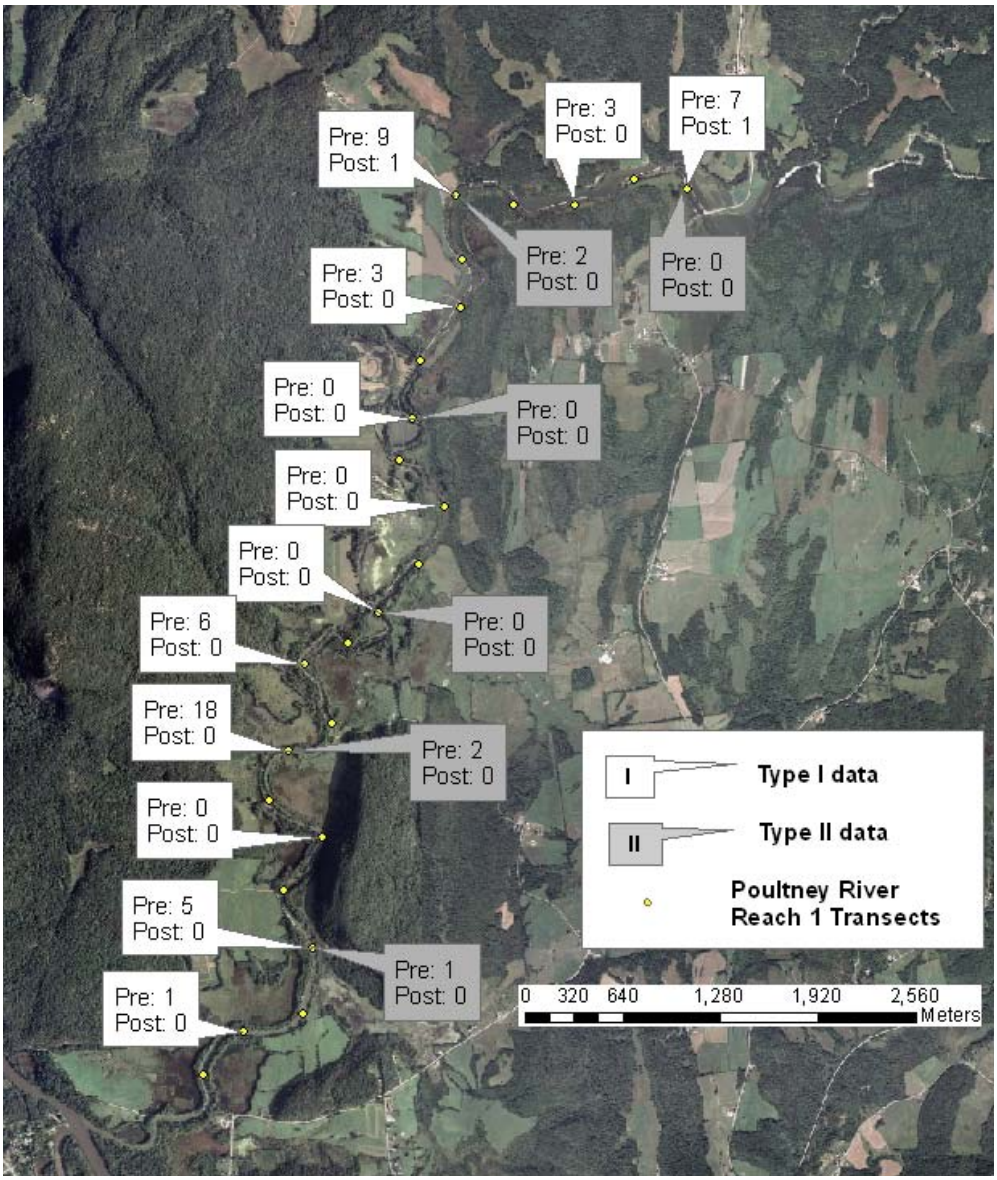

Figure 4. Poultney River, Reach 1 (E. Bay Rd. Bridge to Coggman Rd. Bridge) backpack electrofishing sampling locations and numbers of sea lamprey captured prior to and following a lampricide treatment in 2007. Pre-treatment data collected during the summer of 2006; post-treatment data collected during the summer of 2008.

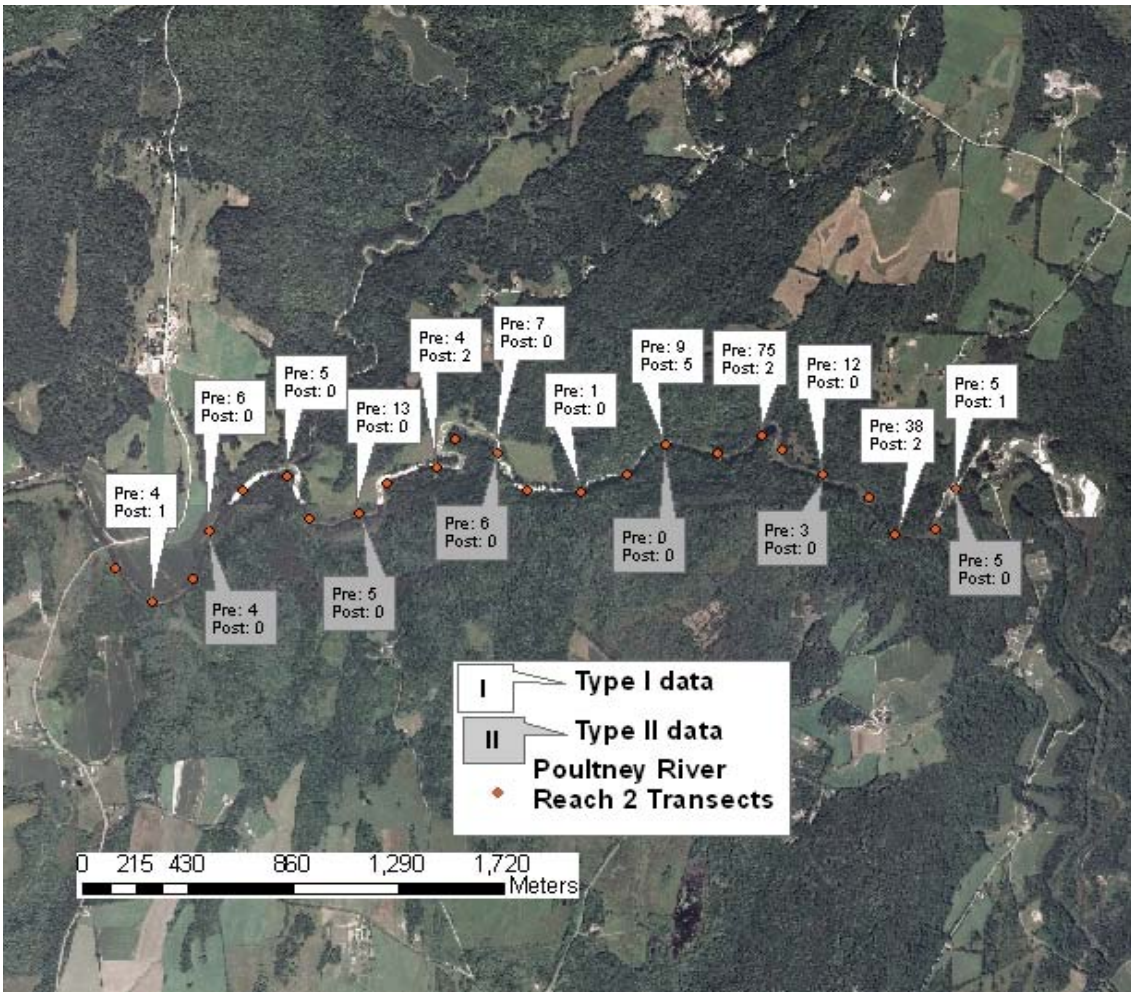

Figure 5. Poultney River, Reach 2 (Coggman Rd. Bridge to Carver's Falls) backpack electrofishing sampling locations and numbers of sea lamprey captured prior to and following a lampricide treatment in 2007. Pre-treatment data collected during the summer of 2006; post-treatment data collected during the summer of 2008.

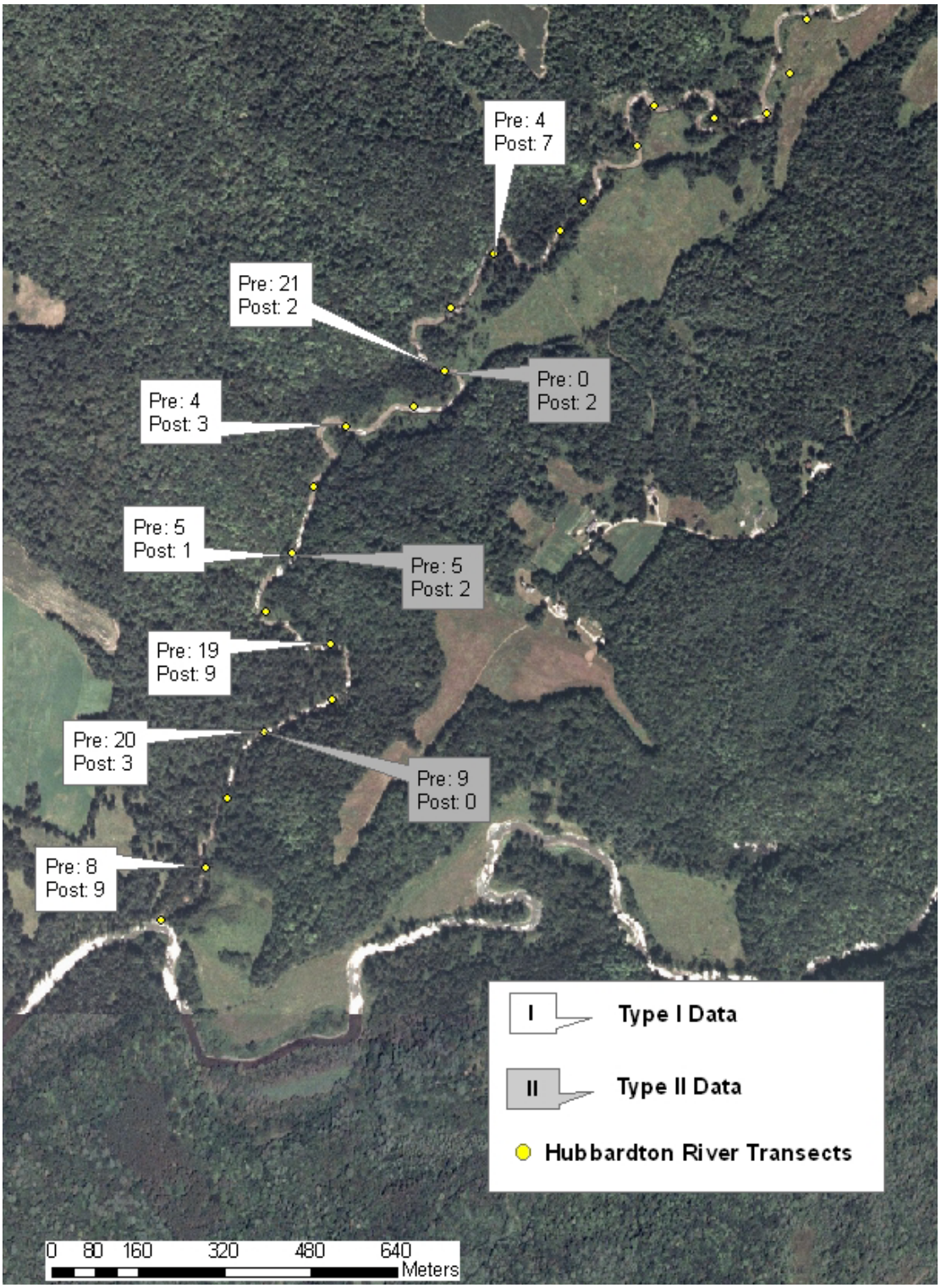

Figure 6. Hubbardton River, backpack electrofishing sampling locations and numbers of sea lamprey captured prior to and following a lampricide treatment in 2007. Pre-treatment data collected during the summer of 2006; post-treatment data collected during the summer of 2008.

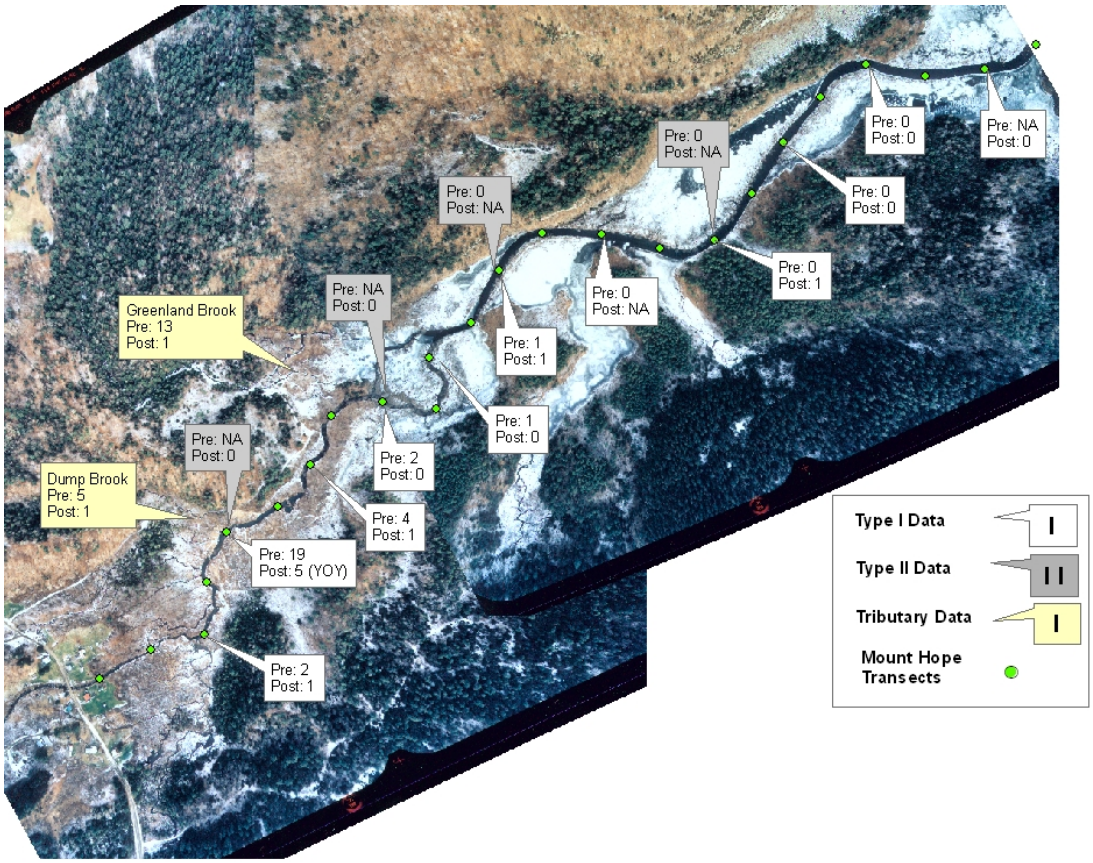

Figure 7. Mount Hope Brook backpack electrofishing sampling locations and numbers of sea lamprey captured prior to and following a lampricide treatment in 2008. Pre-treatment data collected during the summer of 2007; post-treatment data collected during the fall of 2008.

2.4 Post-treatment mortality collections

Following TFM treatments in the state of Vermont, up to 20 dead lamprey from each even-numbered, QAS-corresponding transect are collected to determine the lamprey species composition. Collections were made on the Winooski River (Figures 8 and 9; Tables 5 and 6) and on the Missisquoi River (Figure 9; Table 7) following treatments in the fall of 2008.

Figure 8. Proportion of sea, silver, and American brook lamprey collected following lampricide treatment on the Winooski River, reach 1.

Table 5. Numbers of sea, silver, and American brook lamprey collected following lampricide treatment on the Winooski River, reach 1.

Transect	Sea	Silver	ABL	Transect Totals
2	0	0	0	0
4	0	0	0	0
6	0	0	0	0
8	2	0	0	2
10	0	0	0	0
12	0	0	0	0
14	3	2	0	5
16	4	1	0	5
18	0	0	0	0
20	9	2	1	12
22	10	1	1	12
24	7	1	0	8
Species Totals	35	7	2	44
Percentages	79.55%	15.91%	4.55%	

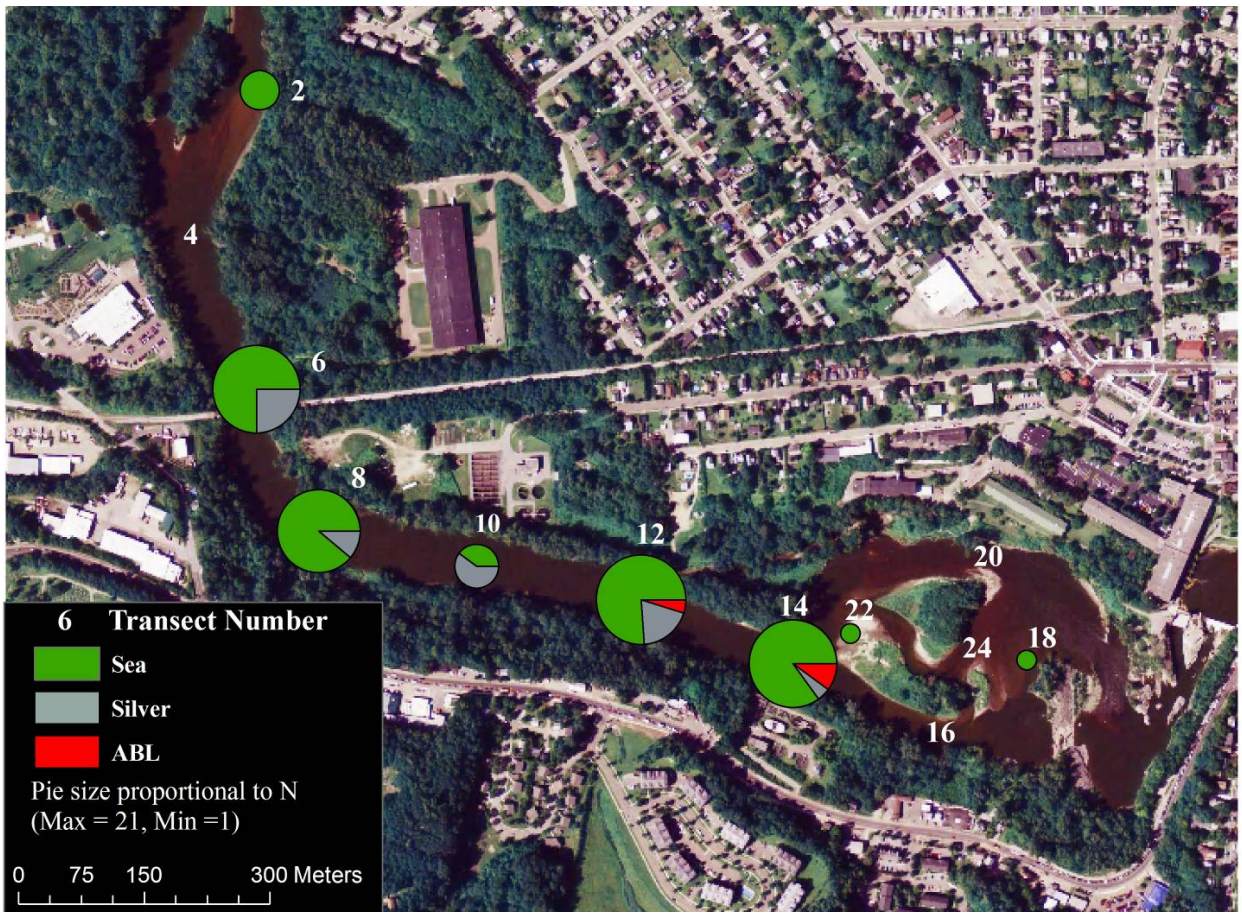

Figure 9. Proportion of sea, silver, and American brook lamprey collected following lampricide treatment on the Winooski River, reach 2.

Table 6. Numbers of sea, silver, and American brook lamprey collected following lampricide treatment on the Winooski River, reach 2.

Transect	Sea	Silver	ABL	Transect Totals
2	4	0	0	4
4	0	0	0	0
6	15	5	0	20
8	16	2	0	18
10	2	3	0	5
12	16	4	1	21
14	17	1	2	20
16	0	0	0	0
18	1	0	0	1
20	0	0	0	0
22	1	0	0	1
24	0	0	0	0
Species Totals	72	15	3	90
Percentages	80.00%	16.67%	3.33%	

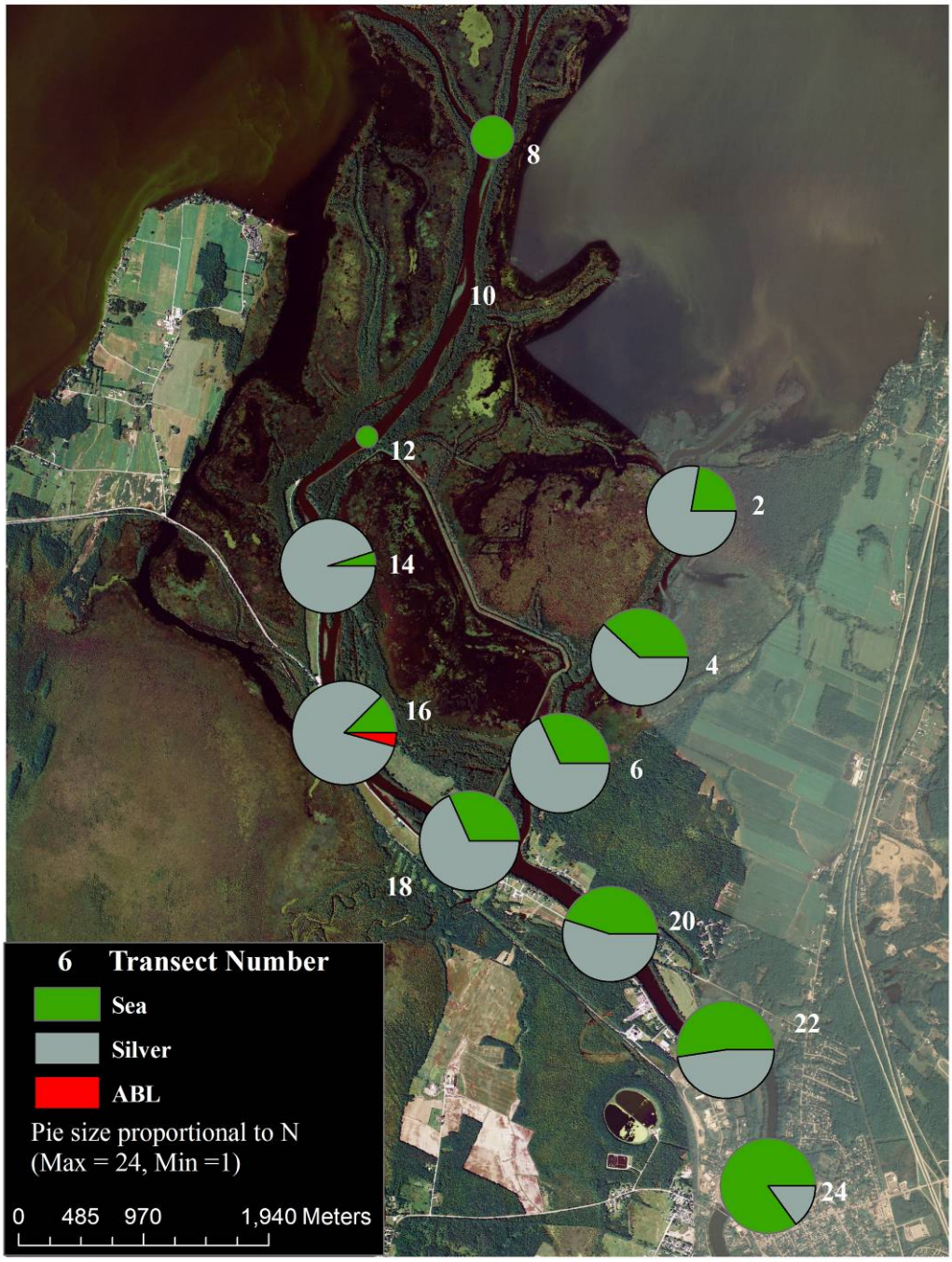

Figure 10. Proportion of sea, silver, and American brook lamprey collected following lampricide treatment on the Missisquoi River.

Table 7. Numbers of sea, silver, and American brook lamprey collected following lampricide treatment on the Missisquoi River.

Transect	Sea	Silver	ABL	Transect Totals
2	4	14	0	18
4	8	13	0	21
6	6	12	0	18
8	4	0	0	4
10	0	0	0	0
12	1	0	0	1
14	1	19	0	20
16	3	20	1	24
18	7	15	0	22
20	9	11	0	20
22	11	10	0	21
24	17	3	0	20
Species Totals	71	117	1	189
Percentages	37.57%	61.90%	0.53%	

3.0 Larval Assessment – Deltas and Deepwater

Deepwater assessment is another critical piece of our larval sampling program. Larval populations are known to exist on the deltas of up to nine NY tributaries and possibly some in VT. Assessing the presence and abundance of these deepwater populations guides our decisions of where to control these deepwater populations in the face of a limited supply of Bayluscide.

3.1 Deep-water post Bayluscide treatment surveys

In September of 2007, approximately 75 acres of the Ausable River delta was treated with granular Bayluscide to eliminate larval sea lamprey populations that were found to occur there. In 2008, a deepwater electrofishing survey was conducted over the treatment area to determine treatment effectiveness. This was the first time a post Bayluscide treatment electrofishing survey was conducted on a Lake Champlain delta. Assessment of treatment effectiveness is a critical component of a successful lamprey control program. Results of the post-treatment survey are found in Figure 11. The post-treatment survey resulted in the collection of 27 larvae in the areas that were treated in 2007. The size structure of the collected animals suggests that these larvae are one-year old larvae which would have been young-of-year in 2007. This year class may well have emigrated from the river out onto the delta following the treatment in 2007. We compared the length frequency of the larvae collected after treatment with the length frequency of the larvae collected before and during the treatment to illustrate this theory (Figure 12).

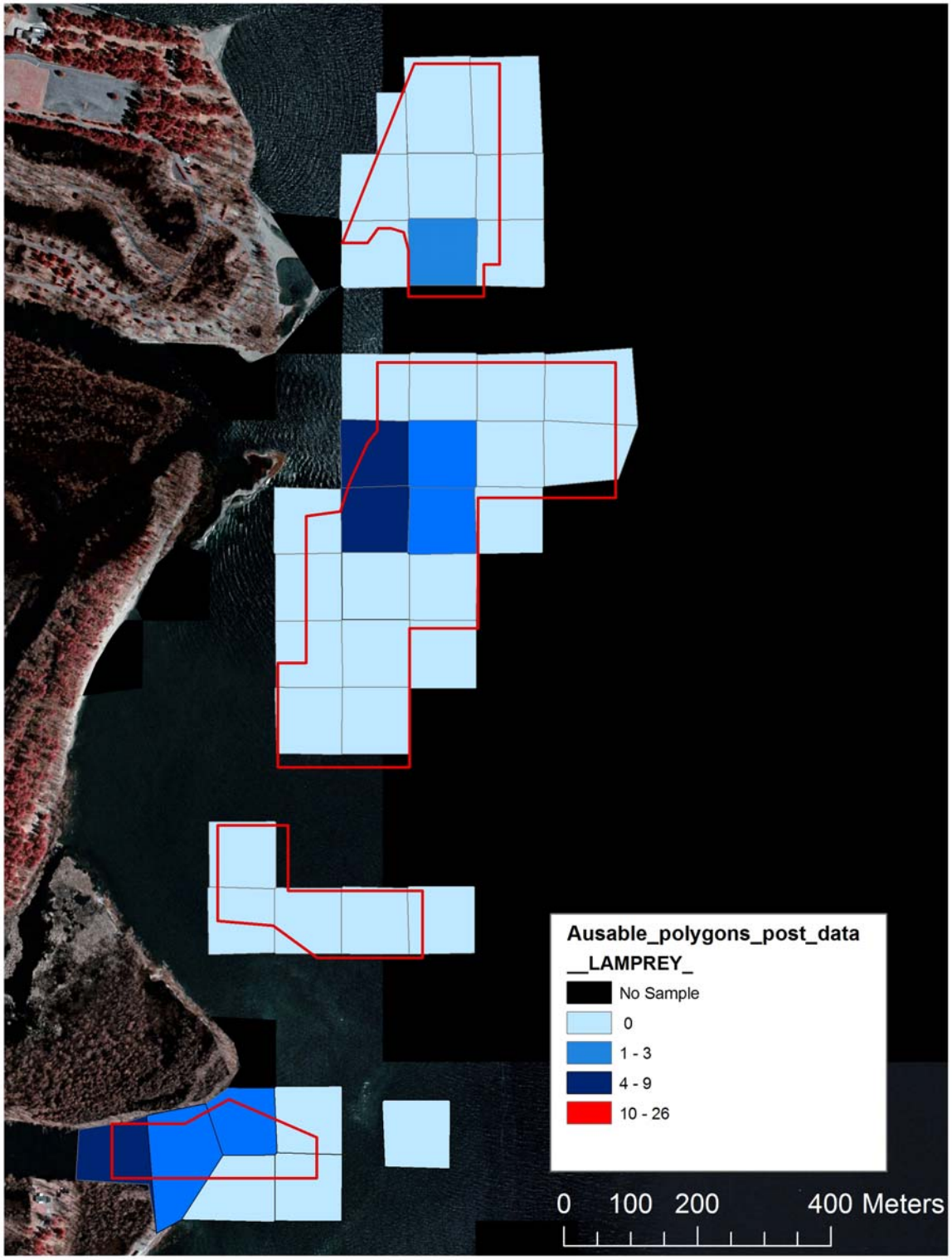

Figure 11. Post-Bayluscide treatment deepwater electrofishing lamprey collections on the Ausable River delta.

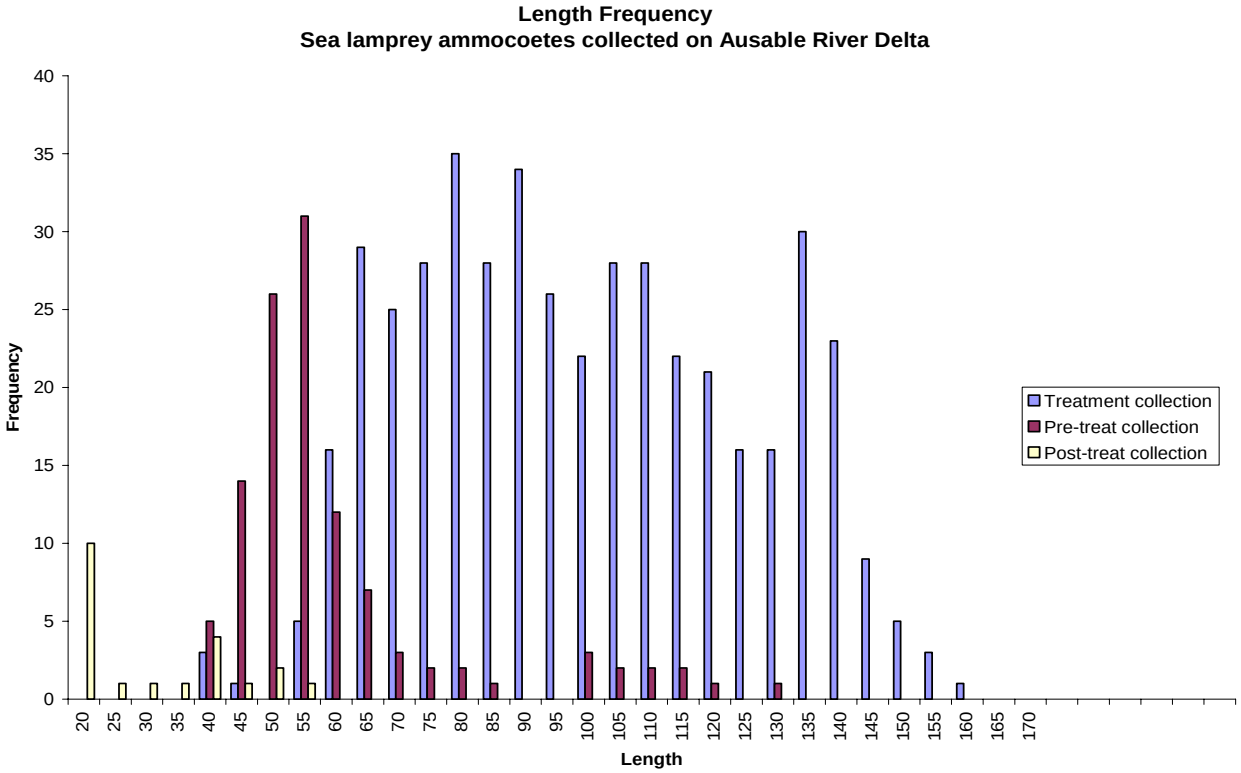

Figure 12. Saranac River deep-water electrofishing sample locations and number of lamprey captured during 2007.

3.2 Additional Deep-water Larval Sampling Treatment Delineation

A DQAS survey was conducted on The Saranac River delta in 2007 as a pre-treatment survey for the Bayluscide treatment planned for 2008. Additional sampling was conducted in the summer of 2008 to ensure that the larval distribution had not changed since the original survey. Treatment boundaries were set after incorporating the 2008 data into the prior year's survey (Figure 13).

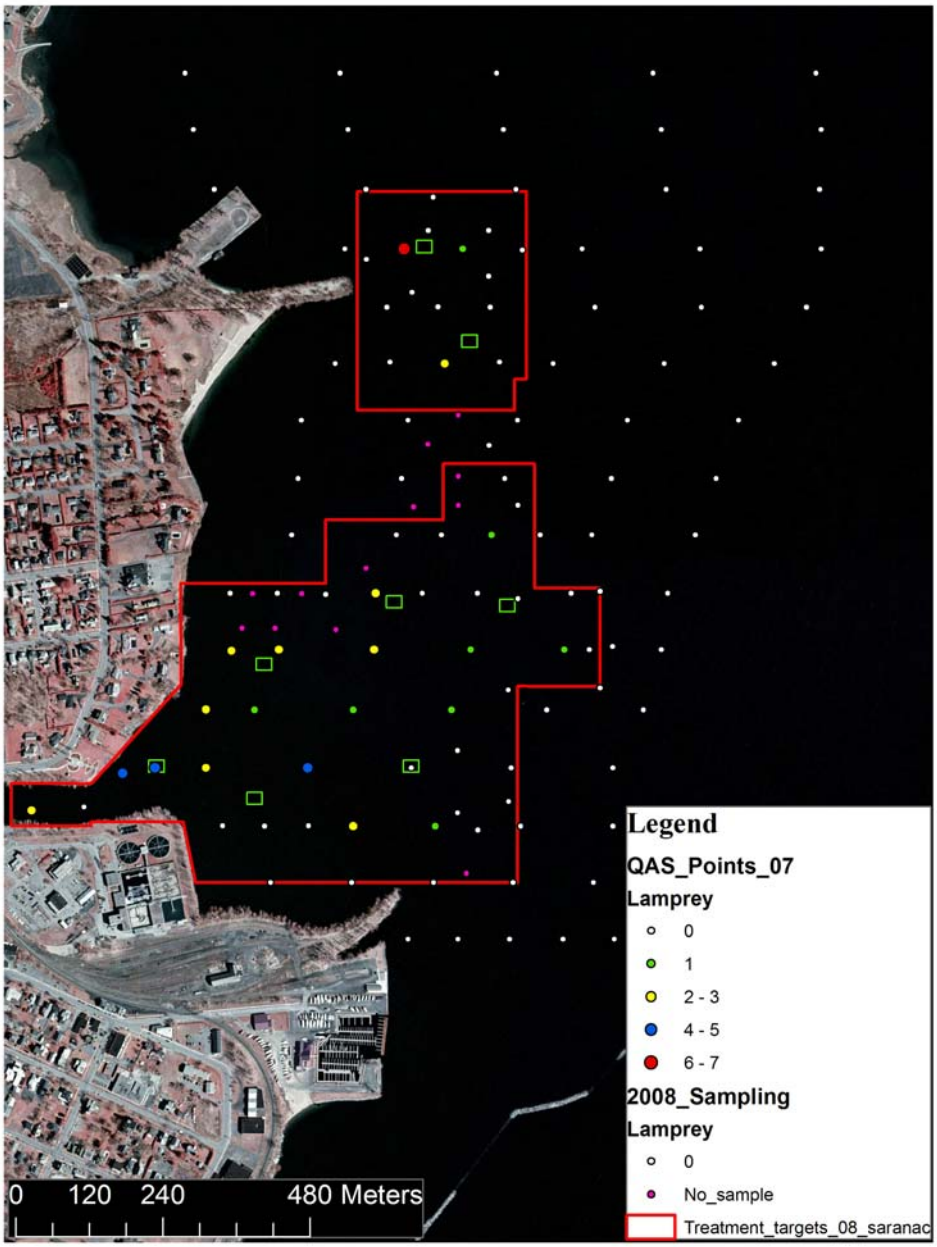

Figure 13. Saranac River delta larval sea lamprey sampling along with Bayluscide treatment application zones.

Deep-water sampling on the Mill Brook delta was initiated in 2006. Sampling conducted in 2006 indicated that the population did not extend to the south beyond the breakwall on the south side of the mouth. Samples collected in 2007 confirm results from 2006 that identify the existence of a delta population in the area to the North of the breakwall. Further sampling was conducted in 2008 to get a better handle on the population density on the delta in order to make a more informed decision about controlling the population on the delta with Bayluscide. The data collected in 2008 was used to both justify a delta Bayluscide treatment as well as set the treatment boundaries. All of the pre-treatment sampling is summarized in Figure 14.

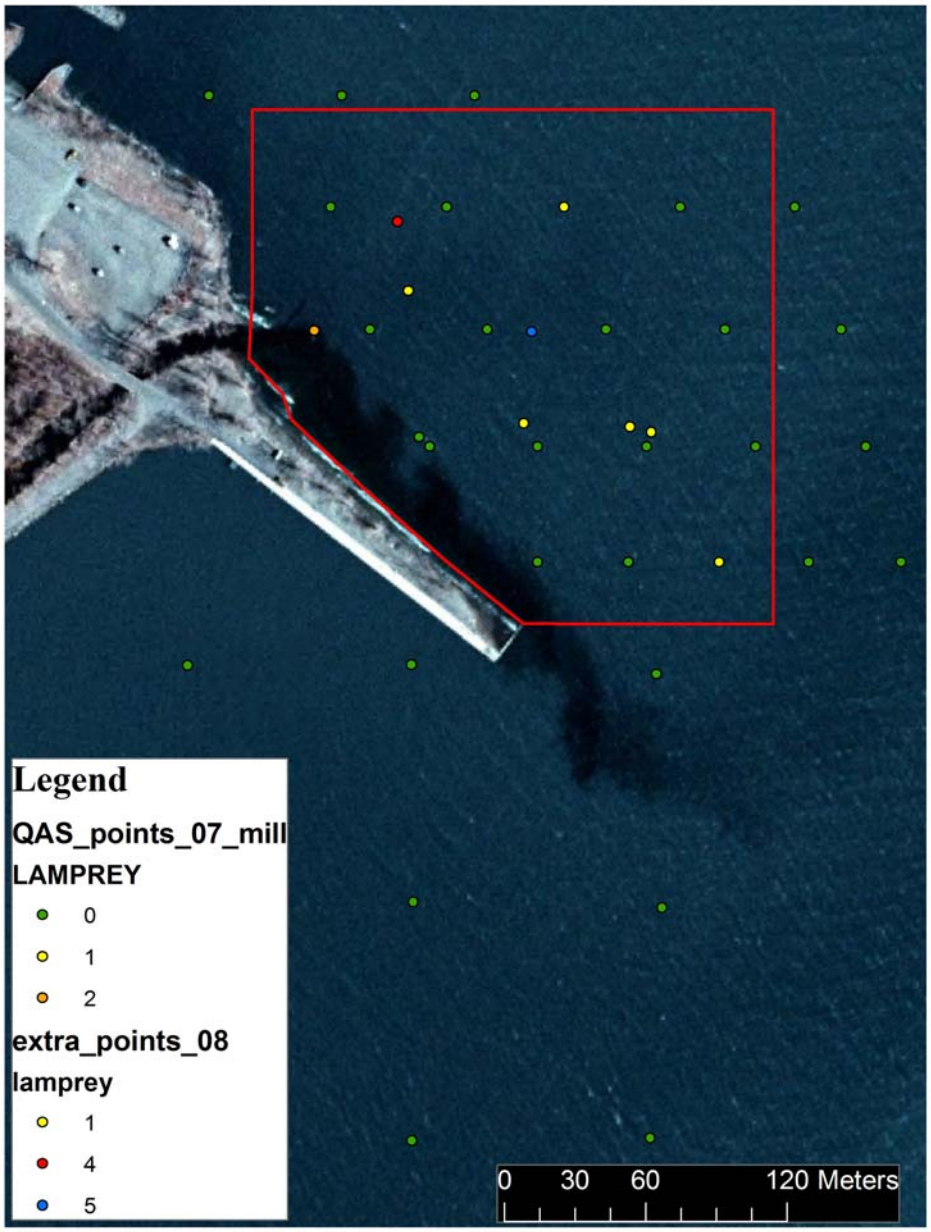

Figure 14. Pre-treatment deepwater electrofishing samples on Mill Brook Delta.

4.0 Delta Treatments

4.1 Saranac River Delta Bayluscide Treatment 2008

Date of Application: **September 3, 2008**
Application Method: **2 Boat mounted granular material spreaders**
Chemical Applied: **18,000 lbs. of 3.2% granular Bayluscide formulation**
Active Ingredient Applied: **576 lbs. of active ingredient**
Area Targeted: **~115.4 acres**
Area Treated: **~115.4 acres**

	Costs:
Chemical (@$10.20/lb):	**$183,600**
Plattsburgh City water for GP:	**$ 10,509**
Maddens transfer and storage:	**$ 1,520**
Total:	**$195,629**

Staff: A Lake Champlain Fish and Wildlife Management Cooperative effort of 24 individuals from the U.S. Fish and Wildlife Service, New York Department of Environmental Conservation, and the Vermont Fish and Wildlife Department.

Equipment: Two application boats equipped with granular material spreaders, two chemical ferries (VTDFW pontoon boat and 18' roughneck), two ammocete collection boats (VTDFW and USFWS Clark boats), and supporting vehicles, trailers and gear. NYDEC's cargo trailer was used for on-site storage of treatment-related gear and equipment. In order to have enough Bayluscide on-site, a tractor trailer was rented from Madden's Transfer and Storage (518-891-2791) in Saranac Lake. The chemical was loaded into the tractor trailer in Ray Brook on August 28th, and the NYDEC operations supplied a forklift and operator, while Madden's supplied a hand truck for moving the pallets after they were placed in the trailer. The trailer was delivered to Wilcox Dock on Friday, August 29th in preparation for the September 3rd treatment. A site on the northwestern portion of the dock was recommended by Plattsburgh City officials for parking the trailer and serving as a treatment staging area.

Treatment Narrative:

Landowner notifications were made and water use advisories were released to the news media prior to treatment. There were no affected residential lake-water intakes. The Georgia Pacific plant which draws water from the advisory area was transferred to the city of Plattsburgh's water system on the day prior to treatment, September 2.

On the day prior to treatment, boats were launched from the NYSDEC launch at the Wilcox Dock. Treatment advisory buoys were placed on the perimeter of the treatment area. Individual treatment zones and collection plots within the zones were marked with corner buoys using GPS coordinates (See Figure 15). This was the second Bayluscide treatment that was conducted without the aid of guidance buoys. An advanced GPS/Chart-plotting navigation unit was used to guide the treatment. Pre-determined treatment routes were created based on analysis of population surveys using GIS software and transferred to the chart-plotter.

Application boats and ammocete collection boats motored out onto the delta at approximately 0630 hours on Wednesday September 3rd. Calibration of the application rate (boat velocity) was conducted by feeding measured amounts of Bayluscide through the spreaders over a known distance. Calibration transects indicated target treatment velocity to be ~8.6 mph as measured by GPS. Treatment of Zone 1 was initiated at approximately 0700 hours. Target speeds were maintained whenever possible. The weather on treatment day could not have been better: sunny with a light southerly breeze. Treatment proceeded until Zone 2 was completed at approximately 1530 hours.

Empty Bayluscide containers were washed on-site at the end of the pier by using NYDEC's bucket-washer, which uses a 110 V submersible pump. The pump was powered with a portable Honda generator. Container lids were washed using a small hand brush and water supplied through a 12 V submersible pump powered by a 12 V battery.

Water-use advisories were lifted on Monday, September 7th. Most shoreline advisory signs were removed at that time; however a few signs immediately adjacent to the buoyed treatment zone were left to advise the public about the 15-day fish consumption advisory. Treatment zone advisory sign buoys and remaining shoreline advisory signs were removed on September 18.

Ammocete Collections:

Ammocete collections occurred on 8 plots located throughout the 2 treatment Zones (see Figure 15) according to the Standard Operating Procedures for the Chemical Control of Sea Lampreys (GLFC) Volume I, Appendix G (Larval Assessment Sampling Protocol for Non-Wadable Waters of the Great Lakes and its Tributaries). Ammocete collection allows for calculation of lamprey density which can be used to estimate the total number of lamprey killed during treatment (Table 8). Zone 1 collections showed moderate ammocete density (0.863 ammocetes/m²) and Zone 2 very high densities (2.53 ammocetes/m²). Gull feeding activity appeared to correlate well with ammocete abundance in collection plots.

Non-Target Observations:

Ammocete collection boats recorded non-target mortality when encountered. A shoreline walk was also conducted after treatment on the evening of September 3rd. See Table 9 for a summary.

Problems:

No major problems occurred, allowing the treatment to proceed from beginning to end without any prolonged stoppages. The biggest problems appeared to be associated with operation the outboard motors in shallow areas. One of the application boats had minimal problems with batteries for the spreader units. Each application boat was equipped with 3 deep-cycle batteries wired in parallel. One of the wiring systems was faulty, and in the future the batteries should be wired directly together without the aid of terminal plates.

It may be worth constructing a second bucket washer, as empty Bayluscide containers and lids quickly piled up.

Table 8. Sea lamprey density and estimated population for each treatment zone on the Saranac River delta.

	Ammocetes		Transformers	
	Density	Zone estimate	Density	Zone estimate
Zone 1	0.863	84,092	0.113	10,968
Zone 2	2.53	928,348	0.025	9,176
Total for Treatment Area		1,012,440		20,145
	Estimated total kill		1,032,585	

Table 9. Non-target fish collected or noted during and following treatment of the Saranac River delta.

Species	Number	Observer	Location
yellow perch (*Perca flavescens*)	3	collection boat/shore walk	treatment Zone 2
tessellated darter (*Etheostoma olmstedi*)	1	collection boat	treatment Zone 2
white sucker *(Catostomus commersoni*)	7	collection boat/shore walk	treatment Zone 2
brown bullhead (*Ameiurus nebulosis*)	1	shore walk	treatment Zone 2
smallmouth bass (*Micropterus dolomieu*)	2	collection boat/shore walk	treatment Zone 2
northern pike (*Esox lucius*)	9	collection boat/shore walk	treatment Zone 2
rock bass (*Ambloplites rupestris*)	1	collection boat	treatment Zone 2
bluegill (*Lepomis macrochirus*)	1	collection boat	treatment Zone 2
pumpkinseed (*Lepomis gibbosus*)	3	collection boat	treatment Zone 2

Figure 15. Saranac River treatment zones and collection plots.

4.2 Mill Brook Delta Bayluscide Treatment 2008

Date of Application:	**October 15, 2008**
Application Method:	**1 Boat mounted granular material spreaders**
Chemical Applied:	**1,450 lbs. of 3.2% granular Bayluscide formulation**
Active Ingredient Applied:	**46.4 lbs. of active ingredient**
Area Targeted:	**~10.5 acres**
Area Treated:	**~9.3 acres**

	Costs:
Chemical (@$10.20/lb):	**$ 14,790**

Staff: A Cooperative effort of 24 individuals from the U.S. Fish and Wildlife Service and the New York Department of Environmental Conservation.

Equipment: One application boat equipped with granular material spreaders, one ammocete collection boat (USFWS Clark boat), and supporting vehicles, trailers and gear. NYDEC's cargo trailer was used for on-site storage of treatment-related gear and equipment. The NYDEC boat launch in Port Henry was used as a staging area.

Treatment Narrative:
Landowner notifications were made and water use advisories were released to the news media prior to treatment. The water use advisory on Lake Champlain began October 14, and was lifted October 19, 2008. One seasonal household received 6 gallons of bottled water.

On the day prior to the delta treatment (October 14th), boats were launched from the NYSDEC launch in Port Henry. Treatment advisory buoys were placed on the perimeter of the treatment area. Individual treatment zones and collection plots within the zones were marked with corner buoys using GPS coordinates (See Figure 16). Pre-determined treatment routes were created based on analysis of population surveys using GIS software and transferred to the chart-plotter. The Mill Brook TFM treatment was being conducted on October 14th thus the application boat that was placing marker bouys was also observing the delta area for any TFM related ammocete mortality on the delta. There was a stiff westerly breeze the 14th which pushed the TFM plume back inshore and to the north of the stream mouth. As a result essentially no delta habitat was exposed to TFM from the stream treatment.

The application boat and ammocete collection boat motored out onto the delta at approximately 0700 hours on Wednesday October 15th. Calibration of the application rate (boat velocity) was conducted by feeding measured amounts of Bayluscide through the spreaders over a known distance. Calibration transects conducted on the Saranac River delta in September 2008 indicated target treatment velocity to be ~8.6 mph as measured by GPS. This target velocity was used on Mill Brook delta as the spreading equipment had been changed since the Saranac delta treatment. Treatment was initiated at approximately 0715 hours. Target speeds were maintained whenever possible. The weather on treatment day was sunny with a light southerly breeze. Treatment was completed at approximately 1130 hours.

Empty Bayluscide containers were washed on-site at the boat launch by using NYDEC's bucket-washer, which uses a 110 V submersible pump. The pump was powered with a portable

Honda generator. Container lids were washed using a small hand brush and water supplied through the bucket-washer.

Water-use advisories were lifted on Monday, October 20th. Treatment zone advisory sign buoys and shoreline advisory signs were removed following the 15 day fish consumption advisory.

Ammocete Collections:

Ammocete collections occurred on 2 plots located throughout the treatment zone (see Figure 16) according to the Standard Operating Procedures for the Chemical Control of Sea Lampreys (GLFC) Volume I, Appendix G (Larval Assessment Sampling Protocol for Non-Wadable Waters of the Great Lakes and its Tributaries). Ammocete collection allows for calculation of lamprey density which can be used to estimate the total number of lamprey killed during treatment (Table 10). Collections showed moderate ammocete density (0.90 ammocetes/m²). Gull feeding activity was excessive and indicated high ammocete abundance in the treatment zone. The gull activity may have been exacerbated by concentrating large numbers of gulls in a relatively small treatment area.

Non-Target Observations:

Ammocete collection boats and a shoreline walk conducted after treatment on the October 15th encountered no non-target mortality.

Problems:

The lower unit on the application boat outboard motor was destroyed during the treatment. A tire located at the end of the pier half buried on the bottom in approximately 3 feet of water was struck at the beginning of one of the treatment runs. The motor was deemed out of commission, as a gear in the lower unit was broken. Luckily the USFWS Clark boat is equipped with a large outboard motor (115 hp) which was capable of towing the application boat at target speed. The remainder of the treatment was conducted by towing the application boat with the Clark boat while crews used hand signals and throw buoys to maintain treatment route spacing.

Table 10. Sea lamprey density and estimated population for the treatment zone on the Mill Brook delta.

Ammocetes		Transformers	
Density	Zone estimate	Density	Zone estimate
0.9	33,728	0.0125	468
Estimated total kill		34,196	

Figure 16. Mill Brook delta treatment zone and collection plots.