LAKE CHAMPLAIN FISH AND WILDLIFE MANAGEMENT COOPERATIVE

FISHERIES TECHNICAL COMMITTEE
ANNUAL REPORT
2009

Management of the fishery resources of Lake Champlain requires cooperation with several organizations. The activities of those organizations are coordinated via the Lake Champlain Fisheries Technical Committee which is part of the Lake Champlain Fish and Wildlife Management Cooperative. The Fisheries Technical Committee includes the US Fish and Wildlife Service (USFWS), the Vermont Department of Fish and Wildlife (VTDFW), the New York State Department of Environmental Conservation (NYSDEC), the University of Vermont, and the Vermont Cooperative Fish and Wildlife Research Unit. In addition, representatives from the Province of Quebec, Sea Grant, and other universities are frequently involved in Technical Committee activities.

In this annual report, the activities discussed are not specific to a single agency; some aspects were conducted jointly with, or in some instances, independently by member agencies of the Technical Committee. Last names of authors are listed after section headings. Their affiliation can be found on the Fisheries Technical Committee Membership List at the end of this document.

Administrative Accomplishments

In addition to the regular and recurring field activities reported in this document, there were three noteworthy accomplishments in 2009.

1) Through negotiations with the Vermont Department of Environmental Conservation, we began developing a multi-year, multi-stream Aquatic Nuisance Control Permit for lampricide treatments. This will save both the applicant and permitter substantial time and resources while maintaining environmental protections. Work on this permit will continue into 2010.
2) A pesticide storage building was constructed at the Ed Weed Fish Culture Station. This new building will provide much-needed additional space to store lampricides used in Vermont.
3) The Cooperative updated and signed a new Memorandum of Agreement at the July policy committee meeting that outlines and reaffirms all partners' commitment to continued cooperation in managing Lake Champlain's fishery resources.

SEA LAMPREY

The objective of the sea lamprey control program is to achieve and maintain wounding rates at or below 25 (ideally 10) wounds per 100 lake trout, 15 (ideally 5) wounds per 100 landlocked Atlantic salmon (salmon), and two (ideally less than one) wounds per 100 walleye.

Assessment

Stream quantitative assessment sampling (QAS) **(Bouffard)**

Quantitative assessment surveys were conducted on five streams in preparation for scheduled lampricide treatments in the fall of 2010 (Table 1). A QAS survey was also conducted on the LaPlatte River above the falls in the town of Shelburne to determine the larval sea lamprey population size and distribution.

Table 1. Results of quantitative assessment surveys conducted in 2009.

Stream and Reach	Population Estimate-Ammocoetes	Population Estimate-Transformers
Ausable River-	393,570	0
Little Ausable River-	119,090	0
Salmon River-	123,594	373
Putnam Creek-	232,351	718
Lewis Creek- Reach 1	59,507	3,169
Reach 2	2,452	2,020
LaPlatte River-Reach 2	4,711	342

Detection Sampling **(Bouffard)**

Annually the USFWS 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. In 2009, presence absence surveys were conducted in the southern New York quadrant, Hatchery Brook at the Ed Weed Fish Culture Station, and an unnamed tributary of Appletree Bay in Burlington, VT. No sea lamprey were collected from any new streams during the surveys.

Control

Lampricides **(Chipman)**

The initial lampricide treatment of the Lamoille River in Vermont was successfully completed on October 1, 2009. The lower 6.0 miles was treated with 5,255 pounds of TFM (active ingredient) at an average flow of 970 cfs. This was the only treatment scheduled in 2009. Control status of Lake Champlain tributaries is presented in Appendix 1. A treatment history and schedule of future treatments is presented in Appendix 2.

Post-treatment stream assessment **(Bouffard)**

During the summer of 2009, post treatment surveys were conducted on five streams to determine the effectiveness of treatments conducted during the falls of 2008 and 2009 (Table 2). Mt. Hope Brook, which was also treated during the fall of 2008, was surveyed immediately post-treatment and the results can be found in the 2008 annual report. Population estimates for Mill Brook are based on 6 habitat transects spaced evenly throughout the lamprey-accessible reach and sea lamprey larval densities from electrofishing samples collected from all available habitat. No American Brook lamprey were captured in the Missisquoi River or the Winooski River during pre-treatment or post-treatment electrofishing surveys.

Table 2. Pre-treatment and post-treatment population estimates, numbers of sea lamprey collected, and percent reduction in ammocoete levels for streams where post-treatment assessments were conducted during 2009.

River/Reach	Pre-treatment		Post-treatment		Approximate % reduction
	Pop est	n	Pop est	n	
G. Chazy R2	24,028	203	112	1	99%
G. Chazy R3	357,325	120	2,521	1	99%
Missisquoi	63,173	13	36,967	5	41%
Mill Brook	13,468	117	2,032	14	84%
Winooski R1	174,462	13	0	0	100%
Winooski R2	1,532	9	0	0	100%
Lamoille	38,719	12	2,232	1	94%

Post-treatment delta surveys **(Smith)**

In September of 2008, approximately 115 acres of the Saranac River delta, and approximately 9.5 acres of the Mill Brook delta were treated with granular Bayluscide to eliminate larval sea lamprey populations that were found to occur there. In 2009, a deepwater electrofishing survey was conducted over the treatment areas to determine treatment effectiveness. Assessment of treatment effectiveness is a critical component of a successful lamprey control program. The post-treatment survey resulted in the collection of 18 larvae on the Mill Brook delta and 32 larvae on the Saranac delta in the areas that were treated in 2008. The size structure of the collected animals suggests that the majority of these larvae (16 of 18 on Mill and 32 of 32 on Saranac) are young-of-year or one-year old larvae which would have been young-of-year in 2008. This year class (2008) may well have emigrated from the river out onto the delta following the treatment in 2008.

Trapping and Barriers **(Bouffard, Young)**

Streams where traps were deployed in 2009 included three streams in Vermont where trapping was identified as the primary control method in the supplemental EIS. A more substantial sea lamprey trap site was operated for a second year on Beaver Brook, Westport, NY and the Great Chazy lamprey trap continued to be operated (Table 3). Stream bank erosion immediately below the trap site, caused by high spring flows which inundated the weir, was addressed using stacked stone to armor one of the banks. Modifications to the weir panels to increase the discharge capacity of the structure and reduce the chances of further erosion are planned to be completed prior to the 2010 trapping season.

In a continued effort to determine the likelihood of sea lamprey negotiating the falls immediately downstream of the Willsboro Dam on the Boquet River, two traps were set in the fishway for a third season. Lamprey pots were also deployed at two locations; in the pool approximately half way up the cascades, and immediately below the entrance to the fishway. No sea lamprey were captured in the fishway or at either pot location. While this does not prove lamprey could not negotiate the falls in the absence of the dam, successive years of data suggest that the falls do and would limit the ability of lamprey to migrate upstream of the falls under most conditions.

In order to address the continued escapement of spawning run sea lamprey above the Frog Pond Dam on the Great Chazy River in Champlain, NY, a new lamprey lip was installed. The lip is made of steel plates affixed to the crest of the dam creating a four inch overhang. The screen panels of the trap were also reconfigured to eliminate the possibility of sea lamprey getting under one panel of the trap and moving upstream. If fully functional the barrier on the Great Chazy River would eliminate access to approximately 13 miles of sea lamprey spawning and larval habitat and the need for lampricide treatments above the barrier.

Table 3. Number of migratory-phase sea lamprey captured during 2009 in Lake Champlain tributaries where traps were deployed and the relative differential compared to 2008 catches.

Stream	Date Set	Date Pulled	Number lamprey 2009	% change from 08
Beaver Brook	4/15/2009	6/22/2009	24	-7.69%
Trout Brook	4/13/2009	7/1/2009	55	66.67%
Stonebridge Brook	4/13/2009	7/1/2009	120	64.38%
Great Chazy River	4/23/2009	6/17/2009	195	-10.14%
Malletts Creek	4/14/2009	6/25/2009	95	-40.25%
Boquet River Pots	4/23/2009	6/16/2009	0	
Boquet River Fishway	4/23/2009	6/12/2009	0	
Total			489	-3.74%

International bureaucracy, local politics, and landowner issues all contributed to the further delay in constructing the Morpions Stream lamprey barrier. The Cooperative's Quebec-based consultant, Denis Desrochers (Milieu, Inc.) has continued to work on our behalf to find ways to resolve the numerous issues that challenge us. Entering into 2010, the Municipality of Notre Dame de Stanbridge, Quebec has elected a new Mayor and several new council members. We have been told that this will improve the pace of negotiations and that it will improve landowners' willingness to cooperate. We remain optimistic that construction will occur during the summer or fall of 2010.

Sea Lamprey Wounding Rates (Chipman, Smith, MacKenzie)

Lamprey wounding rates on lake trout and salmon remained above objectives during 2009 (Table 4). The lake trout wounding rate was unexpectedly higher than found over the previous two years, but it is still lower than wounding rates observed during the 2000-2006 period (Figure 1). Wounding rates on salmon continued to decline, with pooled Inland Sea and Malletts Bay salmon showing a greater decline than for Main Lake salmon from 2008 to 2009 (Figure 2). This may be in response to the 2008 Missisquoi River treatment.

Sea lamprey wounding rates on walleye collected in 2009 from the Winooski River were 5 wounds per 100 fish sampled in the length slot (534 to 634mm). This remains higher than the Cooperative's lamprey wounding objective of 2 wounds per 100 walleye.

Table 4. Sea lamprey wounding rates on Lake Champlain lake trout and salmon during 2009, compared with pre-control and eight-year experimental control program results.

	Number of type A1-A3 lamprey wounds per 100 fish			
	Objective	Pre-control	Experimental control	**Year 2009**
Lake trout[a] (Main Lake)	25	55	38	55
Salmon[b] (Main Lake)	15	51	27	31
Salmon[b] (Malletts Bay-Inland Sea)	15	37	40	38

[a] Lake trout in the 533-633 mm (21.0-24.9 inches) length interval. For lake trout, pre-control included 1982 - 92, while experimental control includes 1993 - 97.

[b] Salmon in the 432-533 mm (17.0-21.0 inches) length interval. For salmon, pre-control included 1985 - 92, while experimental control includes 1993 - 98.

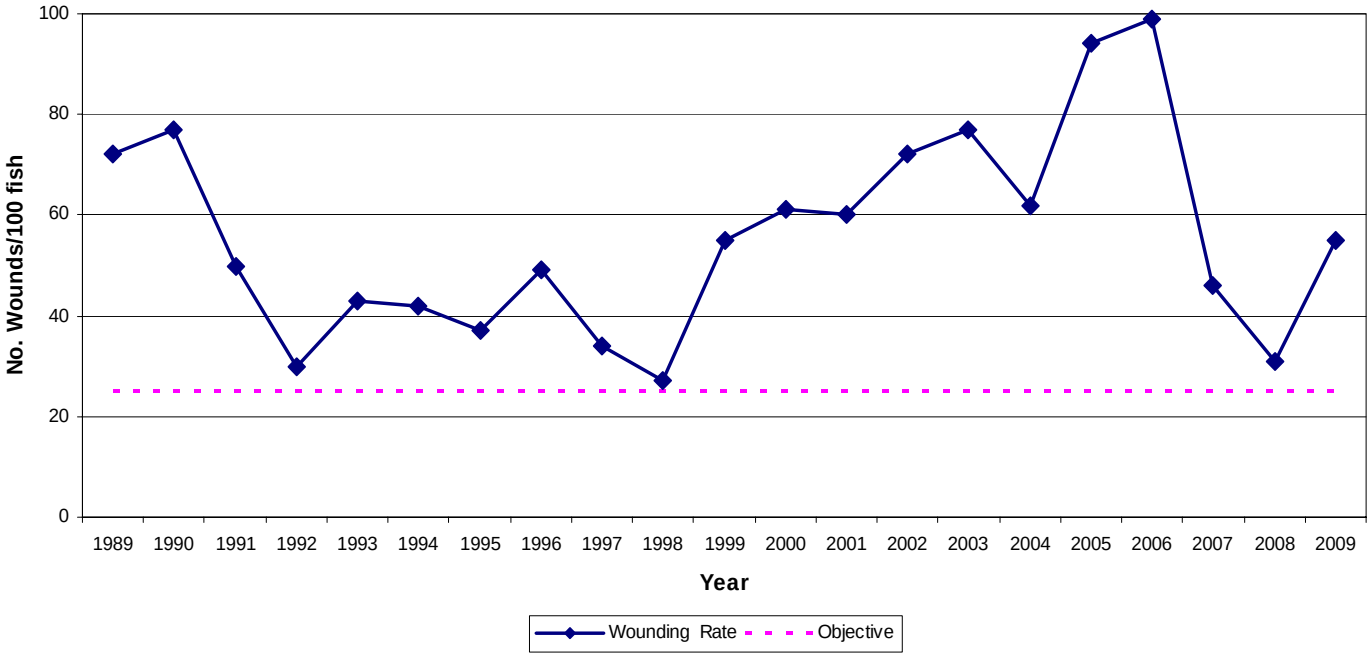


Figure 1. Type A1-A3 sea lamprey wounds (fresh and healing) per 100 lake trout (533-633 mm total length) sampled in the Main Lake basin by fall electrofishing, 1989-2009. For reference, the target wounding rate of 25 wounds per 100 fish is also presented (dashed line).

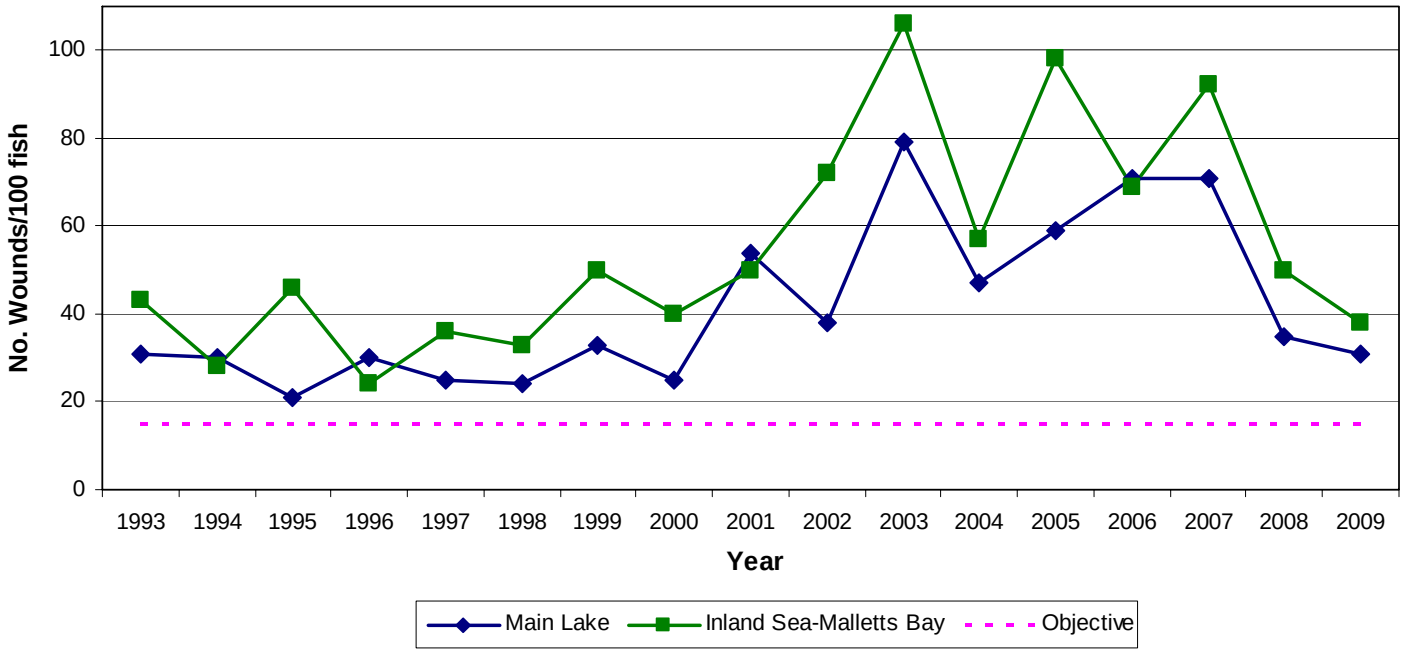


Figure 2. Type A1-A3 sea lamprey wounds (fresh and healing) per 100 salmon (432-533 mm total length) sampled by fall electrofishing in the Main Lake (also includes fishways on the Winooski and Boquet rivers) and Inland Sea-Malletts Bay basins, 1993-2009. For reference, the target wounding rate of 15 wounds per 100 fish is also presented (dashed line).

FORAGE FISH

Smelt Monitoring (Pientka, Staats)

A total of 20 midwater trawls for rainbow smelt were conducted in late summer, 2009 (Table 5). Calculated mean CPUE increased at the main lake stations and continued to decrease in Malletts Bay (Figure 3). At the Northeast Arm station CPUE increased slightly and was dominated by age one smelt (84% of aged sample) which were not found in 2008. Similarly, one-year-olds were very rare in 2008 in Malletts Bay but rebounded in 2009 (42% of sample).

Alewife Monitoring (Pientka, Staats)

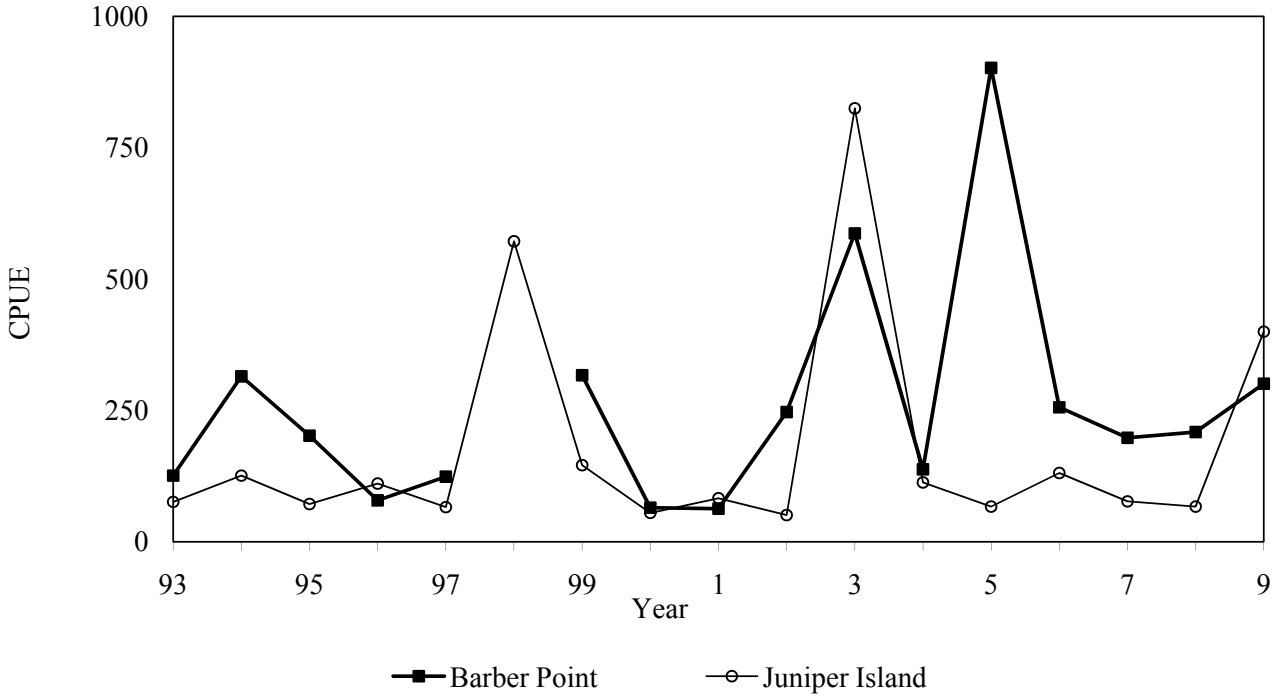
Alewife were first discovered in Lake Champlain in 2004 and their numbers have increased since. A sampling program is being developed to monitoring their abundance and population characteristics. In 2008 and 2009, floating gill nets were utilized to collect alewife samples for age and growth analysis.

Hydroacoustics (Pientka)

Hydroacoustics assessment of Northeast Arm, Malletts Bay and Main Lake was conducted between July 30 and August 20, 2009 following the same procedures as prior years. The assessment transects generally covers around 30 nautical miles in the Northeast Arm, 15 nautical miles in Malletts Bay and just over 100 nautical miles in the Main Lake. Along with the acoustic transect targeted trawls were performed to confirm species compositions. In 2009, 8 tucker and 22 midwater trawls were performed. Processing of the acoustic data is currently ongoing.

Table 5. Mean catch per 55 minute trawl (CPUE with 95% confidence interval) of rainbow smelt in 2009 and comparison to long-term mean and median CPUE.

Station	Number of trawls	CPUE	Mean	Median	N years
		Main Lake			
Barber Point	4	301 ± 211	258	206	16
Juniper Island	4	400 ± 79	172	97	20
Valcour Island	4	248 ± 52	268	138	10
		Malletts Bay			
Malletts Bay	4	82 ± 41	1047	654	20
		Inland Sea			
Northeast Arm	4	108 ± 14	1108	835	20



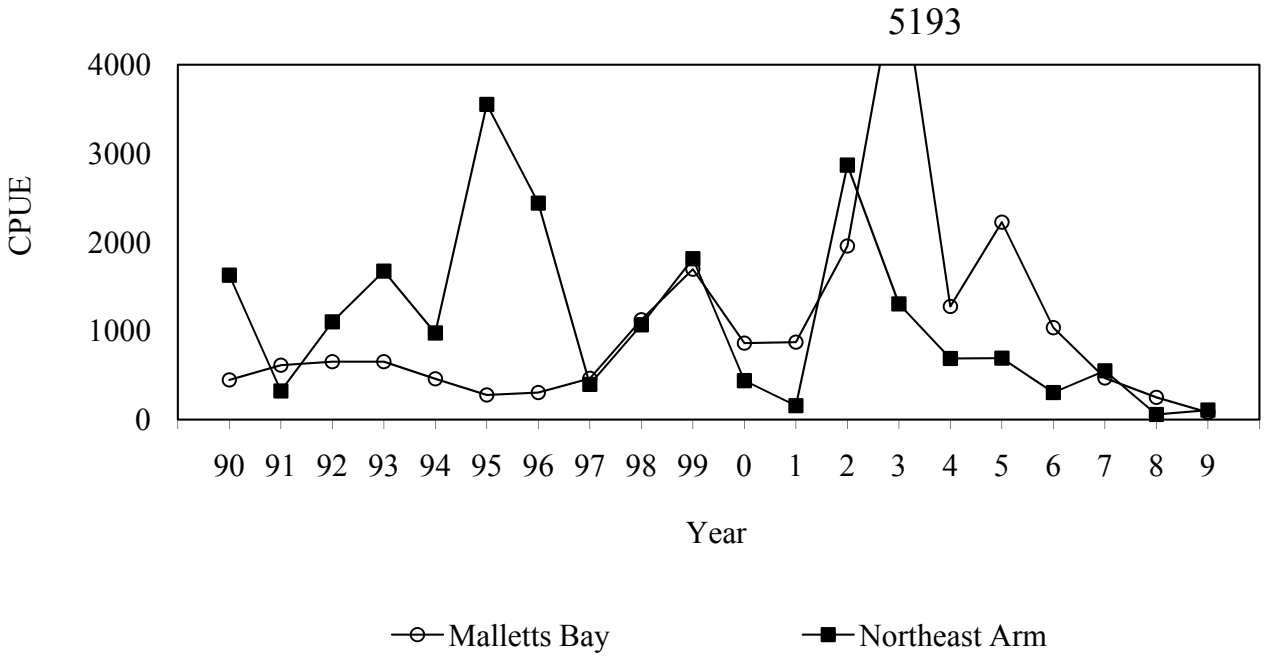


Figure 3. 2009 Mean CPUE of smelt at 4 Lake Champlain stations.

SALMONIDS

Stocking Summary (Zollweg, Chipman)

Salmonid stockings in Lake Champlain during 2009 included about: 300,000 salmon (smolt equivalents); 58,000 steelhead (smolt equivalents); 86,000 lake trout; and 63,000 brown trout (Table 6). The list includes salmon and steelhead that were stocked in the tributaries to the lake. Also listed in Table 5 are the stocking targets for each species. The stocking numbers are presented as "stocking equivalents". Salmonids are stocked at varying sizes, from recently hatched fry that spend two years in the tributaries before emigrating to the lake, to smolts and yearlings that are ready to begin life in the lake at the time of stocking. The numbers stocked are adjusted to stocking (smolt/yearling) equivalents to better represent the effective numbers stocked.

Table 6. Numbers (in stocking equivalents[a]) of salmonids stocked in Lake Champlain during 2009, and stocking targets for the lake.

	Main Lake		Malletts Bay/Inland Sea		Total number
Species	Target	2009	Target	2009	stocked in 2009
Salmon	207,000	247,834	55,000	53,735	301,569
Lake trout	82,000	85,620	0		85,620
Steelhead	73,000	53,522	5,000	5,000	58,522
Brown trout	38,000	35,124	30,000	27,590	62,714
Total	400,000	422,100	90,000	86,325	508,425

[a] Salmonids are stocked in a range of sizes which exhibit very different survival rates. The numbers stocked are converted to stocking equivalents based on expected survival rates.

Stocking Evaluation (Staats)

A salmon stocking evaluation continued in the Winooski River drainage. A total of 32,290 salmon smolts were stocked in the Winooski River in 2009. In addition to the smolt stocking, the upper Winooski River (above the first 3 dams but below Bolton Dam) was stocked with 35,400, 4.5-inch fingerlings (5,400 in the spring and 30,000 in the fall). The Huntington River was also stocked with approximately 102,000 salmon fry in May, 2009.

Age 0+ salmon parr were found in 2 of the 8 tributaries sampled in the early fall of 2009 at densities ranging from 3.1 to 5.2 fish per salmon unit. Extreme high flow events in spring resulted in first summer survival of less than 25 percent. Rainbow trout made up the majority (70%) of the trout collected during surveys.

A rotary screw trap was fished in the Huntington River from April into June, 2009 to capture out-migrating salmon smolts. A total of 88 smolts were captured resulting in an estimate of 418 salmon smolts passing the trapping site.

Fish Passage (Staats, Smith)

One adult salmon was collected in the Willsboro Fishway during 2009. Hopefully, continued lamprey control will allow a salmon run to return to the Boquet River. Thirty-eight salmon and 26 steelhead rainbow trout were trapped at the Winooski One fish passage facility in the fall 2009 while only one steelhead was processed in the spring**.** All lifted fish were tagged and released downstream except for 21 salmon which were transported to the Ed Weed fish culture facility for fall egg-take. The threat of viral hemorrhagic septicemia has curtailed the movement of fish upstream at this time.

Spring and Fall Nearshore and Tributary Assessments (Chipman, Smith)

Spring and fall boat electrofishing surveys for salmonids are conducted annually. This sampling allows for the collection of biological data including length, sex and age information as well as lamprey wounding data. The data are utilized in hatchery product/strain evaluations and to monitor sea lamprey control progress through time.

Near-shore salmon catches continue to be dominated by small, young salmon, suggesting sea lamprey predation is still impacting the recruitment of salmon older than one lake-year. Beginning in 2008 data began to show an increase in the number of larger, older fish, 20% of the 2008 salmon sample was greater than 540 mm. In 2009, this trend continued with 26% of the near-shore salmon catch being greater than 540mm in length.

In fall 2009, an unprecedented 497 returning salmon were collected from Hatchery Brook (Ed Weed Fish Culture Station discharge stream), and 355 adult Sebago-strain salmon collected from Hatchery Brook, the Lamoille River, Sandbar Causeway, and were sent to the hatchery for use as broodstock.

Angler Diary Program (Smith)

During the 2009 open-water fishing season, 35 cooperators returned diaries of their 2009 fishing season. They recorded information from 632 fishing trips, up from 2008's total of 424.

In the main lake, catch rates for legal-sized lake trout and salmon ($\geq$ 15") increased slightly in 2009 from 2008 (Figure 4).

Cooperators reported 106 lake-caught brown trout and 14 steelhead, and no lake trips solely targeting either of these two species were made during 2009. Cooperators reported catching just 2 brown trout and 2 steelhead during fishing trips on tributaries.

Tributary fishing for salmon continued to decline this year (Figure 5). In 2009, it took 14.3 hours to catch a legal-sized salmon in tributaries to Lake Champlain. This is much worse than the tributary fishing during the 1990's. For example, in 1993 it took just 4 hours of tributary fishing to catch a legal-sized salmon. Cooperators reported catching 64 salmon from tributaries.

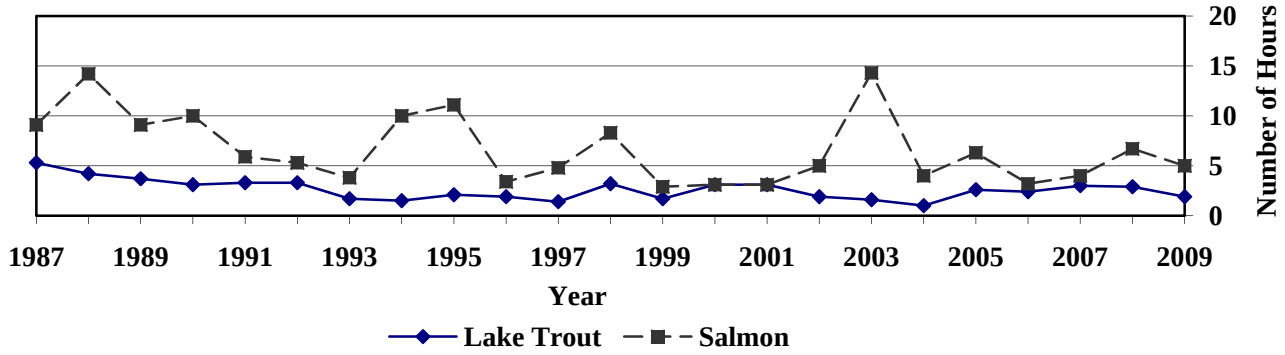


Figure 4. Main lake catch rates (hours of fishing per fish) for legal-sized lake trout and salmon, 1987 – 2009 (from Angler Cooperative Diary Program).

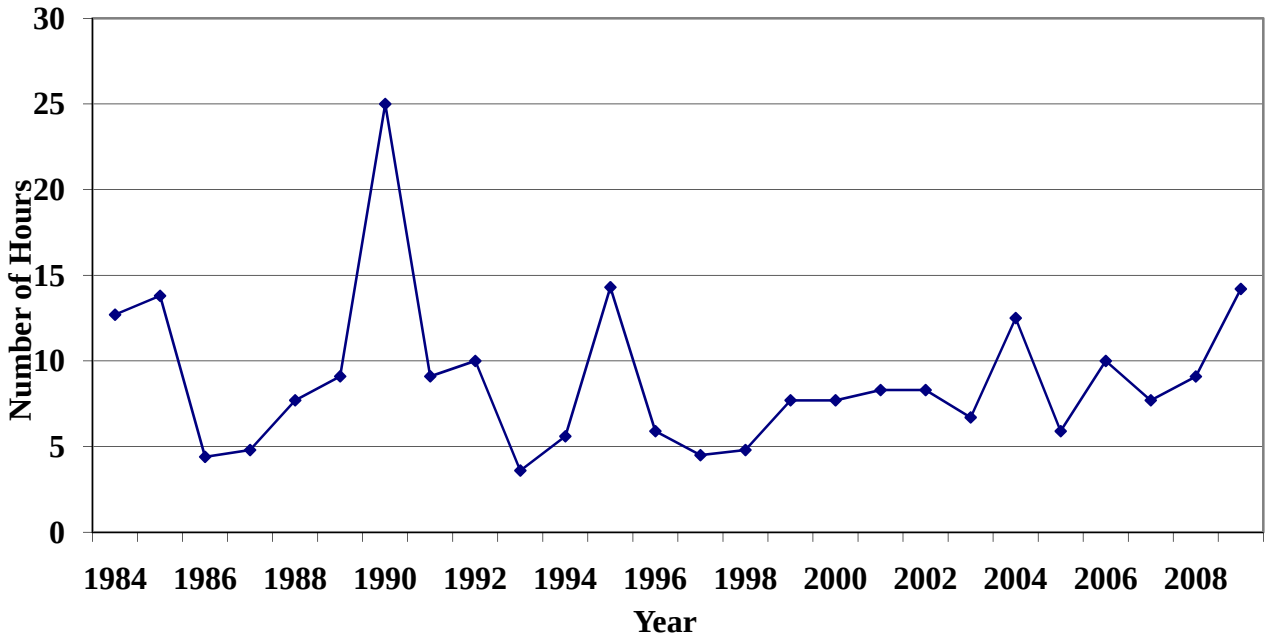


Figure 5. Tributary catch rates (hours of fishing per fish) for legal-sized salmon for the years 1984 through 2008. These include trips where salmon alone or in combination with another salmonid were listed as the angler's target (from Angler Cooperative Diary Program).

WALLEYE (MacKenzie, Zollweg, Smith)

Walleye management activities on Lake Champlain included monitoring adult walleye during the spawning runs in the Winooski River, collection of brood stock from the Winooski River for the fish culture and stocking program, evaluation of the contribution of stocked walleye to the spawning run in the Winooski and continuation of the angler diary program.

In 2009, 3.1 million eggs were collected from 25 pairs of walleye collected from the Winooski River. All adults used for spawning were sacrificed for disease testing because of concerns over Viral Hemorrhagic Septicemia.

Eggs were hatched at both the Grand Isle and Bald Hill Fish Culture stations in Vermont. Fingerlings were reared at the Bald Hill FCS and in rearing ponds managed by the Lake Champlain Walleye Association in Swanton, Vermont. There were 198,000 fry and 81,000 fingerlings stocked into main lake portions of Lake Champlain. All fry were marked with OTC and all fingerlings received a second OTC mark before being stocked.

An additional 994,000 eggs were collected from 9 pairs of walleye collected from the South Bay, New York spawning stock and reared in a portable hatchery managed by the Lake Champlain Walleye Association in Whitehall, New York. An estimated 716,000 unmarked fry were stocked back into South Bay.

Samples of age 3 walleye were collected for OTC analysis from the Winooski River (n = 30) because the river was stocked with OTC-marked fingerlings and fry in 2006. Preliminary results indicate that 100% of the age 3 walleye collected from the 2009 Winooski River spawning run were stocked.

ESOCIDS (Good)

Northern Pike

In 2009, the Vermont Fish & Wildlife Department continued collecting length, age and growth information for Lake Champlain's northern pike population. Ice-out trapnet surveys were conducted in the spring of 2009. Trapnets were set at four sites in southern Lake Champlain in the towns of Orwell and Benson from March 30 through April 10. Trapnets were set at the mouth of potential northern pike spawning marshes so as to intercept fish moving into the marsh to spawn or exiting the marsh after spawning was completed. A total of 379 hours of trapnet sampling effort resulted in the collection of 139 northern pike (99 ♀, 40 ♂), ranging in size from 344mm to 925mm. For aging purposes, 11 female and 15 male northern pike were sacrificed for cleithra removal.

Department staff also attended several Lake Champlain ice fishing derbies in the winter of 2009 to collect cleithral bones from northern pike brought to the weigh-in stations. 27 cleithra were collected from female northern pike ranging in length from 628mm to 1025mm; no males were sampled at these derbies.

The Department also continued to solicit anglers to provide cleithra from harvested northern pike. Information is provided on the Department's website with instructions on how to remove cleithra and record and submit biological data http://www.vtfishandwildlife.com/pike.cfm. Anglers who harvest northern pike offer an untapped resource of biological samples and information. Collecting data from angler-harvested fish allows the fish to be used for both consumption and for data collection.

Department staff will repeat ice-out trapnet surveys in the spring of 2010, as well as continue collecting cleithra from angler harvested northern pike in the winter of 2010. These data will be used to develop length-frequency distributions, generate age and growth curves, and calculate mortality estimates for northern pike on Lake Champlain.

Muskellunge

In 2009, the Vermont Fish & Wildlife Department continued its muskellunge stocking program in the Missisquoi River and Bay area of Lake Champlain. On August 18, VTDFW staff transported 10,000 summer-fingerling muskellunge (approximately 6-inches in length) from New York DEC's Chautauqua Hatchery to Vermont and stocked them into the lower Missisquoi River and into areas of suitable habitat in Missisquoi Bay as far south as the Route 78 bridge. This was the second year of an initial 5-year agreement between VTDFW and NYDEC by which NY provides muskellunge free of charge for stocking into Vermont waters of Lake Champlain. The specific numbers of muskellunge provided by NY will vary year to year, depending upon the amount of surplus summer fingerlings available after NY stocks their hatchery grow-out ponds, and how many of those fish Vermont decides to take.

To satisfy Federal requirements for interstate transfer of live fish, testing for various pathogens is conducted each year by Andrew D. Noyes of NYDEC's Rome Field Station prior to the fish being delivered to Vermont. In 2009, testing was conducted on ovarian fluid samples collected in the field during the 2009 spawning efforts, as well as on muskellunge fry and fingerlings from the Chautauqua Hatchery, progeny of the 2009 spring spawning efforts. Tests were conducted for Viral Hemorrhagic Septicemia, Bacterial Furunculosis, Enteric Redmouth, Infectious Pancreatic Necrosis, and Spring Viremia of Carp. All tests were negative.

Northern Pike × Chain Pickerel Hybrids

In recent years, anglers have reported catching unusual looking esocids from Lake Champlain with increasing frequency (Figure 6). When photographs were provided, Vermont fisheries biologists identified them as some form of esocid hybrid. In 2006 and 2007, tissue samples were collected from suspected hybrids from Missisquoi Bay and sent to Dr. Chris Wilson of the Ontario Ministry of Natural Resources Fish Genetics and Stock Assessment Unit, located at Trent University, Peterborough, Ontario, Canada. Dr. Wilson specializes in esocid genetics. Sequence analysis of the suspected esocid hybrids confirmed all samples as pike × pickerel hybrids. More specifically, all samples had pickerel mitochondrial DNA, indicating successful mating between female pickerel and male pike.

Figure 6. Photo showing chain pickerel (top), chain pickerel - northern pike hybrid (middle) and northern pike (bottom). Pike-pickerel hybrids typically have white, bean-shaped markings similar to northerns, but they appear to line up in vertical rows or bars down the side of the fish. Hybrids also tend to have an emerald green coloration. These fish were collected from Lake Memphramagog and are shown here as an example of what is being reported in Lake Champlain. Photo by Jud Kratzer, VTDFW.

Since this confirmation, pike-pickerel hybrids have been collected during various Department sampling efforts in southern and northern Lake Champlain, as well as Lake Memphramagog in northeastern Vermont. It is unknown why these hybrids are being reported more frequently. It could be due to an increased occurrence of the hybrid species, or simply increased awareness and interest by anglers. In any case, now that muskellunge restoration is underway on Lake Champlain with the Vermont Fish & Wildlife Department's stocking efforts, it will be important to educate Lake Champlain's angling public on the proper identification of all esocid species. Muskellunge may be mistaken for pike-pickerel hybrids and harvested, even though it is currently illegal to harvest muskellunge in Vermont waters of Lake Champlain.

CENTRARCHIDS (Good, Pientka, Zollweg)

Largemouth and Smallmouth Bass

Angling for largemouth and smallmouth bass in Lake Champlain continues to increase in popularity. The lake is frequently named as one of the top 5 bass fishing destinations in the United States by numerous popular national fishing magazines. It not only attracts and supports a high level of recreational fishing pressure, but multiple professional bass fishing tournament trails have added Lake Champlain as an annual stop. As a result, the popularity of and pressure on the lake's bass fisheries have increased in recent years.

A good indication of the health and quality of the bass fishery in the lake is reflected in professional tournament catches since 1997. The average weight of daily 5-fish bag limits were calculated for the top 10 finishers from three- and four-day professional Bassmaster tournaments from 1997 through 2009. With the exception of a single year, results indicate that tournament catches have remained very consistent since the first professional tournament was held on Lake Champlain in 1997 (Figure 7).

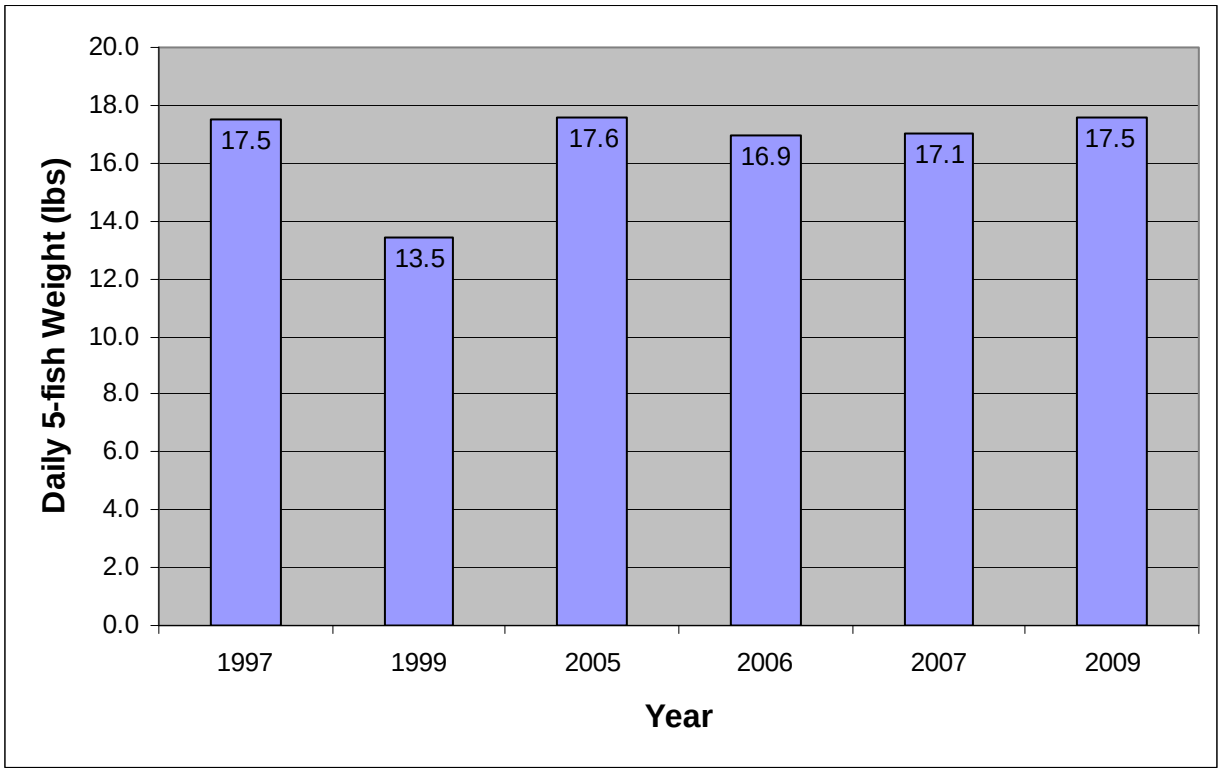


Figure 7. 5-fish daily bag weights averaged for the Top 10 anglers from all 7 professional-level Bassmaster tournaments held on Lake Champlain since 1997.

Despite the positive trends evident from professional tournament results, NYSDEC and VTDFW are collecting bass population data on Lake Champlain, for better monitoring of the fishery for the future.

In 2009, a baseline electrofishing survey was conducted at four sites (King Bay, Cumberland Bay, North West Bay, and Fort Ticonderoga) using the NYSDEC centrarchid sampling protocol. Total catch included 127 smallmouth bass (132-510 mm), and 59 largemouth bass (102-497 mm). These four sites provided basic survey data which will be useful for comparisons and trend tracking of bass indices such as catch per unit effort and sizes in future years. Beginning in 2010, VTDFW intends to incorporate Lake Champlain into its routine bass electrofishing surveys.

RULES, REGULATIONS, and POLICY SHIFTS (Good, Schoch)

Neither state made regulation changes in 2009 that pertain to Lake Champlain fisheries.

RESEARCH

Lake whitefish project (Marsden)

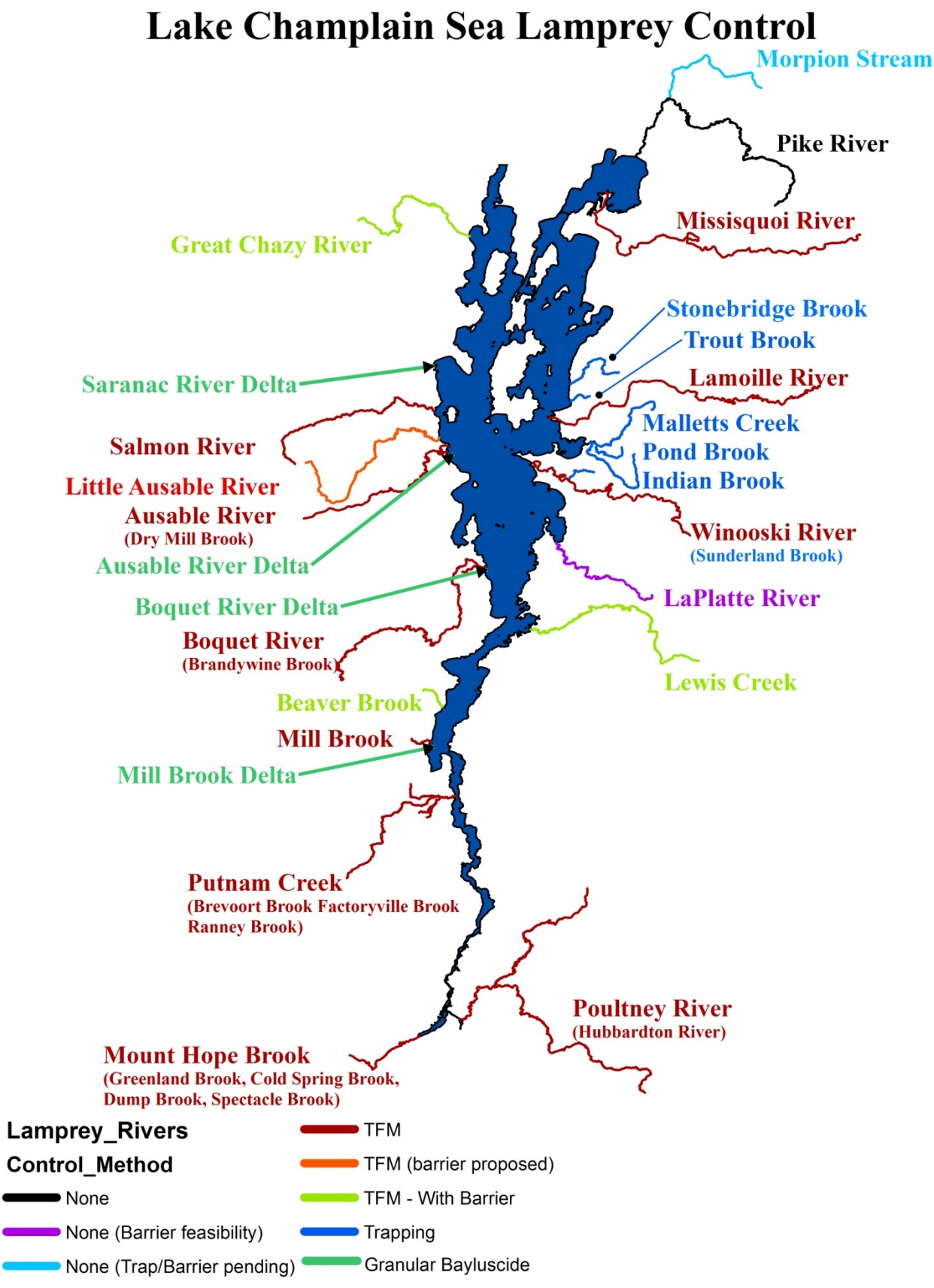
The objectives of the lake whitefish project, funded by NOAA, are to determine the historical trends and current status of the lake whitefish populations in the lake. A particular interest of the study is on the south end of the lake and Missisquoi Bay, where commercial fishing was focused. A review of the commercial fishery landings in Quebec suggests the northern fishery declined steadily since the 1960s and ended in 2005. Continued larval sampling located larvae at multiple sites throughout the main lake, but no larvae in southern Missisquoi Bay and Larabee's Point in the south lake, and only one possible larva in the Inland Sea. Peak larval abundances exceed 2,500/1,000m^3 Diet studies indicate seasonal shifts, with fish eggs dominant in the spring, Mysis in the summer, and snails in the fall; zebra mussels are a rare component of the diet in all seasons. Whitefish condition is good, and at least 19 age classes are present. Only one post-spawning fish has been sampled; spawning appears to occur very late in winter, mid-Dec to mid-Jan.

Alewife thiaminase project (Marsden)

The objectives of this project, funded by NOAA, are to evaluate changes in alewife thiaminase levels during the initial phases of the alewife invasion, and examine effects of alewife consumption and alewife thiaminase expression upon lake trout reproduction in Lake Champlain. Analysis of alewife samples collected in 2008 was completed in 2009; data from 2006-2008 were converted to a different metric than reported in 2009 in order to compare data between labs. Thiaminase levels averaged 4,917 pmol/g/min in 2006, 3,641 in 2007, and 3,871 in 2008. Samples of lake trout and Atlantic salmon eggs were collected in 2004 through 2008; only three individuals were examined in 2004 with an early assay method, so these data may not be comparable to later years (Table 7). Thiamine levels were sufficiently high (> 5 nmol/g) that symptoms of early mortality syndrome (EMS) would not be expected, although the variability among females has increased.

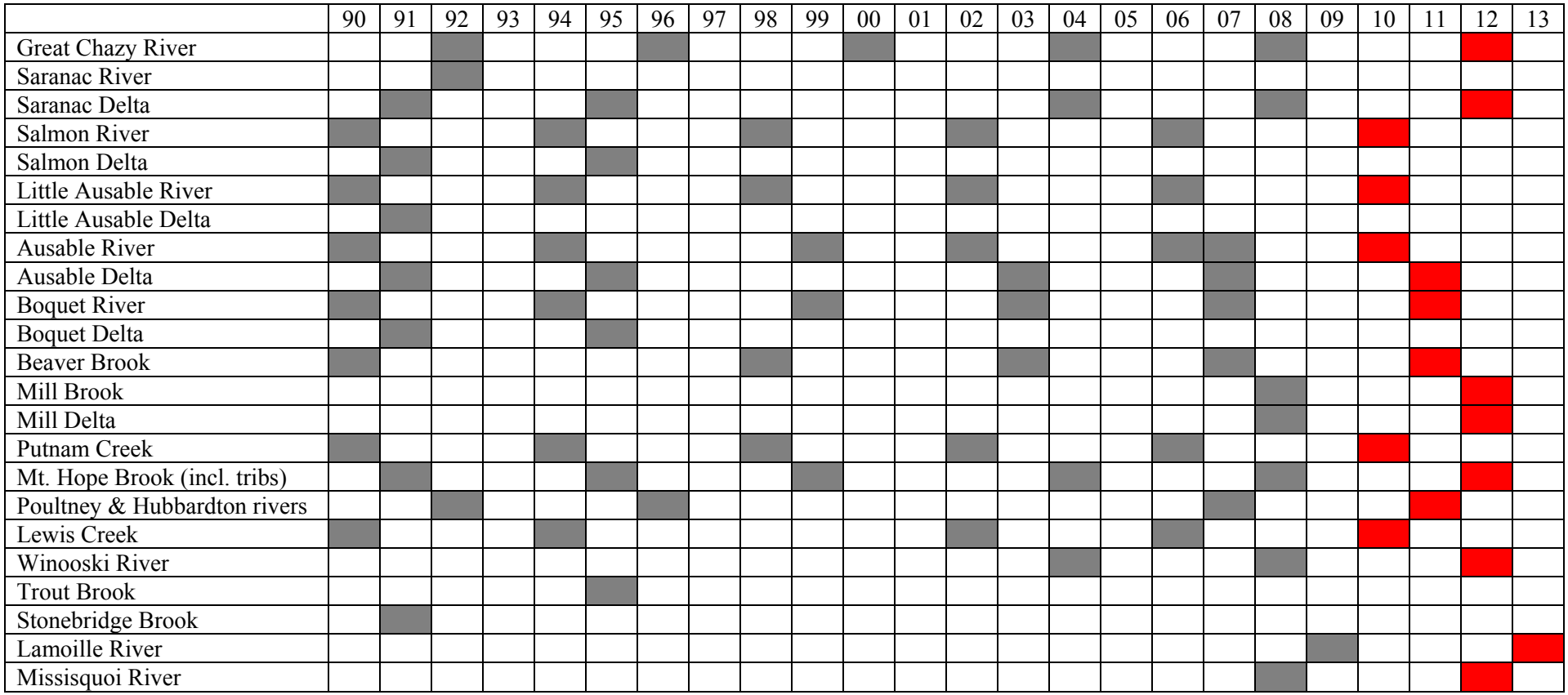
Table 7. Thiamine levels (nmol/g) in lake trout and Atlantic salmon eggs collected from feral fish in Lake Champlain.

	Lake trout			Atlantic salmon		
	N	average	SD	N	average	SD
2004	3	14.8	1.9			
2005	19	11.1	3.4	12	11.5	3.6
2007	14	7.8	4.4	26	5.6	1.9
2008	21	7.7	6.2	19	7.1	3.5



Appendix 1. Lamprey Control Treatment and Trapping Schedule

Appendix 2: Schedule of completed Lake Champlain lamprey treatments through 2009 and projected treatments for 2010 -2013



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