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## What is *Opportunities for Action*?

*Opportunities for Action: An Evolving Plan for the Future of the Lake Champlain Basin* is a comprehensive, long-term management plan for the Lake Champlain basin. It addresses water quality, toxic substances, living natural resources, recreation and cultural heritage resources, economics, monitoring, and data management. The plan also calls for a strong education and outreach program and the active involvement of local communities. *Opportunities for Action* identifies three highest priorities for action:

- Reduce the amount of phosphorus entering the lake
- Prevent and control the release and effects of toxic contaminants
- Establish a comprehensive program for managing nuisance nonnative aquatic species

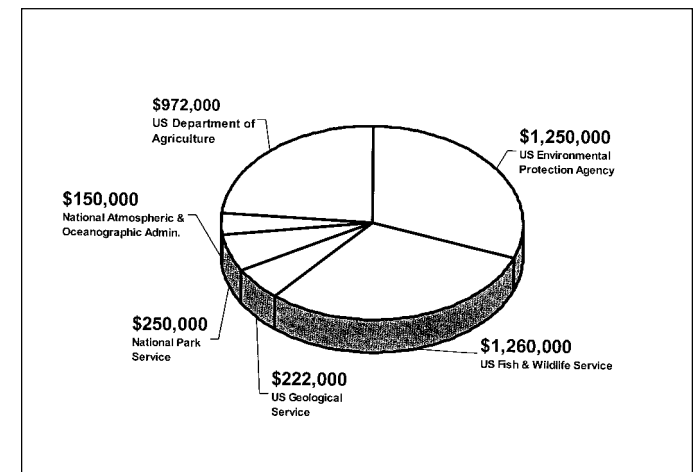
The Lake Champlain Management Conference developed *Opportunities for Action* through a five-year planning process that included public meetings and technical studies. In 1996, the plan was endorsed by the Governors of New York and Vermont, and representatives from the Province of Quebec and the US Environmental Protection Agency. At that time, the Management Conference dissolved, passing leadership of the LCBP to the Lake Champlain Steering Committee. Copies of the plan are available from the LCBP or on our website at [www.lcbp.org](http://www.lcbp.org).



## How is the LCBP Funded?

Last year, over \$7.6 million in US federal funds were directed toward implementing *Opportunities for Action* (Figure 1). The US Environmental Protection Agency provided \$1.25 million directly to the Lake Champlain Steering Committee for LCBP activities. These federal funds must be matched by state or local groups who carry out many of the projects, adding significant local investment to implementing *Opportunities for Action*. The states of Vermont and New York, the Province of Quebec, and many local partners also contribute to activities related to implementing *Opportunities for Action*. The total annual investment from all sources likely exceeds \$12 million in most years.

**Figure 1. 1998 Federal Funding**



Additional funding included \$250,000 of US EPA funding to the University of Vermont's Ecosystem Science Laboratory; \$100,000 of US Department of Defense Legacy Program funding for the Lake Champlain Maritime Museum's preservation management plan for the 1776 gunboat; and \$5 million of US EPA funding for the Middlebury Wastewater Treatment Plant upgrade.

## PROGRESS '99

In 1998, the Lake Champlain Basin Program partners continued many on-the-ground projects and cooperative management efforts around the Lake Champlain basin that address the priorities identified in *Opportunities for Action*. Phosphorus pollution to the lake and its tributaries was further reduced as work continued throughout the basin to upgrade wastewater treatment plants and to help farmers better manage stormwater runoff. Toxic polychlorinated biphenyls (PCBs) are being cleaned up in Cumberland Bay, NY. A bi-state plan for managing nuisance nonnative aquatic species is nearing completion, while efforts to control individual species such as sea lamprey are showing signs of success. Fish and wildlife habitat restoration and protection programs have added acres of protected wetlands and miles of restored streambank buffers to the basin. Recreational opportunities have improved through enhanced access to the lake and new bicycle loops which will continue to draw visitors to the basin. Cultural resources are being documented, restored, and opened to the public, including shipwrecks discovered on the bottom of the lake through the underwater survey program.

In addition to coordinating the efforts of federal, state and provincial governments in each of these areas, local involvement continued to be the key to implementing *Opportunities for Action*. The LCBP helped establish a new watershed group in New York, and supported many other existing groups, such as environmental advocacy groups, museums, libraries, towns, and conservation boards. Each of these groups used a small amount of LCBP support to develop greater local awareness of the issues in the Lake Champlain

basin and carry out projects using local expertise. The LCBP's education and outreach program continued to keep the public informed about the basin and what can be done to help protect and restore it, from conducting youth programs to supporting local media coverage of basin issues.

*Progress '99* describes selected activities of the LCBP partners in more detail and reports on progress toward implementing *Opportunities for Action* in 1998. Each section of the report corresponds to a topic addressed in the plan and provides an overview of the LCBP's progress in that area. Table 5 at the end of the report also provides an assessment of the status of specific priority actions in *Opportunities for Action*. Lastly, the report identifies some emerging issues raised by residents of the basin since the plan was completed in 1996. Please contact the LCBP for more information or for referrals to appropriate LCBP partners.



Fishing on the South Lake.

## REDUCING PHOSPHORUS POLLUTION

### Controlling Point Sources

In *Opportunities for Action*, Vermont and New York committed to specific phosphorus reductions from point sources. The states and local communities have provided substantial funding for upgrading wastewater treatment plants to remove additional phosphorus. In 1998, Vermont provided over \$3 million in capital funds to upgrade plants in Cabot, Milton, Morrisville, Montpelier, and West Rutland (Table 1). In New York, the Clean Water/Air Bond Acts provided over \$5.8 million for treatment projects in Keeseville, Port Henry-Moriah, Whitehall, and Chazy. The US EPA provided \$5 million for the ongoing work at the Middlebury, VT plant and \$1.2 million for the Chazy, NY plant. In Quebec, the Clean-Up Wastewater program provided \$2.2 million to connect the town of St.-Georges-de-Clarenceville to the Venise-en-Quebec treatment plant. Local contributions, such as \$3.7 million from the town of St.-Georges-de-Clarenceville, were essential to meet total project costs of about \$5.9 million.

LCBP



Urban runoff is one of many sources of phosphorus to Lake Champlain.

**Table 1.**

Phosphorus removal upgrades and construction costs for Vermont municipal wastewater treatment facilities in the Lake Champlain basin.

Facility	Completion Removal Date <sup>1</sup>	Phosphorus Project Cost (\$) <sup>2</sup>
Enosburg Falls <sup>3</sup>	1996	291,826
Castleton	1998	543,008
Morrisville	1999	520,000
Middlebury	1999	2,000,000
West Rutland	2000	647,335
Cabot <sup>3</sup>	2001	183,000
Montpelier (Phases 1-4)	2001	2,430,000
Fair Haven	2001	517,000
Poultney	2001	917,000
Milton <sup>4</sup>	2001	1,433,000
Brandon	2001	494,000
Northfield	2002	2,840,000
Richmond	2002	1,286,667

<sup>1</sup> Future completion dates will depend on the rate of state and federal funding.

<sup>2</sup> Cost estimates are for the State of Vermont only. Future projects are subject to change.

<sup>3</sup> New facility will be required to remove phosphorus.

<sup>4</sup> Phosphorus removal will be required when facility converts from aerated lagoon process.

### Phosphorus: Too Much of a Good Thing?

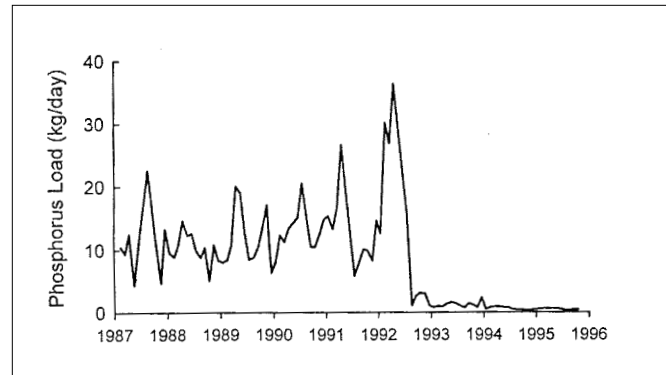
Phosphorus is a naturally occurring nutrient essential for plant growth. In excessive amounts, however, phosphorus can cause algal blooms and excessive growth of other aquatic plants. These plants and the water quality problems that occur when they die can harm fish and other species and limit human uses of the lake. The LCBP partners have been working to control both point sources of phosphorus, such as municipal wastewater treatment plant discharges, and nonpoint sources, such as runoff from farm fields and lawns. Over 80% of the phosphorus entering the lake comes from nonpoint sources. *Opportunities for Action* established reduction targets for each segment of the lake, and specific plans have been developed by New York and Vermont to attain the first 25% of the reductions by 2001.

## How is the LCBP Monitoring Water Quality?

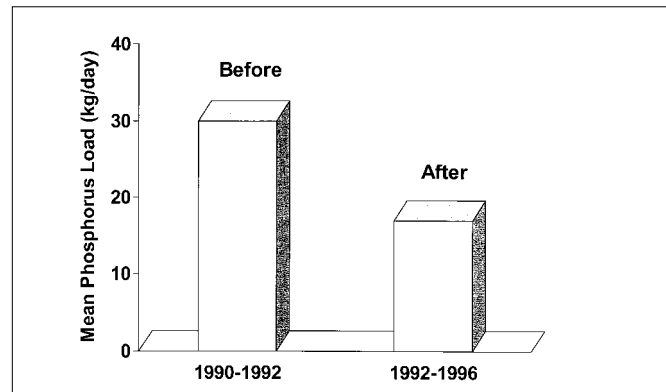
In 1998, the states of Vermont and New York reported the results of their joint Long-Term Water Quality and Biological Monitoring Project for Lake Champlain from 1992 -1996. The monitoring tracks the amount of phosphorus discharged from point sources and delivered by major rivers to the lake, as well as the concentration of phosphorus in various areas of the lake itself.

Monitoring data from the LaPlatte River in Vermont illustrates the positive effects of reducing the amount of phosphorus discharged to rivers in the basin. Phosphorus loads to the LaPlatte River were reduced after advanced treatment equipment was installed at the wastewater treatment facility in Hinesburg in 1992 (Figure 2). Data collected downriver of the plant, near where the LaPlatte River flows into the lake, show that the phosphorus loads to the lake were also reduced compared to before the treatment plant upgrade (Figure 3).

This first analysis of the data since *Opportunities for Action* was completed did not show a general pattern of trends in the in-lake phosphorus concentrations. However, it is expected that continued monitoring will show that phosphorus reduction efforts throughout the basin will result in lower phosphorus concentrations, fewer algal blooms and generally increased water quality in the lake.



**Figure 2. Monthly average total phosphorus discharges from the Hinesburg wastewater treatment plant.**



**Figure 3. Total point source loads from the LaPlatte River to Lake Champlain, before and after point source load reductions at the Hinesburg wastewater treatment plant.**

Figures adapted from: VT DEC/NYSDEC, 1998. Long Term Water Quality and Biological Monitoring Project for Lake Champlain: Cumulative Report for Project Years 1992-1996. LCBP Technical Report No. 26.

### ***Local Connection: Town of Willsboro Explores Innovative Technologies***

*Directly addressing an action called for in Opportunities for Action, the Town of Willsboro, NY and scientists from Cornell University recently completed a pilot study of a promising new technology that removes phosphorus from wastewater. The new method is potentially more cost-effective than traditional chemical phosphorus removal techniques. In the study, treated wastewater from the Willsboro treatment plant was passed through a small experimental wetland containing wollastonite, a locally mined mineral. The wollastonite removed a significant amount of the phosphorus from the wastewater passed through the wetland. Willsboro has applied to the New York Clean Water/Air Bond Act for funding to test the technology at a larger scale. The pilot study was funded in part through an LCBP grant.*

NYCO Minerals



Mark Buckley of NYCO Minerals and Larry Goehring of Cornell University with wollastonite test basins.

## **Controlling Nonpoint Sources**

In 1998, New York awarded over \$800,000 from the Clean Water/Air Bond Act and Environmental Protection Fund to address nonpoint sources of phosphorus. In Vermont, the USDA Natural Resources Conservation Service (NRCS) and the US EPA provided over \$1.3 million toward nonpoint source phosphorus reduction projects in the Vermont portion of the basin. Projects included nutrient and waste management, runoff mitigation, erosion control, and infrastructure improvements. In addition to state and federal funds, landowners contributed a portion of the funds required for each project in a cost-sharing agreement. See Tables 2 and 3 for summaries of some of the agricultural cost-share projects implemented since 1995.

Quebec is providing funding and technical support to farmers for improving manure management and encouraging sustainable agriculture practices. The Ministry of Environment and Wildlife and the Ministry of Agriculture, Fisheries, and Food have targeted several areas within the Missisquoi River basin for accelerated phosphorus control measures, including \$142,000 toward cost-share projects such as manure storage facilities. An ongoing pilot project in the Ruisseau-Au-Castor watershed mapped the watershed and helped area farmers to improve manure management, calculate soil erosion, and sample water to evaluate nutrient loads and pesticide levels.

### **Local Connection: Volunteers Protect and Restore the Ausable and Missisquoi River Basins**

*Missisquoi River Basin Association (MRBA) volunteers have helped restore many streambanks over the past three years. Last year, the MRBA organized 15 workdays on three farms in Franklin County VT. Along with landowners and technical staff, volunteers planted trees and used other natural materials to stabilize streambanks and revegetate stream buffer areas to slow stormwater runoff and filter sediments and phosphorus. The MRBA also organized a public forum, a canoe trip and river cleanups. The MRBA has received several grants from the LCBP.*

*In 1998, the Ausable River Association (ARA) became the basin's newest watershed group. Over the past year the ARA established a board of directors and acquired many members. The ARA has been working in the field with university and technical staff to prioritize flood restoration projects, and with local highway departments on pollution prevention projects. Cornell Cooperative Extension facilitated the ARA's establishment with a LCBP local implementation grant.*

*Over 20 volunteer groups in the basin are dedicated to protecting lakes and rivers. Visit the LCBP website at [www.lcbp.org](http://www.lcbp.org) to find one near you!*

MRBA



Missisquoi River Basin Association volunteers planting cedars along the Missisquoi River.

**Table 2. New York State and USDA Agricultural Cost-share Projects 1995-1998 Lake Champlain Basin.<sup>1</sup>**

Lake Segment Watershed	Projects	Animal Units <sup>2</sup>	Estimated Phosphorus Reduction (metric tons/yr)
South Lake B	19	8094	2.4
South Lake A	12	2411	0.6
Port Henry	7	996	0.2
Main Lake	21	4039	0.9
Cumberland Bay	3	530	0.1
Isle LaMotte	13	7705	1.7
<b>Total</b>	<b>75</b>	<b>23,775</b>	<b>5.9</b>

<sup>1</sup> Includes USDA projects for 1995 and 1996 only.  
<sup>2</sup> One Animal Unit = 1000 lbs. of animal such as cow, chicken or pig. One average cow = 1.4 animal units  
Source: NYS Soil and Water Conservation Committee  
Note that phosphorus reductions are estimates only, and do not include all nonpoint source phosphorus control activities in the basin. No projects were completed in the Otter Creek watershed.

**Table 3. Joint NRCS and Vermont State Agricultural Cost-share Projects, 1995-1998 by Watershed.**

Lake Segment Watershed	Number Of Grants	Animal Units <sup>1</sup> Treated	Estimated Phosphorus Reduction (metric tons/yr)	Estimated State Cost (\$)	Estimated Total Cost (\$)
South Lake A	31	3,959	0.40	133,480	530,841
South Lake B	74	9,404	1.18	313,099	1,238,239
Otter Creek	99	13,314	1.45	218,848	1,097,059
Main Lake	70	10,515	1.63	217,944	1,247,486
Malletts Bay	49	6838	.79	191,365	850,381
Missisquoi Bay	111	17,941	2.40	274,161	1,468,279
Isle La Motte	120	16,846	2.46	570,311	2,463,776
<b>Total</b>	<b>554</b>	<b>78,817</b>	<b>10.31</b>	<b>1,919,210</b>	<b>8,896,063</b>

<sup>1</sup> One Animal Unit = 1000 lbs. of animal such as cow, chicken or pig. One average cow = 1.4 animal units  
Source: VT Department of Agriculture  
Note that phosphorus reductions are estimates only, and they do not include all nonpoint source phosphorus control activities in the basin.  
No projects were completed for the lake segments: Port Henry, Shelburne Bay, Burlington Bay, Northeast Arm, and St. Albans Bay.

## How Are We Doing?

### *Reducing Phosphorus Pollution*

■ New York State Bond Act funding has allowed New York to upgrade treatment plants in the basin more quickly than originally expected. In Vermont, treatment plant upgrades are on schedule. Both states expect to achieve the first 25% of their point source reductions by the five-year milestone established in *Opportunities for Action*.

■ Many nonpoint source phosphorus control projects continue to be implemented, yet the demand for agricultural cost-share funds continues to outpace the available funding. Federal funding for these programs has not been provided at the same levels used to set the nonpoint source reduction targets in *Opportunities for Action* and is expected to decline further. Continued federal agency funding will be critical to meet the 20-year phosphorus reduction timeframe.

LCBP



Improving manure management on farms throughout the basin is a priority of *Opportunities for Action*.

■ Tracking of nonpoint source phosphorus control projects in the basin must be more complete and consistent. Estimates of the phosphorus reductions that result from these projects must also be improved. The LCBP is supporting projects in Vermont and New York that will address these needs for agricultural projects, making possible a more accurate assessment of progress toward the phosphorus reduction goals set out in *Opportunities for Action*. No such program exists for urban nonpoint source control projects, streambank restoration projects and other practices which also help reduce phosphorus loads to the lake.

■ *Opportunities for Action* called for Quebec and Vermont to divide responsibility for phosphorus loads from the Missisquoi River watershed, which they share. The Missisquoi Bay Task Force is developing a phosphorus reduction agreement between the two jurisdictions. A current LCBP study of phosphorus loads from different parts of the Missisquoi watershed will support the work of the Task Force. An agreement is expected to be completed by the end of 1999.



## Toxic Substances in Lake Champlain

Toxic substances are chemicals that can harm plants and animals, including humans. In general, these substances are found in low concentrations in Lake Champlain. However, LCBP studies have shown that contaminants accumulated in lake-bottom sediments may have adverse effects on aquatic organisms at three sites of concern: Cumberland Bay, Burlington Harbor and Malletts Bay. Mercury and polychlorinated biphenyls (PCBs) are present at low levels throughout the lake and have accumulated in the tissues of several fish species, prompting Quebec, Vermont and New York to post fish consumption advisories for these fish. *Opportunities for Action* calls for further investigation and restoration of the most contaminated areas of the lake, and prevention of additional toxic substances from entering the lake and its rivers.

NYSDEC



Clean-up underway on Cumberland Bay.

## MANAGING POLLUTION FROM TOXIC SUBSTANCES

### Cleaning Up Contaminated Sediments

In 1992 and 1996, sediment contaminant surveys conducted for the LCBP discovered high levels of polychlorinated biphenyls (PCBs) in Cumberland Bay, NY. Acting on this information, New York has begun a \$23.1 million restoration project that will remove contaminated sediment and debris for off-site disposal; restore affected wetland areas; and conduct additional monitoring and beach cleanup as needed. During the dredging process, two layers of floating silt fences will be installed to keep contaminated sediments from moving outside the work area. Georgia Pacific will pay \$9 million toward the cleanup. The work is scheduled for completion by early 2001.

The sediment studies also identified potentially harmful levels of certain contaminants in Burlington Harbor. A follow-up study is currently examining the issue further by measuring sediment contaminant levels at more sites and conducting tests to determine whether the contaminants are harmful to aquatic animals. Preliminary results from the study indicate that long-term exposure to toxic substances in sediments may be affecting aquatic organisms living there, especially in the southern area of the harbor. The chemicals of concern are primarily hydrocarbons and metals, whose sources may include historic activities, stormwater runoff and sewage treatment plant discharges.

### ***Local Connection: Preventing Pollution From Toxic Substances***

*Cornell Cooperative Extension (CCE) is helping farmers and residents of Clinton and Essex Counties (NY) reduce water pollution. CCE has been holding workshops for farmers on saving money by reducing chemical pesticide use, and assisting farmers with manure and fertilizer management. Newspaper inserts, public displays, fact sheets, and training classes are also being used by CCE to inform the public about proper use and disposal of pesticides.*

NWF



Senator James Jeffords and Daniel Ferraris, DDS at NWF's press conference for the dental office guide.

*National Wildlife Federation's (NWF) Northeast Natural Resource Center and the Vermont State Dental Society are promoting voluntary mercury pollution prevention by dental professionals. If not properly handled, the mercury-based amalgam used in fillings can contribute to mercury contamination in the lake. One result of the project is a guide for dentists in Vermont and New York on reducing, recycling and properly disposing waste amalgam. The NWF will follow the*

*release of the guide with a survey of dentists to measure the usefulness of the guide and track the changes dentists make in their practices after receiving it.*

*These projects were supported by LCBP pollution prevention grants.*

## **How Are We Doing?**

### ***Managing Pollution from Toxic Substances***

- Work continues at two of the three sites of concern, Cumberland Bay and Burlington Harbor. When the final results of the latest Burlington Harbor study become available, the LCBP partners will consider management alternatives for this area. No additional work has been done on the third site of concern, Malletts Bay.
- The LCBP and its partners have continued to work with industries, businesses and homeowners to reduce waste and prevent pollution through workshops, technical assistance, and public information campaigns. However, additional work to identify pollution sources and target specific prevention activities, as called for in *Opportunities for Action*, is warranted.

## MANAGING NUISANCE NONNATIVE AQUATIC PLANTS AND ANIMALS

### Nonnative Species: Aliens Among Us?

Nonnative nuisance aquatic plants and animals threaten the Lake Champlain basin's native fish, wildlife and plants and impede recreational activities. In some cases, they have substantial ecological and economic impacts. These species, labeled "nuisances," enter Lake Champlain via the Champlain Canal, the Richelieu River and Canal, and over land primarily through human activities such as boating and bait transport. *Opportunities for Action* calls for comprehensive management of nonnative aquatic species along with continued control, research and monitoring efforts for sea lamprey, zebra mussels, water chestnut, and Eurasian watermilfoil.

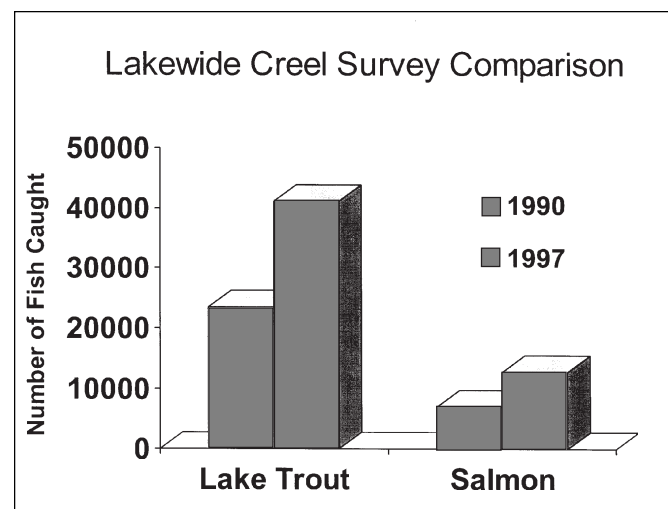
### Planning for Aquatic Nuisance Species

In consultation with a committee of experts from around the basin, Vermont and New York are jointly developing a comprehensive management plan for nuisance nonnative aquatic species in the Lake Champlain basin. Following directly from *Opportunities for Action*, the plan will identify target species, evaluate management alternatives and recommend appropriate controls to prevent the impacts of these species. The plan will also include actions to conduct more detailed assessments where information gaps exist. After endorsement by the LCBP's Steering Committee, the final plan will be submitted for approval by the National

Aquatic Nuisance Species Task Force. Federal funding to implement the plan may then be available under the National Invasive Species Act.

### Controlling Sea Lamprey

New York, Vermont, and the US Fish and Wildlife Service (USFWS) have worked together through the Lake Champlain Fish and Wildlife Management Cooperative on an eight-year experimental sea lamprey control and fish stocking program to reduce sea lamprey and enhance sport fish populations. In 1998, New York conducted successful chemical treatments on the Little Ausable River, the Salmon River, Putnam Creek and Beaver Brook. Planning also continues for a sea lamprey barrier dam on the Little Ausable River, which is expected to reduce the frequency of treatments above the dam by blocking sea lamprey from spawning there.

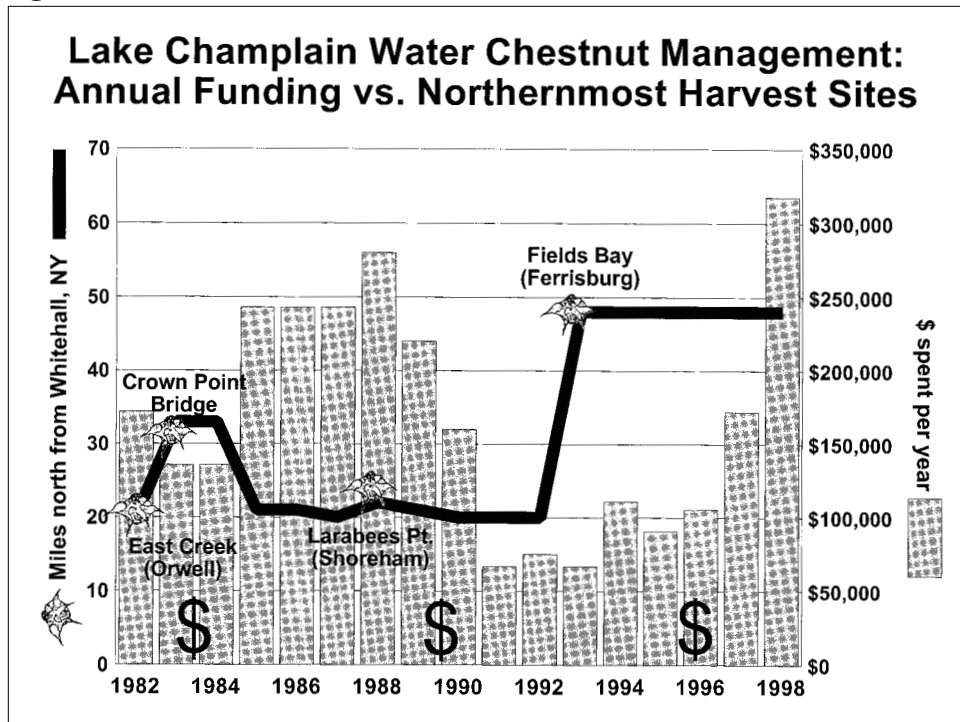


**Figure 4. Total lake trout and salmon catch has increased during the sea lamprey control program. Source: VT Department of Fish and Wildlife.**

A report on the eight-year sea lamprey control program is being finalized. Preliminary results indicate that from 1990 to 1997, the number of sea lamprey nests has decreased, the average number of sea lamprey wounds on landlocked Atlantic salmon decreased and the number of salmon and lake trout caught increased (Figure 4). The results of the report will be a critical component of a Supplemental Environmental Impact Statement (EIS) currently being developed by the USFWS. The EIS will include sea lamprey control strategies for specific river and delta areas in the basin and incorporate all appropriate techniques.

Figure 5.

Source: VT DEC



## Controlling Water Chestnut

First introduced to the lake in the 1940s, water chestnut is a nonnative plant that forms dense surface mats, crowds out other beneficial plant species and limits recreational and commercial activities. Since the early 1980s, the Vermont Department of Environmental Conservation, with support from the US Army Corps of Engineers, has implemented harvesting and educational efforts to control water chestnut in Lake Champlain. A total of \$317,640 was spent on control efforts in 1998. The Nature Conservancy of Vermont and New York organized volunteers to hand-pull 16,000 pounds of water chestnuts in 1998. The LCBP supported the volunteer coordinator and the summer field staff for the water chestnut harvesting program.

The LCBP also sponsored a study of water chestnut composting that was completed in 1998. Composting was found to be an effective way to transform the harvested plants into a valuable agricultural resource; the finished compost can be used by farmers to improve the fertility of their soils. Composting has since been incorporated into the water chestnut management program.

Champlain Valley Compost Company



Consolidating manure and dried water chestnuts at Elysian Fields farm.

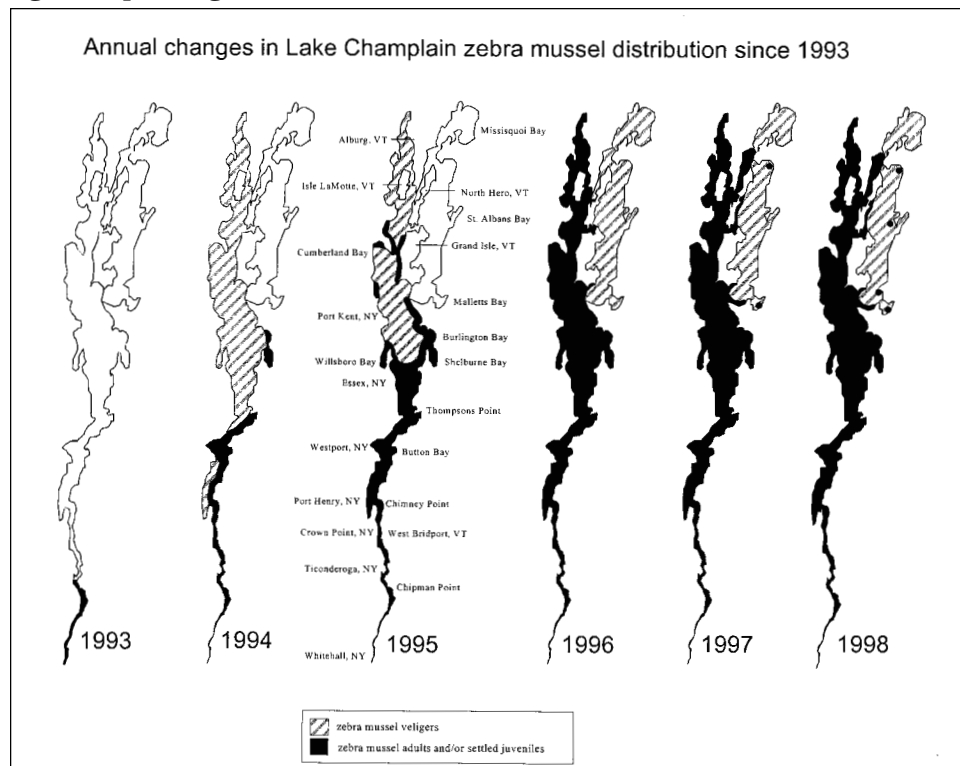
## Controlling Zebra Mussels and Protecting Native Mussels

The zebra mussel is a small freshwater mollusk that was first discovered in Lake Champlain in 1993. Zebra mussels clog water intake pipes, foul boat hulls and engines, obscure archeological artifacts, and can also negatively affect the aquatic ecosystem. Unfortunately, studies around the world have yet to yield effective strategies for controlling zebra mussel populations. The Vermont Department of Environmental Conservation conducts zebra mussel monitoring on the lake and its tributaries along with the LCBP's long-term monitoring program. As shown in Figure 6, zebra mussel adults were found in more locations in the Northeast Arm segment of the lake in 1998.

As adult zebra mussels have spread throughout the lake, native mussels have begun to decline. Large numbers of zebra mussels can attach themselves to the native mussels, severely impacting and potentially killing them. In 1998, the LCBP supported a study of native mussels in the lower Missisquoi River. The lower Missisquoi supports the largest number of rare native mussel species in Vermont. Because habitat conditions are not ideal for zebra mussels, the lower Missisquoi could serve as a partial refuge for native mussels. However, the study report stressed that avoiding zebra mussel introduction into the river by boaters or anglers is still the best way to be certain that the native mussels there will not be affected.



**Figure 6. Spreading Zebra Mussels.**



Note: "veligers" are the early, free-swimming stage of the zebra mussel life cycle, which eventually will settle onto a hard surface as juveniles and then develop into adults. Source: Vermont Department of Environmental Conservation. Source: VT DEC

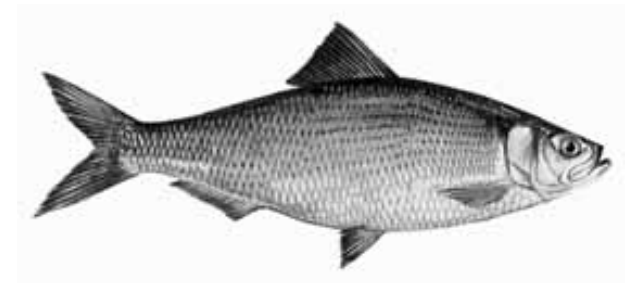
## Managing Alewife

Alewives are nonnative fish that can severely impact native fish species when introduced to a lake by out-competing them for food. In 1997, the Vermont Department of Fish and Wildlife discovered alewives in Lake St. Catherine near Poultney, VT. Their source is unknown, but they may have been released inadvertently by anglers who used them for bait. The presence of alewives is alarming not only for Lake St. Catherine, but also for Lake Champlain. The two lakes are connected, raising the possibility that alewives may spread into Lake Champlain. The state is regularly monitoring for alewives and, thus far, there is no evidence that alewives have moved to Lake Champlain. With funding from the LCBP, Vermont is currently assessing the potential biological, social and economic impacts of alewife introduction to Lake Champlain and evaluating management alternatives.



USFWS

Zebra mussels attached to native mussels.



Alewife

## How Are We Doing?

### *Managing Nuisance Nonnative Aquatic Plants And Animals*

- The development of the comprehensive management plan for aquatic nonnative nuisance species is continuing. The plan is expected to be submitted to the National Aquatic Nuisance Species Task Force for approval by the end of 1999. Additional federal funding should be available at that time.
- Surveys conducted on Lake Champlain before and after the implementation of sea lamprey controls have shown an improvement in the quality of the salmonid fishery. Survival of stocked fish and the number of older and larger fish in anglers' catches have both increased. In addition, there has been a reduction in the sea lamprey wounding rates on salmonids following lamprey control.
- Early gains made during the first 10 years of the Vermont water chestnut control program have largely been lost in the 1990s as funding has been reduced. Water chestnut is now spreading toward recreational areas of the main lake. Stopping its spread and reducing its range to the southern portion of the lake will require \$250,000 to \$300,000 each year over the next 3-5 years. Vermont has provided about \$150,000 annually to the control program and plans to continue this level of support. The US Army Corps of Engineers has provided a 50-70% match to these funds in past years, but eliminated this funding in 1997. The LCBP has provided over \$178,000 to the program from its 1999 budget, an increase of over \$150,000 from its contribution in 1998. However, it is unlikely that the LCBP can consistently provide this level of support. Other sources of funding are now being pursued including a contribution from New York.
- Vermont's Zebra Mussel Monitoring Program has documented the spread of zebra mussels throughout the lake. As zebra mussels colonize all segments of the lake, Vermont will redirect its efforts to issues such as finding places of refuge for native mussels in parts of the lake that may not support large adult zebra mussel populations, and predicting the ecosystem effects in areas where zebra mussel density is highest.
- Both New York and Vermont have active spread prevention programs for zebra mussels, water chestnut and several other nuisance species. These programs raise awareness among boaters and the general public and stem the spread of nuisance species to new areas of Lake Champlain or other waterbodies.

## PROTECTING HUMAN HEALTH

### Human Health Concerns in the Lake Champlain Basin

Potential health threats from poor water quality in the Lake Champlain basin include swimming where there are excessive amounts of bacteria and other pathogens and consuming contaminated drinking water and fish. *Opportunities for Action* outlines efforts to control the sources of pathogens

such as livestock manure and failing septic systems, helps small public water systems comply with monitoring requirements and better informs the public about risks associated with poor water quality.

LCBP



A safe fishery on Lake Champlain is important today and for future generations.

### Burlington EMPACT Project

Last fall, the City of Burlington, in partnership with the University of Vermont, the Lake Champlain Basin Science Center and the Green Mountain Institute for Environmental Democracy, received a \$500,000 grant from the US EPA to support an Environmental Monitoring and Public Access through Community Tracking (EMPACT) program. The Burlington EMPACT project will focus on urban air and water quality issues affecting Lake Champlain and the adjacent city beaches, and will seek to make environmental information accessible to residents so it can be more effectively integrated into decision-making at various levels.

### Beach Closings

Local health departments in New York and Vermont sample the water at public beaches to determine if there is any threat to human health from pathogens. Although 1998 was an extremely wet year in the region, the number of public beach closings increased at only two locations, compared to recent years (Table 4).

### Loans and Grants Help Local Drinking Water Suppliers

*Opportunities for Action* calls for state and federal funds to help local communities meet the treatment standards required in the 1996 Amendments to the Safe Drinking Water Act. Fortunately, the amendments also established a



new federal program that allows states to provide loans to local communities for activities such as public water system improvements and source water protection. Both New York and Vermont are working to apply this funding to issues that pose the most serious threat to human health and ensure compliance with the new law, especially for small communities that can least afford expensive treatment upgrades. The New York Clean Water/Air Bond Act also supported drinking water and septic system projects in 1998.

## How Are We Doing?

### *Protecting Human Health*

- The risk to human health at public beaches and from public water supplies remained low in 1998. Monitoring bacteria as an indicator for disease-causing organisms is required at public beaches. The states are providing local water suppliers with funding for improved water treatment.
- Many basin residents draw water from wells or Lake Champlain with minimal or no treatment, and many popular swimming sites in the basin are monitored rarely, if ever. Problems with localized beach contamination have been raised by the public. Additional research, monitoring, and awareness projects, like Burlington EMPACT, may be needed to identify the causes of these problems and to help citizens stay informed about risks from water borne pathogens.

**Table 4. Total Days of Municipal Beach Closings on Lake Champlain, 1989 - 1998**

BEACHES	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Burlington, VT North Beach	n/a	4	1	0	0	2	7	*	0	0
Burlington, VT <sup>1</sup> Blanchard Beach	n/a	n/a	closed	closed	closed	closed	closed	closed	closed	Closed
Burlington, VT Cove Beach	n/a	2	1	0	0	0	0	0	0	0
Burlington, VT Leddy Beach	n/a	0	1	2	2	2	5	0	0	0
Colchester, VT Bayside Beach	2	0	0	3	0	0	0	n/a	0	0
Shelburne, VT	n/a	n/a	n/a	n/a	0	14	most of summer	1	1	4
So. Burlington, VT Red Rocks Beach	12	5	2	1	2	1	8	0	0	8
Port Douglas, NY	n/a	n/a	n/a	n/a	7	0	0	0	0	0
Essex Beach, NY <sup>2</sup>	n/a	1	closed	closed	closed	closed	closed	closed	closed	closed
Cliff Haven Beach, NY	n/a	n/a	n/a	0	0	0	0	0	0	0
Plattsburgh Beach, NY	n/a	n/a	n/a	7	1	0	0	0	0	0

<sup>1</sup> Burlington's Blanchard Beach is closed indefinitely because of consistently high bacteria loads from Englesby Brook.

<sup>2</sup> The Essex Beach closure is due to "swimmer's itch" rather than bacterial contamination.

\* The south end of North Beach was closed for a several days during the end of July to the beginning of August 1996.

This closure was caused by high coliform counts in a small tributary which flows into Lake Champlain at the south end of North Beach (Source: Steve Goodkind, South Burlington Public Works, November 1997)

## MANAGING FISH AND WILDLIFE

### Fish and Wildlife in the Lake Champlain Basin

The Lake Champlain basin's fish and wildlife species are part of a complex ecosystem. These plants and animals depend on interconnected aquatic and terrestrial habitats, including the open waters of the lake, the rivers and streams that flow into it, wetland areas, and forests. *Opportunities for Action* seeks to preserve the integrity of this ecosystem through numerous activities, highlights of which are discussed in this section.

Vermont Fish and Wildlife Department



Ducks in flight over Lake Champlain.

## Restoring Wetland and Riparian Habitat

The US Fish and Wildlife Service's Partners for Fish and Wildlife Program completed 31 habitat restoration projects last year, including installing fencing to keep livestock out of streams, stabilizing streambanks using natural materials and plantings, and creating in-stream habitat (Figure 7). Program participants include the Natural Resources Conservation Service, Vermont Agency of Natural Resources, New York Department of Environmental Conservation, The Nature Conservancy, Natural Resource Conservation Districts, local watershed groups, and private landowners. The NRCS Wildlife Habitat Incentives Program also provided \$175,000 in cost-share funds for use in the Lake Champlain basin for similar projects in 1998. Thirty farmers enrolled in the program last season.

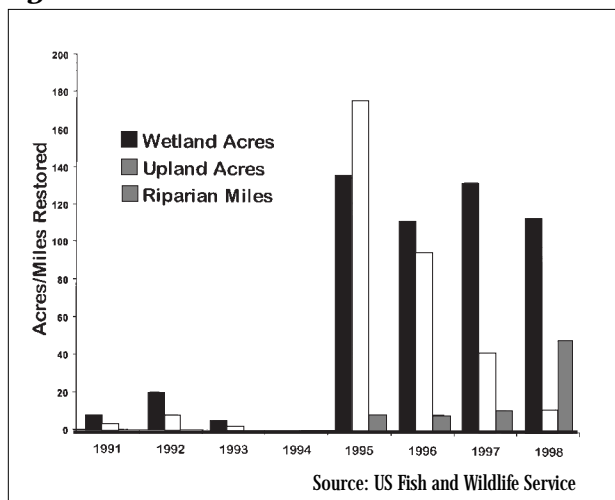
The EPA's National Monitoring Project in the Missisquoi River basin supported the restoration of 5000 feet of shoreline along Samsonville and Godin Brooks by fencing out cattle and replanting the streambanks in 1997-1998. About half of this work was conducted with the Partners for Wildlife program and the NRCS. Stream restoration projects funded by US EPA were also recently completed on the New Haven River, Mad River, and West Branch of the Little River in Stowe.

Quebec is working with The Nature Conservancy of Canada and Saint-Laurent Vision 2000 to create the Riviere aux Brochets (Pike River) Ecological Reserve. Negotiations with landowners continue for the purchase of 311 acres (126 hectares) of land for natural resource protection and conservation in the watershed.

## Acquiring Wetlands

The LCBP's cooperative wetlands acquisition strategy works with willing landowners to permanently protect important basin wetlands. In 1998, several LCBP partners acquired \$800,000 for the second phase of the strategy. Negotiations are underway for the purchase of private lands, including those near the Cornwall Swamp along Otter Creek in Vermont, the Huckleberry Mountain Marsh near Putman, NY, and Ward, Finch, Charter, and Freedom Marshes along the Poultney River in Vermont and New York. Support for wetlands protection comes primarily from the North American Wetlands Conservation Act through the US Fish and Wildlife Service. Additional support is provided by private landowners, nonprofit organizations such as Ducks Unlimited and the Nature Conservancy, the Vermont Department of Fish and Wildlife, and the New York Department of Environmental Conservation.

**Figure 7. Partners for Fish and Wildlife Habitat Restoration.**



### Local Connection:

#### Youth Corps Restores Habitat

*The Vermont Youth Conservation Corps (VYCC) completed a dozen stream restoration, habitat improvement and storm-water drain stenciling projects in Franklin and Chittenden Counties over two seven-week periods in 1998. Twenty Vermonters between the ages of 16 and 24 carried out the projects in cooperation with local watershed groups, the Vermont Agency of Natural Resources, Natural Resource Conservation Service, and the US Fish and Wildlife Service. The crew members also studied watershed resource issues and presented their results at community workshops at the end of each session.*

*The VYCC projects were conducted with a local implementation grant from the LCBP.*



Members of the Vermont Youth Conservation Corps restoring Allen Brook in Williston, VT.

The USDA Natural Resources Conservation Service also continues to purchase permanent easements on wetland areas through its Wetland Reserve Program. To date, 241 acres of degraded wetland and buffer areas either have been, or are being restored. Another 150 acres have been submitted by farmers for consideration under the program

## Monitoring the Spiny Softshell Turtle.

Biologists from several organizations in Vermont and Quebec are studying habitat used by the threatened spiny softshell turtle for basking, egg-laying and hibernation in Missisquoi Bay. Using radio telemetry to track the turtles, the biologists are learning about habitat locations to more effectively

protect the turtles. Program partners include the St. Laurence Valley Natural History Society, (a Quebec not-for-profit organization), the Vermont Nongame and Natural Heritage Program, the Nature Conservancy of Canada, the Granby Zoo, Saint-Laurent Vision 2000, Quebec's Wildlife and Parks Organization, and the US Fish and Wildlife Service.

Quebec Environment and Wildlife



Several organizations are studying the threatened spiny softshell turtle in Missisquoi Bay.

## Restoring Lake Sturgeon

Lake sturgeon populations in Lake Champlain have progressively decreased over the last 100 years, because of a combination of over-harvesting loss of spawning habitat, and other factors. In 1998, the Vermont Department of Fish and Wildlife and the US Fish and Wildlife Service initiated a project to assess lake sturgeon populations. During the first year of the project, three adult sturgeon were captured and tagged during spawning runs on the Lamoille and Winooski Rivers. The available spawning habitat for lake sturgeon in the Missisquoi River was also increased when two spawning beds were constructed directly downstream of the Swanton Dam.

## Managing Walleye Populations

In response to public concern, there are several major efforts underway related to walleye population management in Lake Champlain. In 1998, the Vermont Department of Fish and Wildlife completed management and restoration plans for walleye in Lake Champlain. The plans include setting harvest goals and conducting creel surveys in different sections of the lake, including South Bay. New York, Vermont and the US Fish and Wildlife Service are also cooperatively estimating angler effort and walleye harvest, and gathering information about the early life stages of walleye. Stocking of fry and fingerlings also continues.

## How Are We Doing?

### *Managing Fish and Wildlife*

- Although substantial progress has been made in habitat restoration and wetland protection, sites have not necessarily been selected based on the needs of rare, threatened and endangered species as called for in *Opportunities for Action*. Habitat loss associated with growth and development presents future challenges.
- Vermont, New York and the US Fish and Wildlife Service continue to cooperate on fisheries and wildlife management issues through the Lake Champlain Fish and Wildlife Management Cooperative.
- The LCBP will initiate a new food web study in 1999 that will increase the understanding of how changes in phosphorus concentrations and algae populations are linked to fish populations. The LCBP is also beginning a new project to develop a suite of ecological indicators that will help track the health of the basin's ecosystem and set management priorities.

## MANAGING RECREATION AND CULTURAL HERITAGE RESOURCES

### Recreation and Cultural Resources

The Lake Champlain basin is home to a rich array of cultural heritage resources including historic structures and archeological treasures both on land and under water, as well as many recreation opportunities. *Opportunities for Action* outlines efforts to enhance and preserve these resources including providing access to the lake, promoting low-impact recreation through kayaking and bicycling, protecting significant historic resources, and developing heritage tourism that links natural and cultural resources.

### Public Access Enhancement Awards Program

The Public Access Enhancement Awards Program supports local efforts to improve and enhance public access to Lake Champlain and its lower tributaries. In 1998, the LCBP funded eight projects totaling \$30,000 with funds from the National Park Service (Table 6). For example, the Winooski Valley Park District replaced riverbank stairways and installed kayak and canoe slides at the Ethan Allen



Winooski Valley Park District

Ethan Allen canoe on the Winooski River.

Homestead and Millyard canoe launches on the Lower Winooski River.

LCBP



Port Henry Railroad and Mining Heritage Park.

## Technical Assistance Program

The Technical Assistance Program (TAP) supports a range of activities related to cultural heritage tourism or downtown revitalization initiatives including technical assessments, resource documentation and educational programs. In 1998, \$12,410 in TAP grants were provided to 17 organizations. A TAP project completed in 1998 supported a survey of mining artifacts and

sources for oral histories at the Port Henry Railroad and Mining Heritage Park, which includes a museum housed in a restored carriage house. The project was conducted by the Moriah-Port Henry (NY) Economic Development Zone Office, the Village of Port Henry and the Essex County Planning Office.

BRASS



Boquet River Association volunteers painting bike racks for the Adirondack Coast Bikeways loop.

## Lake Champlain Bikeways and Bikeways Enhancement Awards Program

In cooperation with several public and private partners, Lake Champlain Bikeways has successfully promoted the Lake

Champlain region of Vermont, New York and Quebec as a premier bicycle touring destination by developing and promoting a network of bicycle routes on existing roads. To date, over 4,000 cyclists from around the country and beyond have contacted the Lake Champlain Bikeways clearinghouse for information.

Since establishing a 350-mile principal route around the lake, Lake Champlain Bikeways has been collaborating with local communities to establish a system of interconnected bicycle “theme” loops, which link the region’s natural, cultural, recreational and historic resources. The first nine loops were launched in 1998, along with three interpretive guides. Along the Canadian border, Velo Quebec and Lake Champlain Bikeways will install bike route border signs in Rouses Point, NY and Lacolle, Quebec, with assistance from the NY Department of Transportation and the Quebec Ministry of Transportation. Amtrak is helping to distribute bilingual brochure rack cards promoting Lake Champlain Bikeways and La Route Verte.

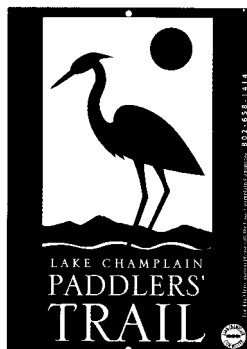
The LCBP’s Bikeways Enhancement Awards Program enhances and promotes additional Lake Champlain Bikeways theme loops. Eleven projects totaling \$15,000 were funded in 1998. For example, the Boquet River Association and a local craftsperson produced bicycle racks and picnic tables for six new theme loops in Essex County, NY. The creative rack design echoes the water and mountain themes of Lake Champlain.

## Lake Champlain Byways

Lake Champlain Byways is a collaborative project to develop a scenic byways corridor management plan that will promote tourism and economic and community development in the region. After the plan is complete, communities may apply for implementation funds from the Federal Highway Administration for various promotional materials and roadside enhancements (e.g., pull-offs, scenic overlooks, information kiosks, etc.). The LCBP has provided recreation and cultural heritage technical assistance to Lake Champlain Byways, and has worked to make the Lake Champlain Bikeways network a major focus of the Byways effort.

## Lake Champlain Paddlers' Trail

From 1996-98, the LCBP supported the development of the Lake Champlain Paddlers' Trail. The trail is currently being managed by the Lake Champlain Committee (LCC), a not-for-profit environmental advocacy group. The LCBP provided funding and technical assistance to LCC to develop signs to mark the trail and a trail guidebook that emphasizes the importance of good stewardship at the sites. The guide is available for purchase through the Lake Champlain Committee at (802) 658-1414. Support for the project came from the National Park Service and EPA.



## Underwater Survey and Underwater Historic Preserves

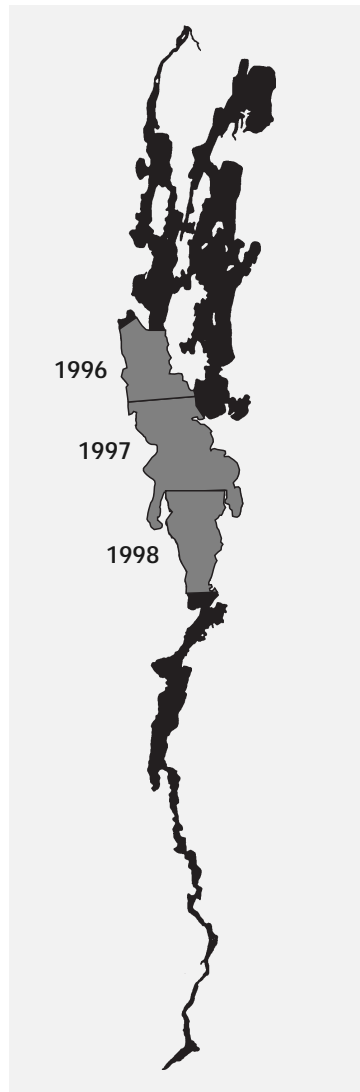
Since 1996, the LCBP has supported a systematic underwater cultural resource survey of the lake and the development of the Underwater Historic Preserve System. The Lake Champlain Maritime Museum is managing both projects for the Vermont Division of Historic Preservation. The need for the survey is particularly urgent because zebra mussels are colonizing many of the shipwrecks in the lake, thus obscuring and potentially damaging them. During the 1998 field season, an additional 42 square miles were surveyed using electronic sensing equipment. Seven new wrecks were discovered (Figure 8). Two wrecks, the Stove Wreck and the Barn Rock Canal Boat, in the Westport-Basin Harbor region were documented fully for potential inclusion in the Lake Champlain Underwater Historic Preserve System. The full report for the 1996 survey season is now available from the LCBP.

The first underwater historic preserve on the New York side of Lake Champlain was developed with \$5,000 from the National Park Service. The "Champlain II" is the wreck of a side-wheel steamer which ran aground at Steam Mill Point in Westport, New York in 1875. The LCBP supported the nomination of the wreck to the National Register of Historic Places and an investigation into its history and archaeology by the Lake Champlain Maritime Museum.

Anne Lessman/LCMM



Anchor shot off of the British ship *Confiance* during the Battle of Plattsburgh toward the end of the War of 1812. With support from the LCBP, Clinton County (NY) Historical Association has contracted with the Lake Champlain Maritime Museum to restore and interpret the anchor.



**Figure 8. Underwater Survey Map**

## Archeological Sites Identified

The USDA Natural Resources Conservation Service routinely conducts cultural resource reviews while planning its conservation projects. In 1998, nineteen archeological sites were identified in the Vermont portion of the basin. Eight of these sites were from the 18th and 19th century, and the remaining sites were Native American encampments from 500 to 5,000 years ago. All of the conservation practices near these sites were modified to avoid disturbing them, or even designed to protect the sites from further impacts of river erosion.

## How Are We Doing?

### *Managing Recreation and Cultural Heritage Resources*

■ Progress continues on cultural heritage and recreation implementation projects outlined in *Opportunities for Action*. More and more public and private partners in the basin are participating in projects that address the goals and objectives in the plan. Collaborations through the Lake Champlain Byways project have facilitated many of these partnerships.

■ Unfortunately, the federal appropriation to the National Park Service for cultural heritage and recreation projects in the basin was eliminated for 1999. Efforts are currently underway to restore this funding, which is critical to continue the successful implementation of cultural and recreational actions in *Opportunities for Action*.

## INFORMING AND INVOLVING THE PUBLIC

### Education and Outreach Efforts

Increasing people's awareness about Lake Champlain issues and providing them with hands on learning opportunities are key to implementing *Opportunities for Action*. A public that understands the basin's water quality and related resource management problems and their solutions can best make informed choices about its long-term protection and restoration.

## Involving Local Communities

Local communities and public and private organizations are helping to implement *Opportunities for Action*. To encourage community involvement, the LCBP offers a series of local grant programs. Local conservation commissions, watershed organizations, and dozens of other LCBP partners use these funds to help residents and visitors learn about and restore basin resources first hand, through projects ranging from school programs to stabilizing streambanks. Examples of



these projects can be found in the "Local Connection" sections of this report. See page 31 for a complete list of grants awarded in 1998.

## Providing a Citizen Voice to Lake Champlain Issues

Vermont, New York and the Province of Quebec each have a Citizens Advisory Committee (CAC), which provides a venue for public input into LCBP activities. In 1998, the CACs hosted a public meeting in Grand Isle, VT to hear citizens' perspectives on Lake Champlain issues and the LCBP's activities. The New York and Vermont CACs oversaw the Partnership Program awards. The Vermont CAC presented their annual report to the Vermont Legislature, as required by Vermont law. The Quebec CAC worked with the Quebec Government to form the Corporation Bassin Versant Baie Missisquoi (the Missisquoi Bay Basin Corporation) this past year. The Corporation's mission is to coordinate the implementation of *Opportunities for Action* within the Canadian portion of the Lake Champlain basin.

## How Are We Doing?

### *Informing and Involving the Public*

- The LCBP website ([www.lcbp.org](http://www.lcbp.org)) was redesigned in 1998, and additional improvements are frequently added. Visitors can find out about watershed groups, access grant applications, obtain a list LCBP publications, read on-line versions of *Opportunities for Action* and the LCBP newsletter, *Casin' the Basin*, and link to other

sites such as Lake Champlain Bikeways. The site is used frequently by school children. It received an average of 50 hits per week in 1998.



LCBP

Teachers identifying macro-invertebrates at a CBEI workshop.

### ***New Missisquoi Visitor Center To Be Built***

*In 1998, Congress approved a request from Senator Patrick Leahy of Vermont for \$2 million towards an administration and visitor complex at the Missisquoi National Wildlife Refuge. It is expected that fish and wildlife education and outreach will be greatly enhanced by the new complex. Site selection and planning for the new facility began in April, 1999.*

- In 1998, the LCBP maintained a strong partnership with the Lake Champlain Basin Science Center, providing \$25,000 toward educational programming, teaching school programs, and managing and updating the LCBP's Resource Room at the Science Center. The LCBP also awarded eight watershed education grants, including an award to the Ticonderoga Historical Society for a Sense of Place exhibit.
- To expand LCBP's work in basin schools, funds were set aside to support the Champlain Basin Educational Initiative. The Initiative brings educational professionals together to learn ways to teach about Lake Champlain Basin issues. More than 75 New York, Vermont, and Quebec teachers participated in CBEI workshops in 1998.
- The LCBP organized *Celebrate the Lake*, an annual festival that offers dozens of activities hosted by more than 30 organizations.

LCBP



- LCBP education and outreach staff presented slide shows and/or watershed model demonstrations to 98 schools or community groups in 1998.

Robin Ulmer of BRASS (center) and Joe Racette of the NYSDEC leading a canoe trip for 1998's *Celebrate the Lake*.

- In addition to working with news media on a variety of LCBP projects in 1998, the LCBP laid the groundwork for a partnership with WPTZ, the NBC TV affiliate for the Lake Champlain region. WPTZ is now hosting the Champlain 2000 series, a weekly series on Lake Champlain issues. Details from each segment of series can be accessed through the LCBP website.



### ***Local Connection: Learning on the Lake***

*More children are exploring Lake Champlain by boat and learning valuable skills, thanks to a partnership among the Lake Champlain Maritime Museum, the Counseling Service of Addison County (VT) and Addison County district schools. Eight at-risk students from Addison County built authentic long boats at the museum and launched them this spring. The students rowed part of the lake, stopping along the way at other basin schools.*

*Students at Whitehall, NY High School are preventing pollution while learning about the Lake Champlain basin. On the Poultney River's East Bay, near the Bald Mountain Wildlife Preserve, students worked with community members to pick up trash, monitor soil and water quality, and build a nature trail.*

*These projects were funded by the Vermont and New York Citizen Advisory Committees through LCBP Partnership Program grants.*

## EMERGING ISSUES

*Opportunities for Action* was developed with the flexibility to adapt to new issues affecting the Lake Champlain basin. Since it was completed in 1996, citizens in the basin have brought several emerging issues to the attention of the LCBP, some of which are discussed below.

**Double-Crested Cormorants.** The number of double-crested cormorants nesting on islands in Lake Champlain has increased sharply in recent years. Cormorants, a protected species under the Migratory Bird Treaty Act, may impact other colonial waterbirds by crowding them out of nesting sites and destroying nesting habitat. In response, the Vermont Department of Fish and Wildlife, with a permit from the US Fish and Wildlife Service, has initiated a program to limit cormorant populations on Vermont state managed islands. These actions will protect valuable habitat of birds

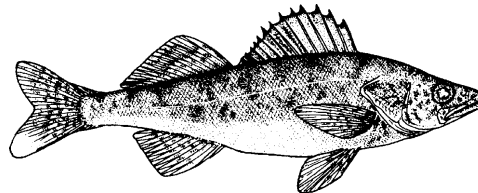
such as the endangered common tern. There is also public concern that cormorants, which are fish-eating birds, might be reducing the population of gamefish in the lake. Research conducted by the University of Vermont and High Peaks Audubon suggests that this is unlikely. The most common prey fish eaten by cormorants is the yellow perch.

**Declining Walleye Populations.** Basin citizens have voiced concern over a potential decline of walleye populations in Lake Champlain. Despite stocking programs, angler catch rates are low in many areas of the lake. A 1994 LCBP review of state walleye data concluded that further study of juvenile walleye survival was needed. In response, the LCBP supported a Lake Champlain Walleye Association study that produced valuable information on how to collect young walleye for study. In 1998, the Vermont Department of Fish and Wildlife completed plans for walleye management and restoration in Lake Champlain. Currently, the state is working with the Walleye Association and other groups to implement these plans, including conducting research to better understand walleye survival in the lake.



LCBP

Addison County youth testing the longboat they built at the Lake Champlain Maritime Museum.



Walleye

**Accelerating Phosphorus Reduction.** During the development of *Opportunities for Action*, a number of citizen groups were concerned that the 20-year timeframe for reducing phosphorus loads to the lake was too long. In response, the Governors of New York and Vermont, and the US EPA's regional administrators called for accelerating priority actions in the plan as funding allows, especially the reduction of phosphorus pollution. Discussions on accelerating the reduction timeframe have been initiated by the Lake Champlain Committee, an environmental advocacy group, along with the New York and Vermont Citizen Advisory Committees. The LCBP is currently assessing the resources that would be needed to meet the reductions targets sooner. The results of the investigation will be factored into the upcoming five-year evaluation of progress toward phosphorus reduction goals.

**Controlling Bacteria and Pathogens.** Lake Champlain's municipal beaches are routinely monitored for bacteria as an indicator for the presence of harmful pathogens, yet many other popular swimming areas are never monitored. Residents have voiced concern about high levels of bacteria in some areas. Sources of pathogens may include leaking sewers and septic systems, and pet, livestock and other animal waste in stormwater runoff. Many of the same practices that reduce the amount of phosphorus and other pollutants reaching the lake will also reduce the number of pathogens at the same time. Projects like Burlington EMPACT (see the Protecting Human Health section of this report for more information) will help inform citizens about the risks from pathogens and how to reduce them, but additional monitoring may be needed in some areas to ensure public safety.

**Controlling Urban Nonpoint Source Pollution.** Phosphorus pollution reduction efforts have been focused on agricultural areas because they are the largest nonpoint source of phosphorus to the lake. Urban land, however, contributes about 18% of the nonpoint source phosphorus load, despite comprising a much smaller part of the basin. Citizens have expressed concern that the farming community is bearing too much of the weight of nonpoint phosphorus pollution control and have called for greater emphasis on reducing phosphorus in urban stormwater, which may also contain toxic substances. The City of Burlington, the US Geological Survey and the LCBP are monitoring urban runoff in Englesby Brook as runoff controls are implemented in the coming years. Additional opportunities for urban nonpoint source control may be explored as part of the investigation into accelerating the phosphorus reduction timeframe.

***The LCBP Would Like  
to Hear From You!***

*This summer, the LCBP will be holding a series of public meetings to hear your views about implementing Opportunities for Action and on addressing emerging issues.*

*Call the LCBP at (800) 468-5227 or check our website ([www.lcbp.org](http://www.lcbp.org)) for specific dates and locations.*

## CONCLUSION

From reducing phosphorus to discovering new underwater shipwrecks on the bottom of the lake, the Lake Champlain Basin Program partners made significant progress toward implementing *Opportunities for Action* in 1998. The LCBP continued to increase local involvement and raise public awareness about basin issues. The key to sustained progress is citizen involvement and action. Adequate public funding is critical to meeting the goals in *Opportunities for Action*, especially for phosphorus reduction and cultural and recreational resource management. Emerging issues identified by basin citizens add to an already ambitious set of goals in the plan.

*Opportunities for Action* calls for updating the plan every two years. The Lake Champlain Steering Committee has decided that comprehensive evaluations and plan updates would more appropriately be accomplished in tandem with the five-year phosphorus reduction strategy milestones. Until the first milestone in fall of 2001, the LCBP will continue to produce annual implementation reports, its newsletter *Casin' the Basin*, and other reports to keep the public informed about LCBP activities and progress toward implementing *Opportunities for Action*. Cooperation among various government agencies and the active involvement of citizens and local groups has been the hallmark of the LCBP since its inception, and will continue to be so until the goals in *Opportunities for Action* are met.

Alden Pellett




Taking a break along the shores of Lake Champlain in Shelburne, VT.


## APPENDICES

**Table 5. 1998 Implementation Status of High Priority Actions in Opportunities for Action.**

Full - the action is fully implemented =    




























Substantial - progress is on schedule or action is more than 50% complete =   

Some - less than 50% completed but some progress has been made =  























Negligible - little or no progress has been made = 

### Water Quality and the Health of the Lake







#### Reducing Phosphorus Pollution

1. Identify Specific Actions by October 1, 1996 .....    
2. Focus Phosphorus Reduction Efforts on Targeted Watersheds .....  
3. Develop and Begin Implementing Phosphorus Reduction Strategies for Targeted Watersheds .....  
4. Provide Funding for Point Source Phosphorus Reductions .....   
5. Expand and Accelerate Implementation of Existing Federal Agricultural NPS Pollution Programs .....    
6. Expand Implementation of State Agricultural NPS Programs .....    
7. Promote the Implementation of Nutrient Management Plans .....   
8. Expand NRCS/FSA, USFWS, and Other Agency Cost-Sharing .....   
9. Implement Retrofitted Stormwater Management Systems & other Measures for Reducing P from Urban & Developed Land ..... 
10. Research and Demonstrate the Effectiveness of Nutrient Management Practices ..... 

#### Preventing Pollution from Toxic Substances




















1. Focus on Toxic Substances of Concern and Sites of Concern .....  
2. Develop and Implement Pollution Prevention and Control Strategies for Groups 1 and 2 Toxic Substances .....  
3. Accelerate Implementation of Pollution Prevention Programs .....   
4. Evaluate Management Alternatives for Sites of Concern .....    
5. Encourage Industries and Businesses, and Public Institutions to Implement Pollution Prevention and Recycling .....   
6. Continue Research on the Fate and Effects of Toxic Substances .....   
7. Assess the Importance of Sites of Concern as Sources of Toxic Substances .....   
8. Establish Consistent Water Quality Standards, Ecosystem Goals and Ecosystem Indicators for Toxic Substances ..... 
9. Evaluate Existing Regulatory Framework with Respect to Toxic Substance Reduction & Control ..... 

#### Protecting Human Health















1. Encourage the States and Federal Government to Provide Funds to Implement the Safe Drinking Water Act .....   
2. Investigate Areas with Potential Contamination Problems Due to Faulty Septic Systems and Devise Flexible Solutions .....  
3. Develop a Coordinated Approach to Risk Communication ..... 

### Living Natural Resources



























#### Managing Fish and Wildlife

1. Identify and Restore Habitats and Conserve Vulnerable Habitat Corridors .....   
2. Refine Current Management of Lake Champlain's Fish and Wildlife Resources to Enhance the Application of an Ecosystem Approach .....   
3. Integrate Aquatic Food Web Models into Fisheries Management Decisions .....   
4. Use Biological Indicators of Ecosystem Change .....   
5. Improve Species-by-Species Protection Strategies for Managing Threatened and Endangered Species .....  
6. Work with Landowners to Conserve, Enhance and Restore Fish and Wildlife Habitat .....   
7. Acquire Land and Easements from Willing Landowners .....  

#### Protecting Wetlands















1. Continue to Secure Funding and Implement all Four Phases of the Lake Champlain Wetlands Acquisition Strategy .....   
2. Update Wetland Inventory Maps Using Current Land Cover Data .....   
3. Expand Wetland Restoration Efforts in the Basin .....  
4. Develop Incentives for Local Municipalities and Private Landowners to Protect, Restore and Enhance Wetlands .....   
5. Promote Local Watershed Planning Efforts Throughout the Basin ....   

#### Managing Nuisance Nonnative Aquatic Plants and Animals










1. Develop and Implement a Comprehensive Management Program for Nuisance Nonnative Aquatic Species .....    
2. Continue a Sea Lamprey Control Program .....    
3. Study the Ecological Role of Nuisance Nonnative Aquatic Species .....   
4. Evaluate and Demonstrate Zebra Mussel Control Strategies .....   
5. Study the Feasibility of Barriers and Other Control Methods for Sea Lamprey .....   
6. Accelerate Water Chestnut Control Efforts .....   
7. Evaluate and Demonstrate Eurasian Watermilfoil Control Strategies .....   
8. Evaluate the Effectiveness of Biological Controls for Nuisance Nonnative Aquatic Species .....   

## Recreation and Cultural Resources

### Managing Recreation













1. Develop and Implement a Strategy to Provide New Public Access Opportunities .....   
2. Pursue Funding Alternatives for Public Access Site Enhancement .....  
3. Provide Funds to Local Governments and Non-profits to Develop Additional Public Access Sites .....   
4. Encourage New Opportunities for Recreation .....   
5. Determine and monitor the Impact of Increased Recreational Use in Ecologically Sensitive Areas ..... 
6. Evaluate the Need for Local Recreation Management Plans in other High Use Areas ..... 
7. Assist Communities Who Wish to Develop Local Recreation Management Plans ..... 

### Protecting Cultural Heritage Resources










1. Develop and Promote Locally Planned, Approved and Managed Networks of Heritage Trails and Programs around the Lake .....   
2. Develop a Stewardship Program to Strengthen Non-regulatory Protection .....   
3. Develop and Implement a Management Strategy for Lake Champlain's Underwater Historic Resources .....   

## A Strategy for Implementing the Plan







### A Framework for Carrying out Key Functions

1. Continue the Present Steering Committee and Include Additional Representatives .....    
2. Continue the Present Citizens Advisory Committees (CACs) .....    
3. Restructure and Continue the Technical Advisory Committee .....    







### Informing and Involving the Public





1. Build Awareness and Understanding of Basin Resources .....   
2. Produce Coordinated Education Programs for Students .....   
3. Provide Opportunities for Hands-on Citizen Action and Implementation of the Plan .....   

### Building Local-Level Implementation

1. Expand Technical and Financial Assistance for Watershed Planning at the Local Level .....   
2. Develop a Program to Facilitate Information Exchange among Local Watershed Associations .....  
3. Conduct Watershed Planning Demonstration Projects ..... 

### Measuring and Monitoring Success

1. Continue to Monitor Key Baseline Parameters in the Lake Champlain Basin .....    
2. Continue and Expand Monitoring Programs Essential for Particular Management Concerns .....  

3. Expand the Monitoring Program (in Action 1) to Include Indicators of Environmental Quality .....  
4. Implement the Expanded Monitoring Program as Rapidly as Possible ..... 
5. Establish a Process for Coordination and Data Sharing ..... 

**Table 6. 1998 ICBP Grant Projects.**

### Bikeways Enhancement Awards Program

- Richmond Village Bike Project  
*Town of Richmond, VT \$1,197*
- Adirondack Coast Enhancements  
*Boquet River Association, Elizabethtown, NY \$1,850*
- Cyclist's Guide to Services & Attractions  
*Cooperative Business Network, Willsboro, NY \$1,100*
- Triangle Park Renovation  
*Middlebury Business Association, Middlebury, VT \$1,100*
- Whitehall Bikeway Enhancements  
*Town of Whitehall, NY \$1,948*
- Amenities at Norma Jackson Park  
*Essex Community Heritage Organization, Essex, NY \$1,793*
- Bicycle-Friendly Enhancements  
*Lake Champlain Maritime Museum, Vergennes, VT \$875*
- Port Kent Ferry Shelter Bicycle Benches  
*Chesterfield, NY \$717*
- Natural Interpretation Signs  
*South Hero, VT \$660*
- Missisquoi Valley Rail Trail Bike Racks  
*NW Rail Trail Council, St. Albans, VT \$2,000*
- Islands Theme loop Interpretive Guide  
*NW Regional Planning Commission, St. Albans, VT \$1,760*

### Local Implementation Projects

- VYCC Watershed Restoration Crews  
*Vermont Youth Conservation Corps, \$10,000*
- Ausable River Association Implementation  
*Cornell Cooperative Extension, \$36,000*
- Control of Nonpoint Source Pollution from Local Roads  
*Boquet River Association, \$25,000*
- Missisquoi Basin Streambank Restoration Initiative  
*Missisquoi River Basin Association, \$16,250*
- Enhanced Water Quality in Rutland County Lakes and Streams  
*Rutland Natural Resources Conservation District, \$21,400*
- Streambank Stabilization and Habitat Enhancement (Browns River)  
*Trout Unlimited, Central Vermont Chapter, \$1,337*

## Partnership Program

- Land for Learning  
*Moriah Central School \$4,000*
- The Vermont Guidebook: Touring Vermont's Oldest City  
*City of Verennes \$2,800*
- Final Intervale Land Restoration  
*Intervale Foundation \$2,500*
- Saranac Lake River Corridor Commission Riverbank Stabilization  
*Village of Saranac Lake - River Corridor Commission \$5,000*
- Addison County Riverwatch Collaborative  
*Otter Creek Audubon Society \$2,000*
- Missisquoi River Dynamics/Canoe Course  
*Arvin A. Brown Public Library \$500*
- Field Barn Stabilization  
*The Nature Conservancy \$5,000*
- Youth Corps State Park Improvements  
*Vermont Youth Conservation Corps \$2,500*
- The Winooski Mills: Economic, Social & Ecological Impact  
*Heritage Winooski \$4500*
- Northern Lake Champlain Endangered & Threatened Species  
*Green Mountain Audubon Society \$4,200*
- Mentors in the Champlain Basin  
*Vermont Museum & Gallery Alliance \$3,000*
- Boat-building/Sailing Program for Youth at Risk  
*Lake Champlain Maritime Museum \$2,500*
- Historic Monitor Barns Project  
*Richmond Land Trust \$4,800*
- Burlington Guidelines for Stormwater Pollutant Reduction  
*Burlington Conservation Board \$4,000*
- Gilleland History/Nature Foot & Canoe Trail  
*Boquet River Association \$2,000*
- Otter Creek Heritage Corridor  
*University of Vermont \$3,000*
- Coon Mountain Preserve/Split Rock Link  
*Adirondack Nature Conservancy & Adirondack Land Trust \$5,000*
- B.A.C.S.T.O.P. Summer '98  
*Village of Whitehall, NY \$3,000*
- East Bay (Poultney River) Watershed Improvement  
*Whitehall Jr./Sr High School \$1,500*
- Adopt-a-Salmon Family  
*Lake Champlain Chapter of Trout Unlimited \$1,200*
- Lake Champlain Bilingual Boating Publication  
*Lake Champlain Committee \$5,000*
- Lake Champlain Paddler's Trail Outreach Project  
*Lake Champlain Committee \$2,000*

## Pollution Prevention Projects

- Mercury Reduction and Pollution Prevention for the Dental Community  
*NWF, Northeast Natural Resource Center, \$15,098*
- Pollution Prevention Training in New York  
*Cornell Cooperative Extension, Clinton County, NY, \$19,615*

## Public Access Enhancement Awards Program

- Ice Storm Clean-up on Split Rock Mtn.  
*Boquet River Association, Elizabethtown, NY \$3,000*
- Lee Park Beach Enhancements  
*Town of Westport, NY \$1,000*
- Falls Park Enhancements  
*City of Vergennes, VT \$2,500*
- Canoe/Kayak Launch Improvements  
*Winooski Valley Park District, Burlington, VT \$3,000*
- Marycrest Beach Parking Area Dev.  
*Town of Grand Isle, VT \$8,300*
- Ticonderoga Boat Launch Dock  
*Town of Ticonderoga, NY \$3,000*
- Preservation of Rock Island  
*Lake Champlain Land Trust, Burlington, VT \$5,000*
- Burlington Waterfront Interpretive Signs  
*Burlington Business Association, Burlington, VT \$4,200*

## Technical Assistance Program

- Hire Sid Couchey to Illustrate Guide to Lake Champlain Lighthouses  
*Cumberland Head Tomorrow, Plattsburgh, NY \$750*
- Interpretive Trail Guide for Poke-O-Moonshine Mountain  
*Friends of Poke-O-Moonshine, Keeseville, NY \$750*
- Conditions Assessment  
*Keene Valley Library Association, Keene Valley, NY \$750*
- Guided Trails Walk  
*Rokeby Museum, Ferrisburgh, VT \$739.86*
- Addison County Oral History Project  
*Sheldon Museum, Middlebury, VT \$220*
- Point Au Roche Lighthouse Engineering Assessment  
*Town of Beekmantown, NY \$750*
- Vermont Preservation Conference Brochure - Graphic Designer  
*Preservation Trust of Vermont \$200*
- Consultant for Caring for the House of Worship Workshop  
*AARCH, Keeseville, NY \$500*
- Archaeological Investigation of Submerged Sites in Greater Saranac Lake  
*Lake Champlain Maritime Museum \$750*
- Conditions Assessment  
*Wells Memorial Library, Upper Jay, NY \$1,000*
- Museum Consultant  
*Historical Society of Bolton, Bolton, NY \$750*
- Printing of Poster for Vermont Archaeology Week  
*Vermont Archaeological Society \$750*
- National Register Nomination of Georgia Schoolhouse  
*Georgia Historical Society, Georgia, VT \$750*
- Otter Creek Heritage Corridor  
*University of Vermont, Burlington, VT \$1,000*
- South Main Street National Register Nomination  
*Westport Historical Society, Westport, NY \$750*

- Preserving Historic Timber Dams  
*VT Division for Historic Preservation, Montpelier, VT \$1,000*
- Ballard Park Performance Space Design  
*Ballard Park Foundation, Westport, NY \$1,000*

## Watershed Education Projects

- Portable Models of How Streams Behave  
*Boquet River Association, \$9,942*
- Environmental Chemistry Outreach  
*Chazy Central School and Miner Institute, \$4,558*
- State of the Winooski Basin  
*Winooski Valley Park District, \$4,000*
- Outstanding Geologic Sites  
*SUNY Center for Earth and Environmental Sciences, \$4,000*
- Potash Brook Watershed Project  
*Potash Brook Group working w/ South Burlington H.S., \$5,000*
- Ecosystem Exposition  
*Poultney-Mettowee NRCD, \$3,500*
- Winter Outreach Program  
*Lake Champlain Maritime Museum \$10,000*
- A Sense of Place, Experiencing the Lake Champlain Basin  
*Ticonderoga Historical Society \$9,000*

*Note: New York Clean Water/Air Bond Act and Environmental Protection Fund projects were also awarded in the basin. Contact Joe Racette, NY Department of Environmental Conservation for more information: (518) 897-1271.*