

Lake Champlain Basin Aquatic Nuisance Species Management Plan

Coordinated by:

Lake Champlain Basin Program
Vermont Department of Environmental Conservation
New York State Department of Environmental Conservation

Developed in Cooperation with:

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Adirondack Park Invasive Plant Program
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I. Executive Summary

Lake Champlain is one of the largest freshwater lakes in the United States, with 435 square miles of surface water, more than 70 islands, and 587 miles of shoreline. It is 12 miles wide at its broadest point and reaches depths of more than 400 feet. The Lake flows from Whitehall, New York north almost 120 miles across the U.S.-Canadian border to its outlet at the Richelieu River in Quebec. The Lake's watershed, known as the Lake Champlain Basin, encompasses an area of 8,234 square miles in New York, Vermont, and Quebec, Canada and includes hundreds of lakes and ponds and 34 major tributaries.

An aquatic nuisance species (ANS), as defined by the *Nonindigenous Aquatic Nuisance Prevention and Control Act* of 1990, is “a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters.” Within the Lake Champlain Basin, dozens of plant and animal species fit this definition. Eurasian watermilfoil and water chestnut, two nonindigenous plant species, crowd out native species and impede recreational activities, such as fishing, boating and swimming, by forming dense monotypic stands. Purple loosestrife, a nonindigenous wetland plant, continues to spread throughout the Basin, displacing native species and threatening the diversity and stability of wetlands. Sea lamprey have limited the potential of native trout and salmon fisheries within Lake Champlain while zebra mussels are displacing the Lake's native mussel species and are encrusting boats, historic shipwrecks, popular swimming areas, and water intake lines. Hundreds of thousands of dollars are spent each year within the Lake Champlain Basin to manage ANS and mitigate their impacts. Countless other nonindigenous plant and animal species such as hydrilla, quagga mussel, and Eurasian ruffe threaten to enter the Basin from neighboring waters.

The *Lake Champlain Basin ANS Management Plan* facilitates the coordination of ANS management efforts throughout the Lake Champlain Basin. It also provides opportunities for federal cost sharing support for such efforts under the *Nonindigenous Aquatic Nuisance Prevention and Control Act* as amended by the *National Invasive Species Act* of 1996. Additionally, the *Lake Champlain Basin ANS Management Plan* implements a key section of *Opportunities For Action; An Evolving Plan for the Future of the Lake Champlain Basin*, which was originally completed and signed by the Governors of Vermont and New York and representatives of the Environmental Protection Agency in 1996 and revised in 2003. Both the original and revised *Opportunities for Action* plans identify the development and implementation of a comprehensive management program for nuisance nonnative aquatic species as one of the highest priority actions required to address the long-term health of the Lake Champlain Basin.

The Goals of the *Lake Champlain Basin ANS Management Plan* are to:

- I. Prevent new introductions of ANS into waters of the Lake Champlain Basin;
- II. Limit the spread of established populations of ANS into uninfested waters of the Lake Champlain Basin; and
- III. Abate harmful ecological, socioeconomic, and public health and safety impacts resulting from infestations of ANS within the Lake Champlain Basin.

The original and revised ANS Management Plans were developed by a team of staff from the Lake Champlain Basin Program, the Vermont Department of Environmental Conservation and the New York State Department of Environmental Conservation with guidance from a Review Committee consisting of representatives of state and federal agencies, nonprofit organizations, and the research community, from New York, Vermont, and the province of Quebec.

The Plan identifies priority Actions to be implemented within the first two years after Plan approval. Many of the Actions in the original 2000 Plan remain high priorities in 2004. Several new Actions, however, were included in the 2004 revision. Some of these include: 1. Develop and maintain an ANS Advisory Committee to guide Plan implementation and set priorities on a regular basis; 2. Continue to strengthen the newly-established Adirondack Park Invasive Plant Program; and 3. Determine the population status of alewives in Lake Champlain. These new Actions represent a few of the newly emerging issues and programs within the Lake Champlain Basin since the original Plan was developed and approved in 2000. The Plan will continue to be reviewed and new Actions will be identified as new priorities become established.

II. Introduction

The Lake Champlain Basin Aquatic Nuisance Species (ANS) Management Plan facilitates the coordination of aquatic nuisance species management efforts throughout the Lake Champlain Basin. It also provides opportunities for federal cost sharing support for such efforts under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (P.L. 101-646) (NANPCA) as amended by the National Invasive Species Act of 1996 (NISA) (Appendix A).

Section 1204 of NANPCA requires that the management plan identify “those areas or activities within the State, or within the interstate region involved, other than those related to public facilities, for which technical, enforcement, or financial assistance (or any combination thereof) is needed to eliminate or reduce the environmental, public health, and safety risks associated with aquatic nuisance species, particularly the zebra mussel.”

The *Lake Champlain Basin ANS Management Plan* implements a key section of *Opportunities For Action; An Evolving Plan for the Future of the Lake Champlain Basin* (OFA) (Appendix B). OFA, completed in 1996 and revised in 2003, was developed under the national Lake Champlain Special Designation Act of 1990 (Appendix C). It contains recommended actions to protect and restore the ecological and cultural resources of the Basin while maintaining a vital economy for the region. Based on extensive public and technical input, four action areas are designated as the highest priorities within OFA and the most important for addressing the long-term health of the Lake Champlain Basin. The development and implementation of a comprehensive management plan for nuisance nonnative aquatic species is one of these four highest priorities. More information about the development of OFA is provided in Appendix B.

The *Lake Champlain Basin ANS Management Plan* includes the actions specifically identified as priorities in OFA. It also includes many additional actions considered priorities by resource

managers throughout the Basin. The ANS Plan will continue to be reviewed on a regular basis and new Actions will be identified as new priorities become established.

The *Lake Champlain Basin ANS Management Plan* will also assist with fulfilling objectives of the New York State ANS Management Plan approved by the national ANS Task Force in 1994. The New York plan developed general strategies for preventing the introduction and spread of ANS and for mitigating ANS impacts throughout the state of New York. The Lake Champlain Basin ANS Management Plan identifies specific actions that must be taken to execute those strategies within the Lake Champlain Basin region of New York. A plan to address ANS issues outside of the Lake Champlain Basin of Vermont will be developed in the near future.

The Lake Champlain Basin

Lake Champlain is one of the largest freshwater lakes in the United States, with 435 square miles of surface water, more than 70 islands, and 587 miles of shoreline. It is 12 miles wide at its broadest point and reaches depths of more than 400 feet. The Lake flows from Whitehall, New York north almost 120 miles across the U.S.-Canadian border to its outlet at the Richelieu River in Quebec. From there, the water enters the St. Lawrence River, which eventually drains into the Atlantic Ocean at the Gulf of St. Lawrence. The Champlain Canal System connects the southern end of the Lake to the Hudson River. For much of its length, Lake Champlain defines the state border between Vermont and New York (see Figure 1).

The Lake's watershed, known as the Lake Champlain Basin, encompasses an area of 8,234 square miles extending from the High Peaks of the Adirondacks to the west, the Green Mountains to the east, the Taconic Mountains to the southeast, and the St. Lawrence Valley to the north. The Basin encompasses hundreds of lakes and ponds and includes 34 major tributaries which drain sub-basins of greater than 10 square miles in size. Fifty-six percent of the Basin is in Vermont, 37% is in New York, and 7% is in Quebec, Canada (see Figure 2).

Plan Justification

An aquatic nuisance species, as defined by *NANPCA*, is a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters. Within the Lake Champlain Basin, dozens of nonindigenous plant and animal species fit this definition. For example, Eurasian watermilfoil and water chestnut, two nonindigenous plant species, crowd out native species and impede recreational activities, such as fishing, boating and swimming by forming dense monotypic stands. Purple loosestrife, a nonindigenous wetland plant, continues to spread throughout the Basin, displacing native species and threatening the diversity and stability of wetlands. Sea lamprey have severely limited the potential of native trout

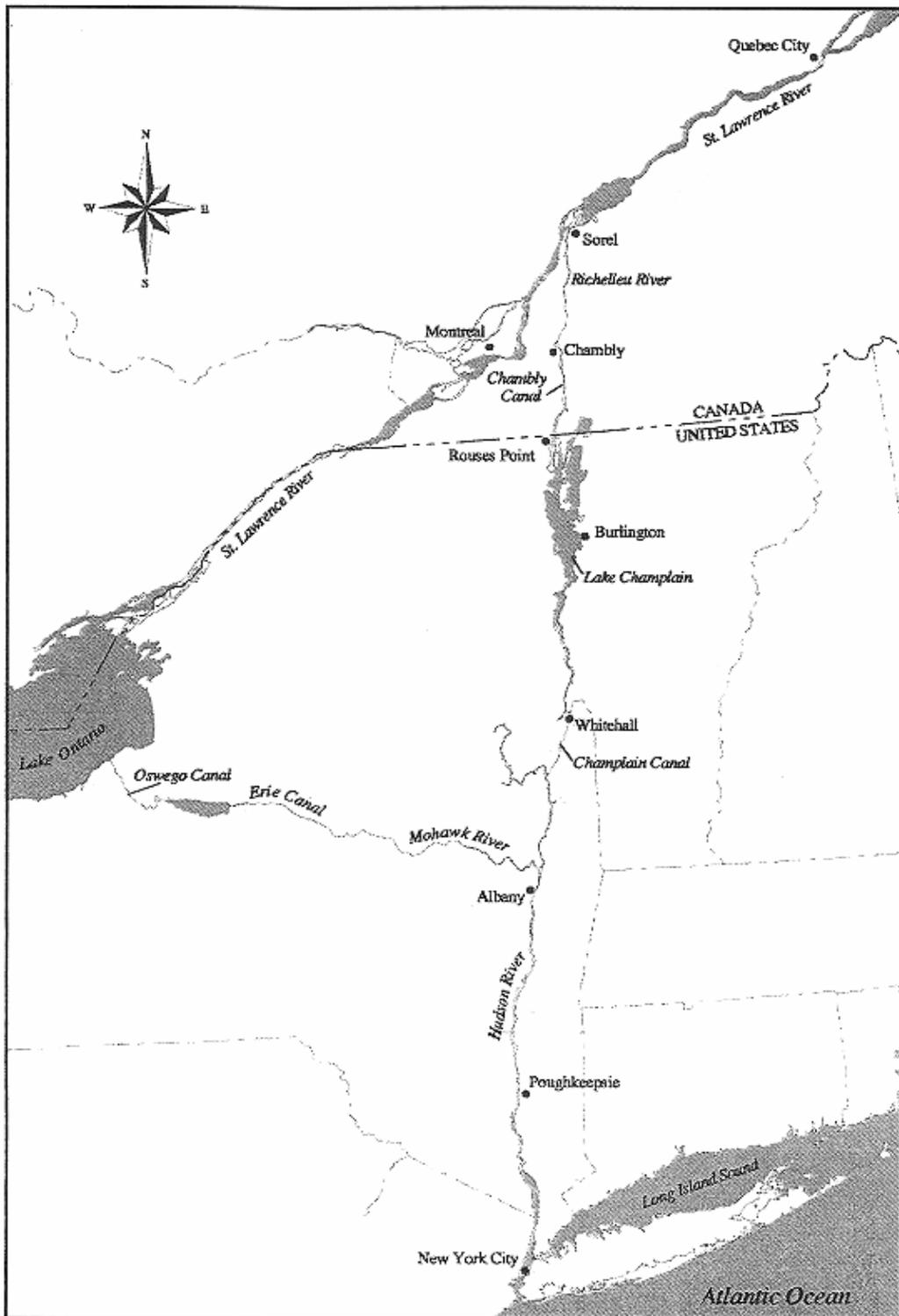


Figure 1. Waterways from New York City to Montreal

(From the *Cruising Guide to Lake Champlain, The Waterway from New York City to Montreal* reprinted with permission of the Lake Champlain Publishing Company)

and salmon fisheries within Lake Champlain while zebra mussels are displacing the Lake's native mussel species. Zebra mussels also negatively impact recreational activities by encrusting boats, historic shipwrecks, and popular swimming areas. Additionally, zebra mussels threaten municipal and commercial facilities and private homes that draw water from Lake Champlain and other infested bodies of water by encrusting water intake lines and other equipment. Hundreds of thousands of dollars are spent each year within the Lake Champlain Basin to manage ANS and mitigate their impacts.

Public health and safety is also a concern. Zebra mussels, for example, can potentially facilitate the cycling of heavy metals and other toxins into aquatic food webs ultimately resulting in increased exposure to humans. Preferential feeding by zebra mussels may also result in greater concentrations of the toxic blue-green algae, *Microcystis* sp. Additionally, zebra mussel shells have sharp edges and easily cut people who come into contact with them in swimming areas.

If populations of aquatic nuisance species are left unchecked or additional nonindigenous species enter the Basin, current levels of impact will increase. The *Lake Champlain Basin ANS Management Plan* provides guidance on management actions to prevent, control, and limit the impacts of ANS that have invaded or may invade the Lake Champlain Basin.

Plan Development

The original and revised *Lake Champlain Basin ANS Management Plans* were developed by a team of staff from the Lake Champlain Basin Program (LCBP), the Vermont Department of Environmental Conservation (VTDEC), and the New York State Department of Environmental Conservation (NYSDEC) with guidance from a Review Committee consisting of representatives of state and federal agencies, lake groups, and the research community from New York, Vermont, and the province of Quebec (Appendix D). A draft of the original Plan was made available for public review in July 1999 for a period of 45 days. In addition to accepting comments by mail, comments were received at four public meetings held by LCBP in New York and Vermont to review the status of OFA implementation. Comments received were incorporated into the final draft of the 2000 *ANS Management Plan*. A list of comments received on the original Plan and responses are listed in Appendix E.

The revised *ANS Management Plan* identifies priority Actions to be implemented within the first two years after Plan approval by the National ANS Task Force. Many of the Actions in the original 2000 Plan remain high priorities in 2004. Several new Actions, however, are included in the 2004 revision. Some of these include: 1. Develop and maintain an ANS Advisory Committee to guide Plan implementation and set priorities on a regular basis; 2. Continue to strengthen the newly-established Adirondack Park Invasive Plant Program; and 3. Determine the population status of alewives in Lake Champlain. These new Actions represent a few of the newly emerging issues and programs within the Lake Champlain Basin since the original Plan was developed and approved in May 2000.

This revised *Lake Champlain Basin ANS Management Plan* is the guiding document for a continually evolving coordinated program to manage aquatic nuisance species within the Lake Champlain Basin. Establishing a Lake Champlain Basin ANS Advisory Committee, a new priority Action in the Plan, will further strengthen coordination of the Plan implementation, while providing a more formal mechanism for evaluating priority actions on a regular basis and for coordinating future iterations of this Plan.

Goals

The following three goals of the Lake Champlain Basin ANS Management Plan are consistent with those established by other state and interstate ANS management plans submitted to the national ANS Task Force, as well as those of OFA. Education and outreach is as an integral part of all three:

- I. Prevent new introductions of ANS into waters of the Lake Champlain Basin.
- II. Limit the spread of established populations of ANS into uninfested waters of the Lake Champlain Basin.
- III. Abate harmful ecological, socioeconomic, and public health and safety impacts resulting from infestations of ANS within the Lake Champlain Basin.

Evaluation and Review

The Lake Champlain ANS Advisory Committee will oversee implementation of specific priority actions and overall evaluation of this Plan two years from its completion. Information provided by research and monitoring activities, input from groups impacted by management activities, and funding needs will be used to revise Actions and identify future priorities.

III. Aquatic Nuisance Species Problems and Concerns in the Lake Champlain Basin

At least four dozen non-native species have been introduced into waters of the Lake Champlain Basin (Basin). Many of these species have dispersed and are at nuisance levels, causing substantial environmental and economic impacts. These are considered to be aquatic nuisance species (ANS). Other ANS are expanding their ranges in adjacent regions and threaten to enter the Basin. If introduced, many of these new species would likely cause additional negative impacts and further strain limited management resources.

Historically, attention to the ANS problem within the Lake Champlain Basin has been largely reactionary. Resource managers have generally focused on addressing problems associated with specific ANS already introduced and only after the ANS populations reach nuisance proportions. Similarly, it was only after reaching nuisance proportions that ANS problems attracted significant attention from the public. Only minimal efforts were given to preventing the

introduction of new ANS to the Basin, and those efforts were generally not well coordinated with similar efforts outside of the Basin.

The potential pathways of introduction for ANS into and around the Lake Champlain Basin are numerous. The movement of boats and other aquatic equipment is the most visible and readily recognized pathway, but aquarium dumping, improper disposal of live bait, accidental releases from cultivation, and intentional introductions all play a role. Natural and artificial waterways also serve as conduits for ANS into the Lake Champlain Basin. The Champlain Barge Canal connects the southern end of Lake Champlain to the Hudson-Mohawk watershed, which is, in turn, connected to the Great Lakes drainage basin by the Erie Canal System. The Champlain Barge Canal likely provided access for numerous ANS into the Basin, including zebra mussels, blueback herring, water chestnut, flowering rush, purple loosestrife, white perch, and mud bythnia. The Richelieu River, which flows out of the northern end of Lake Champlain and ultimately into the St. Lawrence River, has a similar potential to move nonindigenous species into and out of the Lake Champlain Basin. For example, tench likely entered Lake Champlain via this waterway. Some preliminary work has been done to identify potential management options for the Champlain Barge Canal, but a great deal more work and funding will be required to eliminate the threat of ANS introductions from the Canal.

There is a lack of knowledge concerning the presence and extent of many ANS found in the Lake Champlain Basin, and little is known about their population biology or their impact on indigenous species, habitats, and foodwebs. Obtaining this type of technical information through surveys and monitoring programs is essential to formulate effective and efficient management strategies. While programs exist within the Lake Champlain Basin that produce some of this information, the programs need improved coordination and the results regular integration to maximize their usefulness. Existing programs should be reviewed continually and modified as needed; new programs should be implemented as necessary to fill information gaps. This information should then be used to determine future management strategies and priorities.

Resource managers throughout the Basin generally agree that ANS spread prevention efforts should emphasize public outreach and voluntary compliance with established ANS spread prevention guidelines. Compliance with such guidelines appears to be relatively high within the Basin; the small percentage of the public who do not comply, however, pose a significant risk to the economic and ecological integrity of the Basin's waters. Where necessary laws exist, active enforcement has been minimal. Vermont has recently established or revised rules that give the State's resource managers considerable legal authority in preventing the introduction and spread of ANS. For example, in recent years, there has been active enforcement of Vermont's ANS transport law. ANS laws, however, continue to vary significantly among jurisdictions within the Basin as well as with neighboring jurisdictions. This produces many "holes" through which introductions can occur and it makes it difficult to present a consistent Basin-wide public message about ANS spread prevention.

Since this management plan was originally completed in 2000, there has been additional progress made in addressing many of the above areas of concern. Lakeshore residents and other members of the general public are becoming more actively involved in ANS monitoring, spread prevention, and management activities. Vermont has doubled the annual awards to towns and

lake groups for ANS management and spread prevention efforts. The Adirondack Park Invasive Plant Program has substantially increased the number of citizens it trains and the number of waterbodies it monitors for ANS. The Northeast Aquatic Nuisance Species Regional Panel has facilitated information sharing among resource managers throughout the region and regional coordination of outreach efforts has improved considerably. Greater efforts are being directed at preventing the introduction of new species, such as hydrilla, and in addressing other potential pathways of introduction, such as fishing tournaments and aquarium dumping. The water chestnut management program on Lake Champlain has reduced much of the former range of the plant to below nuisance levels. Rapid response development for the Lake Champlain Basin is also underway.

Unfortunately, limited funding continues to restrict the scope and extent of much of the ANS work within the Basin. At the same time, ANS continue to spread within the Basin and new challenges from an ever-growing world-wide ANS problem continue to mount.

Priority ANS of Concern

For this 2004 revision of the *Lake Champlain Basin ANS Management Plan*, thirteen species are designated as priority species of concern. In developing this list, the Plan Review Committee, as well as the LCBP's Technical Advisory Committee and other resource managers throughout the Basin, considered the severity of existing impacts, the programmatic authority and scientific capability to resolve the problem, the cost of management or prevention alternatives, the existence of established management or prevention programs, the potential for species to expand their range within the Basin and cause greater impacts, and the potential for species to enter the region and cause substantial impacts if introduced.

Seven of the thirteen priority aquatic nuisance species are presently in the Basin. These species include: purple loosestrife, water chestnut, Eurasian watermilfoil, Japanese knotweed, zebra mussels, sea lamprey, and alewife. Most of these are causing significant negative ecological and economic impacts and have a high potential of expanding their ranges throughout the Basin, causing even greater impacts. Management activities, including education and outreach efforts, are ongoing for each of these species.

The remaining six priority species are not known to occur in the Basin at this time. These include: hydrilla, an aggressive aquatic plant, quagga mussel, a relative of the zebra mussel, Eurasian ruffe and Round goby, two prolific fish species, and fishhook and spiny waterflea, two species of zooplankton, all occur in adjacent regions and have the potential to enter the Basin. These species have caused significant negative impacts elsewhere and would likely do so in the Lake Champlain Basin. Spread prevention, including public education, is an ongoing high priority in order to keep these highly invasive species out of the Basin.

Following are descriptions of each of the thirteen high priority species of concern:

Within the Lake Champlain Basin

Purple loosestrife (*Lythrum salicaria*)

Purple loosestrife, a perennial, wetland plant that spreads readily by seed has been locally common in marshes bordering Lake Champlain since at least 1929 (Muenscher, 1930). A native to Europe and Asia it likely advanced into Lake Champlain from the NY State Barge Canal where it had become established by the turn of the 19th century (Thompson et. al., 1987). Accidental releases from ornamental stocks and transport in raw wool or on sheep may have also facilitated its spread into the Basin. Purple loosestrife now occurs in more than 171 towns in Vermont (Copans and Garrity, 2003) and in an unknown, but considerable, amount of wetlands within the Lake Champlain Basin of New York and Quebec. Purple loosestrife out-competes cattails and other native wetland plants and provides unsuitable habitat for a wide range of native wetland animals.

In 1996, the VTDEC also began a program to reduce purple loosestrife populations in wetlands throughout Vermont using two species of leaf eating beetles (*Galerucella californiensis* and *G. pusilla*). More than 318,000 beetles have been and released into 101 sites throughout the state. By 2003, fifteen percent of the sites, or nearly 122 acres of purple loosestrife, have been defoliated. However, purple loosestrife continues to spread faster than the beetles can control it (Copans and Garrity, 2003). The total cost of the program to date is approximately \$200,000.

The United States Fish and Wildlife Service conducted chemical controls for purple loosestrife in the Missisquoi National Wildlife Refuge on the northeast end of Lake Champlain between 1986 and 1991. Since that time the USFWS has periodically released *Galerucella* beetles to control purple loosestrife in the Refuge.

A researcher at SUNY-Plattsburgh, has initiated a purple loosestrife biocontrol program in cooperation with Cornell Cooperative Extension, the Boquet River Association, and Master Gardener volunteers. They have released beetles at four sites in New York: Elizabethtown, Peru, Plattsburgh, and Wadhams. Staff and volunteers are conducting a 5-year post-release monitoring program to evaluate the effectiveness of the biocontrol program.

Eurasian watermilfoil (*Myriophyllum spicatum*)

Eurasian watermilfoil, a perennial, submersed aquatic plant native to Europe, Asia, and parts of Africa, was first discovered in New England in 1962 when it was reported in St. Albans Bay of Lake Champlain (Countryman, 1975). Now widely distributed throughout North America, the aquarium trade likely played a role in its initial introduction and spread (Couch and Nelson 1985). A 1976 survey of Lake Champlain showed Eurasian watermilfoil present in all areas of the Lake and estimated that several thousand acres of the Lake were infested. (Countryman, 1978). Eurasian watermilfoil continues to occupy an extensive range throughout the Lake and it infests at least 40 other bodies of water throughout the Lake Champlain Basin. New infestations of Eurasian watermilfoil are discovered nearly every year. Fragments attached to trailered boats are the likely cause of these overland introductions. Eurasian watermilfoil can proliferate in high densities in lakes causing impairments to water recreation such as boating, fishing and swimming

and a reduction in native species. The establishment of Eurasian watermilfoil in Lake George, New York significantly reduced the number of native plant species in just two years (Madsen et al, 1991).

Numerous Eurasian watermilfoil control technologies have been employed within the Lake Champlain Basin including bottom barriers, suction harvesting, mechanical harvesting, hand-pulling, lake drawdowns, hydroraking, and biological controls. Several chemicals have been used to control Eurasian watermilfoil in bodies of water within New York and as of 2004, SONAR A.S. (active ingredient fluridone) has been applied to 5 lakes and ponds in Vermont. In most cases, chemical controls are used in combination with several other methods as part of a lake's comprehensive, long-term management program.

The use of two aquatic insects as biological controls on Eurasian watermilfoil is being explored in the Basin. One of these insects is the non-native aquatic macrophyte moth, *Acentria ephemerella*. During 2000 and 2001, approximately 30,000 moths were released into various milfoil beds in Lincoln Pond, Elizabethtown, New York. None of these introductions appear to have significantly changed the background levels of moths in Lincoln Pond nor to have had a significant impact on milfoil in the Pond, although there was one documented decrease in milfoil in one mid-lake plot following augmentation. Fish predation on the moths is a likely cause for their lack of survival.

The other aquatic insect currently under consideration is the native weevil, *Euhrychiopsis lecontei*. In 1990, the VTDEC, through a \$500,000 grant from the US Environmental Protection Agency's Clean Lakes Program, initiated research to investigate the potential of the weevil to control Eurasian watermilfoil. Researchers from Middlebury College working on the project were able to demonstrate under laboratory and controlled field conditions that the weevils were effective at significantly reducing Eurasian watermilfoil biomass. Results were mixed, however, when open water field introductions were conducted. The VTDEC and Middlebury College reared and released more than 100,000 weevils into eight Vermont lakes between 1993 and 1997. At the sites where quantitative samples were collected, there were no significant declines that could be attributed to the weevils. It is not known whether augmenting the sites with higher numbers of weevils would have resulted in a more successful treatment. Currently, both weevils and moths are being used for Eurasian watermilfoil control on only a limited basis within the Basin.

The expense of Eurasian watermilfoil control programs can reach millions of dollars to implement successfully. For example, since 1982, more than \$4.1 million of federal, state, and local funds (excluding salaries and administrative costs) and thousands of volunteer hours have been spent to control Eurasian watermilfoil populations in the State of Vermont. In one lake alone, the Upper Saranac Lake of New York, the cost of a three-year Eurasian watermilfoil control program initiated in 2004 will total \$1.5 million.

Japanese knotweed (*Fallopia japonica*)

Japanese knotweed, a semi-woody perennial plant, was likely introduced to the United States from eastern Asia as an ornamental in the late 1800s. While technically a terrestrial species, Japanese knotweed is commonly found around water sources and has become a dominant species along substantial stretches of rivers and streams throughout much of the Lake Champlain Basin. It also invades wetland areas (Shaw and Seiger, 2002). It spreads quickly, forming dense thickets

in early spring that prevent the growth of native species and are of little value to wildlife. Annual die off of the plant leaves river and stream banks vulnerable to erosion. The plant's spread is facilitated by flooding and the downstream flow of rivers. Japanese knotweed is a difficult plant to control due to its ability to reproduce both vegetatively and from seeds. Mechanical and chemical methods are most commonly used to eliminate it. Single young plants can sometimes be pulled by hand, but all roots and runners must be removed to prevent re-sprouting. The application of an herbicide to freshly cut stems has proven effective. The Adirondack Park Invasive Plant Program is coordinating a Japanese knotweed management program within the Adirondack Park.

Water chestnut (*Trapa natans*)

Water chestnut, an annual aquatic plant native of Europe, Asia, and Africa was first documented in Lake Champlain in the early 1940s in shallow bays in the southern end on both the Vermont and New York shores. It is generally assumed that water chestnut seeds hitchhiked to Lake Champlain on boats traveling through the Champlain Barge Canal from the Mohawk or Hudson River where it had been previously established (Countryman, 1970). Water chestnut displaces other aquatic plant species, is of little food value to wildlife, and forms dense mats that alter habitat and interfere with recreational activities. Currently, extensive growth of water chestnut in southern Lake Champlain severely restricts boat traffic and other recreational uses. Populations of water chestnut also exist in several inland lakes in the southern portion of Vermont. In 1998, the first population found in Quebec, Canada was located in the South River approximately 9 miles northwest of Missisquoi Bay, Lake Champlain (Bove, et.al., 2002). Plants have since been found in the Richelieu River and Pike River, Quebec (Hunt and Crawford, 2003).

Several water chestnut control technologies have been employed within the Lake Champlain Basin including mechanical harvesting and hand-pulling. Chemical controls have generally not been used in the past 25 years. Mechanical harvesting has been the main water chestnut control method. A demonstration project to investigate mechanical cutting with an airboat, a new method which cuts but does not collect cut plants, was initiated on Lake Champlain in 1994. An evaluation of the mechanical cutting showed that although the method is less costly and faster than conventional harvesting, cut water chestnut plants not removed are able to continue to mature and set seed. Based on this information, the use of mechanical cutting has been reduced due to concern over its potential to spread water chestnut.

Since its introduction in the 1940s, the water chestnut population in Lake Champlain has reached nuisance proportions on several occasions. In 1960, the Lake Champlain water chestnut population inhabited a 20 mile range in the extreme southern portion of the Lake. By 1967, a management program, which primarily involved hand-pulling, virtually eliminated the plant from the Lake. (The plant dies back annually and its populations can be effectively controlled if adequate harvesting is performed each year before seeds drop to the lake bottom.) Hand-pulling efforts were discontinued in 1971 and, by 1981, the population had rebounded. Mechanical harvesting of the Lake Champlain water chestnut population began in 1982. Between 1982 and 1990, a total of \$1.7 million was spent on water chestnut management in the Lake, an average annual expenditure of \$177,000. By 1990, the population, which at its peak covered between 200-300 acres over a range of 34 miles, was reduced by approximately 120 acres to a range of 20 miles. Between 1991 and 1996, the average annual expenditure was reduced to \$74,000 and the

water chestnut population spread to a range of 54 miles. In 1997, annual expenditures for water chestnut management began to increase and have been close to \$500,000 for each of the last several years. Total expenditures in state and federal funds for water chestnut management on Lake Champlain between 1982 and 2003 were more than \$5.2 million.

Additionally, the Vermont Field Office of The Nature Conservancy (TNC) has been managing ANS with volunteers for a number of years. In 1998 TNC and the VTDEC formed a partnership to manage water chestnut on both Conservancy and non-Conservancy lands. Between 1998 and 2003, hundreds of volunteers have contributed over 7,000 hours of hand-pulling and removed an estimated 207 tons of water chestnut plants from sites in Vermont and New York.

Sea lamprey (*Petromyzon marinus*)

The sea lamprey is a parasitic fish that weakens or kills other fish by attaching to them and feeding on their body fluids. It was generally accepted that sea lamprey entered Lake Champlain through the Champlain Barge Canal. Daniels (2001), however, reviewed the history of the region's canals and suggests that canals may not have been routes for invasion. In addition, current genetic research pending publication provides further evidence that sea lamprey may be native to Lake Champlain. The native status of this species and its associated management programs will likely be re-evaluated for the next revision of this Plan. Nonetheless, the Lake's population of sea lamprey has been at nuisance levels for many years and has caused substantial economic losses to recreational fisheries. During the 1970s, sea lamprey became a noticeable problem when Vermont and New York state biologists attempted to reintroduce landlocked salmon and lake trout to the Lake. Attacks by adult sea lamprey on salmon, lake trout, and other fish species limited the full development of a Lake Champlain fishery, and restricted recreational and associated economic opportunities.

Between 1990 and 1998, the USFWS, NYSDEC, and VTANR conducted an experimental sea lamprey control program to reduce the sea lamprey population in Lake Champlain. Thirteen tributaries to Lake Champlain and five delta areas where larval lamprey populations are known to be concentrated were treated with a chemical lampricide. During the experimental program, the number of lamprey wounds per 100 fish was reduced, which encouraged USFWS, NYSDEC, and VTANR to continue sea lamprey control using an integrated pest-management approach. Sea lamprey populations are surveyed yearly and controlled through trapping, barriers, and selective lampricide application. Alternative and additional control methods are under development and planned for future inclusion in the integrated control program. As lamprey control efforts become more focused and comprehensive in the Lake Champlain Basin, sea lamprey populations are expected to diminish to acceptable levels and allow fish stocks an opportunity to reestablish themselves.

Two sea lamprey barrier dams have been installed on Lake Champlain tributaries. These and other existing barriers on rivers such as the Winooski, Lamoille, Missisquoi, and Saranac are currently serving to restrict both lamprey spawning and larval rearing in the upper reaches of the rivers. The feasibility of installing sea lamprey barriers on other Lake Champlain tributaries, and other technologies such as microelemental analysis to help locate sources of lamprey production, telemetry tracking to identify where lamprey can best be trapped, and sex pheromone attractants are all being currently researched by biologists in the Lake Champlain Basin.

Expenditures to carry out a sea lamprey control program on Lake Champlain are approximately \$850,000 per year, including personnel costs, chemical purchases, equipment, contract services, and alternative research. Total costs incurred for sea lamprey controls in Lake Champlain have exceeded \$9 million (Gilbert, 1997).

Zebra mussel (*Dreissena polymorpha*)

The zebra mussel, a small freshwater mollusk native to Eastern Europe, likely entered Lake Champlain through the Champlain Barge Canal. It was first discovered in the southern end of the Lake in 1993 and can now be found throughout the entire length of the Lake. In 1997, zebra mussel larvae, known as veligers, were recorded at a level in excess of 400,000 veligers/m³ in the southern end of the Lake. In many areas, all firm submerged surfaces are densely covered by adult zebra mussels.

In June 1999, zebra mussels were found by a young boy in Lake Bomoseen. In 2000, snorkel surveys conducted by researchers from Castleton State College confirmed the presence of adult zebra mussels at numerous locations in Lake Bomoseen. In 2003, veligers were detected in all Lake Bomoseen samples collected. Adult zebra mussels were found in the LaPlatte River in 1997 and in Lewis Creek and Otter Creek in 1998. Veligers were found in Little Otter Creek and the Winooski River in 1999. In October 2003, researchers found two adult zebra mussels in Lewis Creek upstream of the Route 7 Bridge.

In 1995, zebra mussels were found in the New York portion of the Lake Champlain Basin in Glen Lake in Queensbury, a few miles south of Lake George. In 1995 and 1997, zebra mussel veligers were found in Lake George, and adults were subsequently found in the southern part of the Lake. While active control and spread prevention programs are currently in place in Lake George, a new population of adult zebra mussels was discovered in 2004. The New York infestations were likely caused by the overland transport of contaminated boats. The upper Richelieu River at the outlet of Lake Champlain in Quebec is also infested with zebra mussels, likely a result of a range expansion of populations in Lake Champlain.

The zebra mussel is highly opportunistic, reproduces rapidly and consumes plankton from the water column in large quantities. The potential impacts on the Lake Champlain fishery may be profound. Changes in food availability and alteration of spawning habitat are just a few of the possible impacts. Entire populations of Lake Champlain native mussels are disappearing due to heightened competition for food and because zebra mussels attach to their shells inhibiting their ability to feed, respire and reproduce. The Vermont state fish culture station in Grand Isle, Vermont has spent more than \$3 million on the design and installation of zebra mussel control mechanisms. Municipal water facilities and industrial facilities that draw water from Lake Champlain have spent in excess of \$2 million on cleaning, monitoring and controlling zebra mussels. Many of the Lake's hundreds of historic shipwrecks and other cultural artifacts, some of which date back to the Revolutionary War, are becoming encrusted with zebra mussels, diminishing their scientific and historic significance. Additionally, zebra mussels cover submerged surfaces in many of the Lake's popular swimming areas and swimmers complain of being cut by the sharp shells.

Currently, there are no environmentally sound methods to control populations of zebra mussels once they become established in a body of water. If such technologies emerge, they should be investigated for potential use within Lake Champlain and other bodies of water within the Lake Champlain Basin in order to reduce negative impacts and allow for the restoration of native ecological communities.

Alewife (*Alosa pseudoharengus*)

A large population of alewives, a member of the herring family native to Atlantic coastal regions, was discovered in Lake St. Catherine in Poultney, Vermont in 1997, marking the first occurrence of the species in Vermont and the Lake Champlain Basin. Fisheries biologists with the Vermont Department of Fish and Wildlife (VTDFW) suspect that the alewife was intentionally introduced to Lake St. Catherine by anglers hoping to increase the numbers of forage fish available to sport fishes. The alewife has the potential to displace native smelt populations in Lake St. Catherine and poses a significant threat to other native fisheries within the Lake Champlain Basin, if allowed to spread. The outlet of Lake St. Catherine flows into the Champlain Barge Canal, which connects directly to Lake Champlain. The VTDFW initially concluded that there was no practicable way to eradicate alewives from Lake St. Catherine, but management alternatives continue to be reviewed. A window of opportunity may still exist to contain the species to Lake St. Catherine before it escapes and becomes established in Lake Champlain. A July 2004 study to determine the feasibility of eradicating Lake St. Catherine's alewife population suggested lake reclamation using a piscicide is technically feasible. While exploration of the fiscal feasibility is ongoing, a recent discovery of a single individual alewife in the northern part of Lake Champlain indicates surveys are needed to determine whether a reproducing population may already exist. The US Fish and Wildlife Service and the VT Department of Fish and Wildlife are planning surveys in 2005.

Outside the Lake Champlain Basin

Hydrilla (*Hydrilla verticillata*)

Hydrilla, an aquatic plant native to Australia, Asia, and central Africa was identified in Florida in the 1960s and has since spread to numerous southern states as well as California and Washington. In recent years, populations of hydrilla have been found in Connecticut, Massachusetts, and Maine. Hydrilla has the ability to spread rapidly through stem fragmentation and the production of tubers. It forms dense mats which can completely clog waterways, posing significant threats to aquatic ecosystems, navigation, and recreational resources. Once established hydrilla replaces native aquatic vegetation and affects fish populations. Several management methods are used on hydrilla including herbicides, grass carp, and mechanical removal. The use of insects has also been studied. (Langeland, 1996). Recreational boats can serve as vectors to accelerate the spread of hydrilla (Anderson, 1996). While the distribution of hydrilla is illegal it is sometimes confused with native plants and made available through aquarium outlets.

Round goby (*Neogobius melanostomus*)

The Round goby, a small bottom-dwelling fish native to the Black and Caspian Seas was first discovered in North America in 1990 in the St. Clair River in Ontario. By 1995 round gobies were present in all five of the Great Lakes. As of 2004, they have traveled over 25 miles down

the Chicago Canal. Their rapid expansion appears to have been mediated by intra-lake ballast water transfer, bait bucket transfer, and active dispersion. They occur primarily in rocky nearshore habitats, but have been found as deep as 180 feet (J. Jonas, Michigan Dept. of Natural Resources, pers. comm.). They are aggressive and can displace native benthic fish, particularly mottled sculpin and darters (Janssen and Jude, 2001). They also consume eggs of native species, such as lake trout, and may threaten lake trout restoration. They are natural predators of zebra mussels and may create a biopathway for contaminants from zebra mussels to sport fishes, such as smallmouth and largemouth bass. Round goby are in eastern Lake Ontario, in the St. Lawrence River near Quebec City, and in Lake St. Francois near Massena, NY (de Lafontaine, 2002). They are, therefore, likely to enter Lake Champlain via either the Champlain or Chambly Canals.

Eurasian ruffe (*Gynocephalus cernuus*)

The Eurasian ruffe, a small, aggressive fish was found in the St. Louis River estuary at the western end of Lake Superior in 1986 and has since spread to Lake Michigan and Lake Huron. Introduced populations in Scotland and Russia have caused declines in yellow perch and whitefish, presumably due to egg predation. Ruffe are generalists and reproduce rapidly. They could compete with native fishes, such as yellow perch, walleye, and emerald shiner.

Quagga mussel (*Dreissena bugensis*)

The quagga mussel, a small bivalve mollusc native similar to the zebra mussel was first reported from the Erie Canal in 1991 (May and Marsden, 1992), and has since spread to Lake Erie and Lake Ontario, the St. Lawrence River, and the Mississippi and Ohio rivers (Mills et al. 1996). The quagga has the same nuisance aspects as the zebra mussel, i.e., biofouling, filter feeding, alteration of food webs, but has a higher tolerance for colder, deeper waters. In Lake Ontario, it was originally found in deep water (>100 m), but has steadily replaced zebra mussels in shallow water (Mills et al., 1996).

Spiny waterflea (*Bythotrephes cederstroemi*)

The spiny water flea is a tiny planktonic crustacean with a long, barbed spine. It is native to Europe, but was discovered in North America in Lake Huron in 1984, likely introduced through ballast water dumping. It has since spread to all of the Great Lakes and many inland lakes in Michigan, Minnesota, Ohio, and southern Ontario. It may be moved between waterbodies on boats, fishing tackle or other aquatic gear. Their viable eggs may also be moved in the guts of fish (Jarnagin, et. al., 2000). The spiny water flea has the ability to disrupt native zooplankton communities (Yan and Pawson, 1997) which may in turn affect fish communities.

Fishhook waterflea (*Cercopagis pengoi*)

The fishhook waterflea is a small predatory crustacean native to the Aral, Azov and Caspian Sea region. It was discovered in North America in Lake Ontario in 1998 and has since spread to Lake Erie, Lake Michigan, and several lakes in the finger lakes region of New York. Like the spiny waterflea, the fishhook waterflea can be spread between waterbodies by sticking to boats, fishing tackle and other aquatic gear. In Lake Ontario, the fishhook waterflea has contributed to the population declines of several zooplankton species (Focazio, 2004). This in turn may lead to changes in fish communities.

Non-native Species of Potential Concern

Within the Lake Champlain Basin

Other nonnative plant and animal species that have the potential to become problematic are found throughout the Lake Champlain Basin. Many of these species have not been well documented and the full extent of their distribution and impacts within the Basin is not known. As new information from survey or research work becomes available a species' status will be re-evaluated and elevated to a priority for management, if warranted. The following list of all currently known non-native species of concern within the Basin was taken from a paper in progress by Dr. J. Ellen Marsden of the University of Vermont and Michael Hauser of Vermont Department of Environmental Conservation:

(*denotes a priority species)

Plants

*purple loosestrife	(<i>Lythrum salicaria</i>)
*Eurasian watermilfoil	(<i>Myriophyllum spicatum</i>)
*water chestnut	(<i>Trapa natans</i>)
*Japanese knotweed	(<i>Fallopia japonica</i>)
flowering rush	(<i>Butomus umbellatus</i>)
European frog's bit	(<i>Hydrocharis morsus-ranae</i>)
common reed	(<i>Phragmites australis</i>)
yellow floating heart	(<i>Nymphoides peltata</i>)
curly leaf pondweed	(<i>Potamogeton crispus</i>)
slender-leaved naiad	(<i>Najas minor</i>)
yellow flag iris	(<i>Iris pseudacorus</i>)
water plantain	(<i>Alisma gramineum</i>)
great water cress	(<i>Rorippa amphibia</i>)

Fish

*sea lamprey	(<i>Petromyzon marinus</i>)
*alewife	(<i>Alosa pseudoharengus</i>)
gizzard shad	(<i>Dorosoma cepedianum</i>)
white perch	(<i>Morone americana</i>)
European rudd	(<i>Scardinius erythrophthalmus</i>)
blueback herring	(<i>Alosa aestivalis</i>)
common carp	(<i>Cyprinus carpio</i>)
goldfish	(<i>Carassius auratus</i>)
tench	(<i>Tinca tinca</i>)
rainbow trout	(<i>Oncorhynchus mykiss</i>)
brown trout	(<i>Salmo trutta</i>)
brook silverside	(<i>Labidesthes sicculus</i>)
white crappie	(<i>Pomoxis annularis</i>)
black crappie	(<i>Pomoxis nigromaculatus</i>)

(Black crappie is native to Lake Champlain, but is spreading to other lakes within the Basin.)

Mollusks

*zebra mussel	(<i>Dreissena polymorpha</i>)
mud bithynia	(<i>Bithynia tentaculata</i>)
big-ear radix	(<i>Radix auricularia</i>)
banded mystery snail	(<i>Viviparus georgianus</i>)
buffalo pebblesnail	(<i>Gillia altilis</i>)
chinese mysterysnail	(<i>Cipangopaludina chinensis</i>)
globe siltsnail	(<i>Birgella subglobosa</i>)
woodland ponds nail	(<i>Stagnicola catascopium</i>)
sharp horns nail	(<i>Pleurocera acuta</i>)
European fingernail clam	(<i>Sphaerium corneum</i>)
greater European pea clam	(<i>Pisidium amnicum</i>)
European stream valvata	(<i>Valvata piscinalis</i>)

Crustaceans

rusty crayfish	(<i>Orconectes rusticus</i>)
Allegheny crayfish	(<i>Orconectes obscurus</i>)
big river crayfish	(<i>Cambarus robustus</i>)
water flea	(<i>Eubosmina coregoni</i>)
gammarid amphipod	(<i>Gammarus fasciatus</i>)
cyclopoid copepod	(<i>Thermocyclops crassus</i>)

Other

freshwater jellyfish	(<i>Craspedacusta sowerbyi</i>)
flatworm	(<i>Schmidtea polychroa</i>)
water veneer moth	(<i>Acentria ephemerella</i>)

Outside the Lake Champlain Basin

Other aquatic or wetland species have the potential to be introduced to the Lake Champlain Basin. These species exist in nearby waters or are potentially available through the bait or aquarium trades. They currently are not known to be established in the wild within the Basin, but it is possible that some are established and have not been detected. The potential for their impact if introduced is not clear; as new information becomes available, a species' status will be re-evaluated and elevated to a priority for spread prevention or management if warranted. The following list of species currently outside of the Basin, but with significant potential to enter the Basin was taken from a paper in progress by Dr. J. Ellen Marsden of the University of Vermont and Michael Hauser of Vermont Department of Environmental Conservation:

(*denotes a priority species)

Plants

*hydrilla	(<i>Hydrilla verticillata</i>)
fanwort	(<i>Cabomba caroliniana</i>)
Brazilian elodea	(<i>Egeria densa</i>)
parrot's feather	(<i>Myriophyllum aquaticum</i>)
variable-leaved watermilfoil	(<i>Myriophyllum heterophyllum</i>)

Fish

*round goby	(<i>Neogobius melanostomus</i>)
*Eurasian ruffe	(<i>Gynocephalus cernuus</i>)
tubenose goby	(<i>Proterorhinus marmoratus</i>)
northern snakehead	(<i>Channa argus</i>)
bighead carp	(<i>Hypophthalmichthys nobilis</i>)
silver carp	(<i>Hypophthalmichthys molitrix</i>)

Mollusks

*quagga mussel	(<i>Dreissena bugensis</i>)
Asian clam	(<i>Corbicula fluminea</i>)
Chinese mystery snail	(<i>Cipangopaludina chinensis</i>)
Piedmont elimia snail	(<i>Elimia virginica</i>)
liver elimia	(<i>Elimia livescens</i>)
sharp hornsnail	(<i>Pleurocera acuta</i>)
Wabash pigtoe	(<i>Fusconaia flava</i>)
paper pondshell	(<i>Anodonta imbecilis</i>)
Atlantic rangia	(<i>Rangia cuneata</i>)
ridged lioplax	(<i>Lioplax subcarinata</i>)
green floater	(<i>Lasmigona subviridis</i>)
New Zealand mudsnail	(<i>Potamopyrgus antipodarum</i>)

Crustaceans

*spiny waterflea	(<i>Bythotrephes cederstroemi</i>)
waterflea	(<i>Daphnia lumholtzi</i>)
*fishhook waterflea	(<i>Cercopagis pengoi</i>)
amphipod	(<i>Echinogammarus ischnus</i>)
calanoid copepod	(<i>Eurytemora affinis</i>)
calanoid copepod	(<i>Skistodiaptomus pallidus</i>)
parasitic copepod	(<i>Argulus japonicus</i>)
Chinese mitten crab	(<i>Eriocheir sinensis</i>)
white river crawfish	(<i>Procambarus acutus acutus</i>)
gammarid amphipod	(<i>Gammarus daiberi</i>)

Oligochaetes

oligochaete	(<i>Ripistes parasita</i>)
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Other Invertebrates

freshwater hydroid	(<i>Cordylophora caspia</i>)
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Other

bacterium	(<i>Thioploca ingrlica</i>)
cynobacterium	(<i>Cylindrospermopsis raciborskii</i>)
whirling disease (protozoan)	(<i>Myxobolus cerebralis</i>)

IV. Authorities and Programs

United States

U.S. Fish and Wildlife Service

Throughout its history, the U.S. Fish and Wildlife Service has been inextricably linked to nonindigenous species issues and activities. Recent activities throughout the United States include prevention of introductions, detection and monitoring of exotic fish; research and management focusing on sea lamprey, Asiatic clam, ruffe, and purple loosestrife; education and technical assistance; and state grants under the Federal Aid in Fish and Wildlife Restoration program, the Endangered Species program, and the National Aquatic Nuisance Species Task Force.

In 2002, the Service, Vermont Fish and Wildlife Department and New York Department of Environmental Conservation initiated a new multifaceted approach to controlling sea lamprey populations in Lake Champlain by installing barriers to spawning migrations, trapping migrating adults and applying target-specific pesticides, known as lampricides. The Long-term Control Program was outlined in a 356-page supplemental environmental impact statement in October 2001. In addition, the Service initiated the process of chartering the Lake Champlain Sea Lamprey Control Alternatives Workgroup under the Federal Advisory Committee Act (FACA) to provide an opportunity for stakeholders to give policy and technical advice about sea lamprey control techniques that may provide useful alternatives to lampricides. Already, prospective members of the Workgroup have helped leverage funding for a variety of alternatives-related projects.

In addition to its role in managing sea lamprey, the Service has provided assistance to determine the technical and fiscal feasibility of preventing alewife from becoming established in Lake Champlain and pursuing options to eradicate alewife from Lake Saint Catherine. The Service is also involved in partnership with The Nature Conservancy, the Lake Champlain Basin Program, and private foundations in an ongoing project to control water chestnut infestations in Lake Champlain wetlands using volunteers to hand-pull the plants. The Service also conducts annual surveys for water chestnut in Missisquoi National Wildlife Refuge, cooperates in propagation and release of beetles (*Galerucella* spp.) to control purple loosestrife infestations, supports research and outreach to address the effects of zebra mussels on native species, and provides technical assistance about invasive species for the U.S. Bureau of Customs and Border Protection and other agencies.

National Sea Grant

From 1995 - 1998, the National Sea Grant Program, through the Connecticut Sea Grant Program, provided \$97,739 support to the VTDEC ANS Education and Outreach Program. Sea Grant also provided development funding (\$10K total) to the University of Vermont (UVM) for zebra mussel and purple loosestrife research. Additionally, other state Sea Grant Programs (primarily in the Great Lakes states) continue to provide invaluable materials and technical assistance to ANS management, and education and outreach programs in the Lake Champlain Basin.

Late in 1998, Vermont became eligible to establish a state Sea Grant Program. Later that year New York Sea Grant (a partnership involving Cornell University and SUNY), UVM, and Plattsburgh State University (PSU) submitted a proposal to the National Sea Grant Office to fund a *Lake Champlain Sea Grant Extension* project for the period 1999 to 2001. The grant, which enabled the hiring of two specialists (one at PSU and one at UVM), was administered by NY Sea Grant staff at Cornell University and SUNY Stony Brook. Approximately \$147,000 was awarded for each of 3 years. *Lake Champlain Sea Grant* (via NYSG administration), began enabling research in 2001, with development of an RFP and subsequent awards (totaling \$140,000 for two years) for research on smelt population dynamics and cormorant diet and dispersal patterns.

Administration of the *Lake Champlain Sea Grant Extension* project switched to UVM (with partnership assistance from Plattsburgh SUNY) starting in 2002. Extension and education efforts continue to focus on watershed, fisheries, and invasive species topics throughout the Lake Champlain watershed. It is also anticipated that \$145,000 per year will be allocated to four research projects to be funded in 2004 and 2005. Current administrative efforts focus on developing a Coherent Area Program which will provide ongoing aquatic research, education and outreach accomplishments in Vermont and northeastern NY.

U.S. Army Corps of Engineers

The U.S. Army Corps of Engineers (USACOE) manages over five million surface acres of water at its reservoirs and through its navigation projects around the country. The USACOE's Aquatic Plant Control Research Program (APCRP) is the nation's only federally authorized research program directed to develop technology for the management of non-indigenous aquatic plant species. The program provides information on effective, economical, and environmentally compatible methods for assessing and managing problem aquatic plants.

In May of 1983, the Vermont Department of Environmental Conservation and the USACOE's New York District entered into an agreement to implement a cost-shared Aquatic Plant Control Program (APCP) for the control of water chestnut (*Trapa natans*) and Eurasian watermilfoil (*Myriophyllum spicatum*) in Lake Champlain. In 1994, the program was expanded to include other bodies of water within the basin. Since the program's inception, well over two million dollars of federal APCP funds have been spent to control water chestnut and Eurasian watermilfoil in the Lake Champlain Basin. Recent budget cuts at the federal level have put the Corps' APCP in jeopardy and it is not known at this time whether the program will continue in the future.

U.S. Environmental Protection Agency

The Environmental Protection Agency has a strong supporting role in the control of aquatic nuisance species at the international, national, and regional levels.

Internationally, EPA coordinates its work in the US with the North American Commission for Environmental Cooperation, including biodiversity and invasive species efforts. EPA participates in the United Nations' International Maritime Organization work to control ballast water discharges, as well as on the UN Biodiversity Convention's invasive species protection efforts. EPA also consults with the World Conservation Union to help improve global cooperation on ecosystems and invasive species and supports related work by the US Department of State. EPA

further participates in invasive species issues through environmental reviews of proposed trade agreements with other countries.

Nationally, EPA is a member of the federal Aquatic Nuisance Species Task Force (ANSTF) and the National Invasive Species Council (NISC). EPA is an active member of the NISC, and has a major role in implementing the National Invasive Species Management Plan and other provisions of Executive Order 13112. EPA provides biopollution research and control grants through the Science to Achieve Results program. EPA also has authority under three federal statutes that can be used for controlling aquatic nuisance species. First, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requires manufacturers and importers who produce or sell a pest control product to register the compound with the EPA. FIFRA is a critical statute for invasive species whenever pesticides are used to control or reduce the impact of invasive species. Examples include the use of a pesticide to control lamprey populations in the Great Lakes and the use of herbicides to control noxious weeds. FIFRA also gives EPA review authority for biological control agents when they are used to control invasive pests. EPA review of environmental impact statements under the National Environmental Policy Act is another statutory tool useful against invasive species. These reviews, conducted in EPA's regional offices, now include an explicit consideration of the proposed action with regard to invasive species. EPA may also have regulatory authority to manage invasive species through several provisions of the Clean Water Act. EPA is responsible for regulating ballast water in the Great Lakes under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 and is engaged, in conjunction with the US Coast Guard, with development of the programmatic environmental assessment for the Mandatory Ballast Water Management Rule for marine waters.

Regionally, EPA is the primary funding source for the Lake Champlain Basin Program, which supports its strong aquatic nuisance species program. EPA also provides funding for invasive species control and prevention elsewhere in the New England region, and participates on the regional ANSTF panel, the Northeast Aquatic Nuisance Species Panel

Canada

Canada has no specific federal laws dealing with the problem of ANS. The Department of Agriculture Canada has regulatory authority over the deliberate introduction of exotic terrestrial species in Canada. This Department also has the mandate to authorize the production, marketing and use of chemical pesticides and other pest controls. The Department of Fisheries and Oceans Canada has developed a code of conduct relative to the deliberate introduction and/or transfer of species in aquatic environments.

Environment Canada is the federal department addressing the water quality and quantity issues for all internationally shared water bodies and seaways in Canada, such as the Great Lakes, the St. Lawrence River, Lake Champlain and the Richelieu River. Management of lakes and rivers in Canadian territory is under the jurisdiction of each province. This includes the management of water quality and quantity, habitat conservation and protection, and resource exploitation for both recreational and commercial purposes. Environment Canada is coordinating the new national strategy on invasive species in Canada (to be adopted in September 2004), which

includes a national action plan on aquatic invasive species. In the Province of Quebec, the St. Lawrence Centre of Environment Canada coordinates a research and monitoring program on aquatic introduced species. Research activities are conducted in the St. Lawrence River and the Richelieu River.

Regulations concerning maritime traffic and recreational boating control and safety over internationally shared Canadian waters are under the mandate of the Canadian Coast Guard, which is part of the Department of Fisheries and Oceans Canada. Regulatory measures over lakes and rivers throughout the Canadian territory are under the jurisdiction of each provincial government, which can in some instances delegate its authority to municipalities.

Regional

Lake Champlain Basin Program

The Lake Champlain Basin Program (LCBP) was established to coordinate the activities envisioned by the *Lake Champlain Special Designation Act of 1990* (Appendix C). It is jointly administered by the U.S. Environmental Protection Agency, the states of Vermont and New York and the New England Interstate Water Pollution Control Commission. Other cooperating agencies include the U.S. Fish and Wildlife Service, the U.S. Department of Agriculture, the U.S. Geological Survey, the National Oceanographic and Atmospheric Administration and the National Park Service. Formal involvement of Quebec is through the Lake Champlain Steering Committee (see below). The LCBP coordinated the development of *Opportunities For Action: An Evolving Plan for the Future of the Lake Champlain Basin (OFA)*, which was first published in 1996 and revised in 2003. One of the top four priority issues in *OFA* is nonnative aquatic nuisance species. The LCBP conducts education and outreach activities for ANS throughout the Basin, facilitates discussion among ANS resource managers and has administered more than \$1.3 million in grants for ANS research, monitoring, education, control and demonstration programs. The LCBP has ex-officio representation on the national ANS Task Force and receives support through the Task Force for an ANS Coordinator.

Memorandum of Understanding on Environmental Cooperation on the Management of Lake Champlain/Lake Champlain Steering Committee

In 1988 a *Memorandum of Understanding on Environmental Cooperation on the Management of Lake Champlain* was signed by the governors of Vermont and New York. The Premier of Quebec officially signed onto the *Memorandum* in 1996. The *Memorandum* created the Lake Champlain Steering Committee, which consists of top-level environmental officials representing state and provincial governments in New York, Vermont, and Quebec. The Steering Committee serves as a forum for information exchange and a mechanism to coordinate state and provincial policies and programs. In 1991, a 31 member Lake Champlain Management Conference (Appendix G) was formed under direction of the *Lake Champlain Special Designation Act of 1990* to oversee development of *OFA*. With the completion of *OFA* in 1996, the Management Conference was dissolved and the Steering Committee membership was expanded to include additional local, state and federal governmental representatives and designees of the Citizen Advisory Committees and the Technical Advisory Committee (Appendix H). An Executive

Committee assists the Steering Committee in providing guidance on *OFA* implementation activities.

Northeast Aquatic Nuisance Species Panel

The Northeast Aquatic Nuisance Species (NEANS) Panel was established in 2001, and is the fourth regional panel to be established under the auspices of the Federal Aquatic Nuisance Species Task Force (ANSTF), following the Great Lakes, Western Regional, and Gulf of Mexico panels. The mission of the NEANS Panel is to "protect the marine and freshwater resources of the Northeast from invasive aquatic nuisance species through commitment and cohesive coordinated action".

The NEANS Panel addresses issues and concerns relative to the freshwater and marine resources of the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut and New York, and the Canadian provinces of Quebec, New Brunswick and Nova Scotia. The panel's members represent state, federal and provincial governments, academia, commercial and recreational fishing interests, recreational boaters, commercial shipping, power and water utilities, environmental organizations, aquaculture, nursery and aquarium trades, tribal concerns, lake associations and the bait industry, among others. Several Lake Champlain representatives serve on the panel. The panel has four working committees: Ballast Water; Communications, Education, and Outreach; Policy and Legislation, and Science and Technology.

Non-Governmental Organizations

The Lake Champlain Committee, the Lake Champlain Basin Science Center and The Nature Conservancy are just a few of the many non-governmental organizations within the Lake Champlain Basin that play an important role in ANS management. In particular, these organizations help to communicate information about ANS to the public and provide a critical link between management agencies and the public.

State and Provincial

New York

New York State Aquatic Nuisance Species Management Plan

Following the passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA), the New York State Legislature amended Article 3-0301(2) of New York State Environmental Conservation Law to require the Department of Environmental Conservation to develop comprehensive management plans for preventing and controlling the introduction of nonindigenous aquatic nuisance species into New York State waters, as described in section 1204(a) of NANPCA. The Bureau of Habitat of the Division of Fish, Wildlife, & Marine Resources was assigned the responsibility of developing the nonindigenous aquatic species management plan. This plan was completed in November 1993, and approved by the national ANS Task Force in March 1994. As of July 2003, the national ANS Task Force has awarded New York more than \$420,000 for plan implementation.

A major effort was undertaken to revise and update New York's ANS management plan. The revision was completed in the Spring of 2003 and is currently undergoing public review and

comment. When comments from the public have been reviewed and adopted, when appropriate, the revised ANS plan will be formally adopted. A major revision of the plan was necessary because the National ANS Task Force published guidance for State ANS plans in March of 1998, and the original ANS Management Plan developed by New York in 1993 did not conform to that guidance.

New York's revised ANS Management Plan is built around the following five goals:

Goal 1. Provide effective and efficient ANS program management;

Goal 2. Prevent the introduction of new ANS into the waters of New York State and enforce ANS Laws and Regulations;

Goal 3. Control the spread of ANS species to new water bodies within the state, and mitigate adverse ecological, societal, and economic impacts resulting from an ANS introduction;

Goal 4. Involve and motivate the general public to take steps to prevent new ANS introductions and control the spread of ANS through education; and

Goal 5. Encourage, promote, and support ANS research in New York State.

There are a total of 23 objectives associated with the five goals. As called for in the Federal Guidance of 1998, New York's revised ANS Management Plan includes detailed implementation tables to describe 126 tasks that have been identified as needed in order to accomplish the objectives. Additionally, the revised ANS Management Plan identifies 21 species already present in New York waters that could be classified as ANS, and an additional 18 potential ANS that have been introduced into the waters of North America but have not yet been found in the waters of New York State. New York's revised ANS Management Plan discusses the need for close coordination with the Lake Champlain Basin Program to support the accomplishment of mutual goals and objectives, avoid duplication of effort, and to prevent the occurrence of conflicting activities or priorities.

Invasive Plant Council of New York State

The Invasive Plant Council of New York State (IPCNY), incorporated in 1999, provides coordination and guidance on the management of invasive plant species in order to protect the biodiversity of New York State. Through partnerships among public and private organizations, the IPCNY:

1. Promotes management projects in field;
2. Compiles and facilitates access to information on invasives;
3. Defines policies and goals for invasives management;
4. Educates the general public about invasives;
5. Holds conferences and forums on invasives and their management;
6. Develops an "official" state list of invasive species; and
7. Develops a list of alternative plants to invasives.

New York regulatory statutes pertaining to ANS are listed in Appendix J.

Vermont

Aquatic Nuisance Control Program (Title 10 ' 921-923)

The Aquatic Nuisance Control Program of the Department of Environmental Conservation was established by the Legislature in 1978. The program performs the following services as established in the statute: receive and respond to aquatic nuisance complaints; work with municipalities, local interest organizations, and private individuals and agencies of the state to develop long-range programs regarding aquatic nuisance controls; work with federal, state and local governments to obtain funding for aquatic nuisance control programs; and administer a Grant-in-Aid Program (' 922). The program is also responsible for administering a permit program under Title 10 ' 1263a for activities to control nuisance aquatic species.

Grant-in-Aid Program (Title 10 ' 922)

The Grant-in-Aid Program provides financial assistance (75% or less of the project cost) for aquatic nuisance control programs in the form of grants to municipalities. Local interest groups such as lake associations must apply through the municipality in which the lake is located. The Department of Environmental Conservation may also use funds provided under ' 922, as well as other funds, for restoration, management or protection projects, or for studies in the best interest of the state, when the appropriate municipal applicant is not available or not eligible to receive a grant.

Aquatic Nuisance Control Permits (Title 10 ' 1263a)

A permit is required to control nuisance aquatic plants, insects or other aquatic life including sea lamprey. Activities and control methods regulated by this statute are: biological controls, bottom barriers, structural controls, powered mechanical devices, pesticides, and chemicals other than pesticides. Application fees are authorized under Title 3 ' 2822e. Between 1993 - 2002, 140 permits were issued for various types of controls.

Vermont Invasive Exotic Plant Committee

The Vermont Invasive Exotic Plant Committee is an informal group comprised of 21 members from state and federal agencies, environmental groups, academia, and the nursery and aquarium industries. Its main function is to provide coordination and guidance on invasive exotic plant issues so as to protect natural communities, agricultural interests, and human use and enjoyment of Vermont's natural resources. The Committee works to:

1. Develop and maintain a state "watch" list of invasive exotic plants;
2. Make recommendations to the VT Department of Agriculture, Food, and Markets on invasive species for consideration to the Quarantine Rule;
3. Compile information on invasive exotic plants and facilitate access to the information;
4. Promote cooperative efforts to address invasive exotic plant issues;
5. Educate the public, special interest groups and policy makers about invasive exotic plants; and
6. Develop a list of alternative plants that can be used in place of invasive exotics.

Vermont regulatory statutes pertaining to the introduction and spread of ANS are listed in Appendix J.

Quebec

With respect to the Lake Champlain Basin, the province of Quebec is fully mandated to develop and put forward, in cooperation with its U.S. administrative counterparts, management schemes to protect, preserve and utilize the watershed and its resources. Under this mandate, in 1996, the province of Quebec co-signed the plan, *Opportunities For Action: An Evolving Plan for the Future of the Lake Champlain Basin* and, in 2003, endorsed the revision of *Opportunities for Action*.

Wildlife and Parks Quebec is a government society that oversees fish and wildlife conservation and enhancement as well as park development throughout the province of Quebec. The Quebec Ministry of the Environment (MENV) has the mandate of environmental protection and conservation throughout the province.

The introduction of exotic species in the St. Lawrence drainage basin is an issue of concern within the federal-provincial action plan, *Saint-Laurent-Vision 2000*. This five year plan (1993-1998) was put forward to preserve, protect, and restore the St. Lawrence River and to produce a general overview of the state of the environment of the River. As part of the biodiversity program of this plan, effort has been mainly dedicated to the study and scientific investigation of the distribution, abundance and ecology of zebra mussels. Initially research was concentrated in the St. Lawrence River, but was expanded to include the Richelieu River with the discovery of zebra mussels in Lake Champlain. Purple loosestrife was also specifically identified as a concern under the plan.

Wildlife and Parks Quebec in association with the Quebec Ministry of the Environment put forward an action plan on aquatic nuisance species for all regions of Quebec. The plan was integrated for the St. Lawrence Basin with the *Saint-Laurent Vision 2000*'s biodiversity program, in cooperation with Environment Canada's St. Lawrence Center. Quebec's five year action plan is oriented towards ANS spread prevention and damage control. The plan implements actions for the major dispersal mechanisms that promote education, public participation, regulation changes, voluntary guidelines as well as research on aquatic nuisance species. For example, research is underway on the possibility of dispersal of aquatic nuisance species in Quebec by aquaculture operations, fish stocking, and bait fish vendors. Sampling of over 200 lakes and rivers was done in order to determine if adequate chemical characteristics exist for zebra mussel proliferation. Special information booklets and guide books are prepared for audiences, such as cottage owners, industries, municipalities, boaters, scuba divers, seaplane operators, and fishermen. The plan also seeks to prevent damages by aquatic nuisance species. For example, the status of indigenous mussels is being examined in order to take appropriate conservation actions against impacts from zebra mussels. The effects of aquatic nuisance species on fish populations will also be studied. Specific actions relative to the Lake Champlain Basin include aquatic nuisance species spread prevention on the Brochets and Richelieu Rivers. The Action plan also calls for coordination between Wildlife and Parks Quebec, the Ministry of the Environment, and over 200 nongovernmental associations throughout Quebec to distribute information on aquatic nuisance species issues in Quebec.

The Regional Committee in Environment of Montérégie is a non-governmental citizen organization dedicated to the promotion and protection of the environment in the Richelieu River region, just north of the Quebec-U.S. border. The group actively works to raise the awareness of the general public about the state of the Richelieu River environment, including ANS issues.

Quebec regulatory statutes pertaining to ANS are listed in Appendix J.

Local

Marinas and Local Contractors

More than 60 Lake Champlain Basin marina owners and contractors providing zebra mussel control products and services are an effective conduit for ANS related information to and from the boating and lakeshore communities. They also provide important feedback about the status of ANS populations and their related impacts. Their assistance will continue to play an important role in Lake Champlain Basin ANS education efforts.

Lake, Watershed, and Fishing Groups

There are more than 50 organized lake and watershed associations within the Lake Champlain Basin of Vermont and another dozen in New York. Many of these groups have ongoing ANS outreach and/or management programs. Activities include: distribution of ANS informational materials, posting of boater advisory signs, boater surveys, public presentations/workshops, ANS “watching”, milfoil weevil rearing, and Eurasian watermilfoil and water chestnut control. Funding for these programs comes from the towns; private donations; membership fees; and grants provided through the VTDEC Grant-in-Aid Program, the LCBP Local Grants Programs, and other grant programs. There are also several organized fishing groups within the Lake Champlain Basin that are actively involved in distributing information about ANS. These groups will continue to provide an important link between the private and public sectors and will play a significant role in ANS education and management activities.

V. Objectives, Strategies, and Actions

The 2000 *Lake Champlain Basin ANS Management Plan* and the 2004 revision were developed in coordination with the development and revision of *Opportunities For Action* (OFA), a comprehensive restoration and management plan for the Lake Champlain Basin. Numerous Actions considered for OFA also address elements of the ANS Management Plan; these Actions were examined and prioritized based on extensive technical and public input. The priority actions of OFA are among the **Strategies** and **Actions** for the *Lake Champlain Basin ANS Management Plan*. The *Review Committees* and writing staff of the 2000 and 2004 ANS management plans (Appendix D) used the comments submitted during the OFA process, together with new technical information and public input, to develop and prioritize specific detailed **Actions** required to implement the Plan. The following **Objectives** have been established to provide a framework for the Strategies and Actions and to accomplish the Plan Goals of preventing new ANS introductions, limiting the spread of established ANS populations, and abating impacts of ANS, as identified under Section II:

- A. Coordinate Plan Implementation;
- B. Education, Outreach, and Legislation;
- C. Early Detection, Monitoring, and Research;
- D. Develop, Evaluate, and Prioritize ANS and Management Actions; and
- E. Implement Rapid Response and Management Actions.

Although these Objectives are not listed in order of priority, it is generally accepted that the first line of defense for minimizing impacts of ANS is to prevent future introductions and further spread of ANS through a comprehensive education and outreach strategy, described in Objective B. In addition, central to all of the Actions of this Plan are the ANS Coordinator (see Action A1a) and the ANS Advisory Committee (see Action A1c) whose roles will be to coordinate implementation of the Actions and to coordinate development of future iterations of this management plan. The Plan Objectives, Strategies, and Actions are as follows:

Objective A. Coordinate Plan Implementation

Strategy A1. Strengthen Coordination of Plan Implementation and other ANS Efforts at the Basin, Regional, and National Levels

Issue Statement: Effective implementation of the Lake Champlain Basin ANS Management Plan requires Basin-wide coordination and oversight to:

1. ensure that all Plan objectives and obligations are met;
2. ensure information is expeditiously and accurately shared among all individuals and organizations involved in the implementation; and
3. minimize redundancy of activities.

Coordination with regional and national ANS management efforts will also ensure that efforts within the Basin are informed by and shared among managers throughout the Northeast and the U.S. Coordinating implementation of the Plan is essential for the fulfillment of all three Plan Goals.

Actions

A1a. Regional ANS Coordinator

Secure annual funding to retain an ANS Coordinator to coordinate overall Plan implementation and conduct specific Plan Actions as appropriate.

Lead: LCBP

Potential key players: USFWS, VTDEC, NYSDEC

A1b. Additional Regional ANS Staff

Obtain funding to hire or maintain existing staff, such as the Lake Champlain Sea Grant staff, to coordinate with the ANS Coordinator and to implement Plan activities, as appropriate.

Potential key players: USEPA, LCBP, NYSDEC, LCSG, USFWS, VTANR, TNC, APIPP

A1c. ANS Advisory Committee

Develop and maintain an ANS Advisory Committee to guide Plan implementation and other local, state, and regional ANS initiatives and to set priorities for research and management on a regular basis.

Lead: LCBP

Potential key players: LCC, NYSDEC, LCSG, USFWS, VTANR, VTAAF, QME, APIPP, TNC, universities, lake groups

A1d. Coordination with NYS Plan

Coordinate Plan implementation with New York State ANS Management Plan activities.

Lead: LCBP

Potential key players: LCSG, TNC, USFWS, NYSDEC, VTANR

A1e. Northeast Coordination

Continue active participation in the Northeast Regional ANS Panel and other regional and local panels and workgroups.

Lead: LCBP, LCSG, VTDEC, NYSDEC

Potential key players: APIPP, LCC, USACE, USDA, USEPA, USFWS, VTDFW, VTAAF, other state agencies

A1f. National Coordination

Represent the Lake Champlain Basin Program on the National ANS Task Force.

Lead: LCBP

Objective B. Education, Outreach, and Legislation

Numerous agencies and organizations throughout the Lake Champlain Basin provide information and conduct education and outreach programs about ANS. Organizations working Basin-wide include the Lake Champlain Basin Program, Lake Champlain Sea Grant, the Lake Champlain Committee, the U.S. Fish and Wildlife Service, and The Nature Conservancy. These organizations develop and distribute ANS literature and integrate ANS information into outreach activities they conduct throughout the Basin. A number of educational materials (e.g. web pages, fact sheets, slide presentations, posters, etc.) have been developed in support of these activities. Some examples may be found at:

<http://research.plattsburgh.edu/LakeChamplainSeaGrantAquatics/ans.htm>;

<http://www.lcbp.org/nuissum.htm>.

In Vermont, ECHO, the lake aquarium and science center at the Leahy Center for Lake Champlain, maintains several ANS exhibits, sponsors ANS presentations, conducts ANS educational activities with school groups, and maintains and distributes a zebra mussel traveling trunk. Within ECHO, the LCBP operates a public Resource Room, which provides multiple ANS informational materials to visitors of the museum. The VTDEC's Education and Outreach Program has several staff members who work throughout the state developing and distributing informational literature, boater advisory signs, loaner slide shows, public service announcements as well as delivering school and public presentations, and coordinating an ANS watcher's programs. Much of the information developed by this agency program can be found at their website: http://www.anr.state.vt.us/dec/waterq/lakes/htm/ans/lp_ans-index.htm. The Lake Champlain Maritime Museum in Ferrisburg, Vermont also has a zebra mussel exhibit and distributes zebra mussel information.

In New York, the Adirondack Park Invasive Plant Program (APIPP), a partnership among the Adirondack Park Agency, Adirondack Nature Conservancy, NYS Dept. of Environmental Conservation, NYS Dept. of Transportation, and the Invasive Plant Council of New York, and numerous local partners, implements regional invasive plant monitoring, management, and education through training programs, inventory protocols, control projects, distribution mapping, community presentations and information dissemination. Additionally, several lake groups and watershed associations in New York, as well as throughout the Basin, are actively involved in educational efforts to help prevent the spread and minimize impacts of ANS.

These ANS education and outreach programs in the Basin have been successful at raising the awareness of the public about ANS. Cooperation among partners is strong. More work needs to be done, however, to 1.) identify educational needs; 2.) develop targeted programs (i.e. a series of educational activities or products); and 3.) measure changes in stakeholder behavior as a function of this outreach. In particular, Basin partners need to increase voluntary public compliance with spread prevention techniques and practices, and to raise support for ANS management activities. Increased resources are required to improve outreach programs, such as developing evaluation programs to measure the effectiveness of programs and materials. Additionally, improved coordination and cooperation among agencies and organizations throughout the Basin would increase education program efficiency and effectiveness.

Many excellent ANS education and outreach programs and resources exist throughout North America. Education and outreach efforts within the Lake Champlain Basin have directly benefitted from these resources. For example, zebra mussel watchcards developed by the University of Wisconsin Sea Grant Program have been distributed throughout the Basin. It was with one of these cards that a teenage boy correctly identified and reported the first zebra mussel found in Lake Champlain. Recent funding awards have enabled Lake Champlain Sea Grant (with assistance from LCBP and VTDEC) to provide additional zebra mussel information via publication of a zebra mussel fact sheet (<http://research.plattsburgh.edu/LakeChamplainSeaGrantAquatics/zmlettersize.pdf>). Linkages with Great Lakes Sea Grant Programs have resulted in the production of additional watch cards of round goby, Eurasian ruffe and two species of invasive zooplankton. Likewise, many of the ANS education and outreach materials developed within the Lake Champlain Basin have been used in ANS programs outside of the Basin. This type of networking increases program diversity

while reducing costs and increasing the consistency of information being presented from one region to another. Coordination with other regional and national ANS education and outreach programs will continue to play an important role in ANS education and outreach efforts in the Lake Champlain Basin.

Strategy B1. Expand Lake Champlain Basin ANS Education & Outreach Programs

Issue Statement: ANS spread prevention is the key to effectively address ANS issues and impacts. Spread prevention is achieved through aggressive and consistent educational outreach programs and training targeting multiple audiences. Coordination among the various organizations delivering outreach programs is also necessary to maintain consistency and to increase the likelihood of voluntary compliance with ANS spread prevention measures. Expanding and strengthening ANS educational outreach programs will lead to increased public support and cooperation necessary for reducing ANS impacts in the Basin.

Actions

B1a. Expand ANS Education and Outreach Programs

Further develop a coordinated ANS education and outreach program for educating the general public, students, stakeholders, interest groups, and state and local officials throughout the entire Lake Champlain Basin. Coordinate the program with other regional and national efforts as appropriate.

Potential key players: LCBP, LCC, LCMM, NYSDEC, NYIPC, LCSG, TNC, USFWS, VTANR, VTIPC, APIPP, ECHO, lake groups, watershed groups, universities

B1b. Evaluate ANS Education and Outreach Programs

Continue to evaluate the effectiveness of ANS education and outreach programs, activities, and materials in use within the Lake Champlain Basin. Identify appropriate ANS education and outreach resources available through other regional and national efforts.

Potential key players: LCBP, NYSDEC, LCSG, USFWS, VTANR, APIPP

B1c. Develop or Acquire New ANS Educational Materials

Using information gathered in Action B1b, develop or acquire new ANS informational literature as necessary, and increase distribution and exposure of the materials to the public.

Potential key players: LCBP, NYSDEC, LCSG, USFWS, VTANR, NYIPC, VTIPC, APIPP

B1d. Post ANS Advisory Signs

Using information gathered in Action B1b, continue to post ANS advisory signs at all boat access areas throughout the Lake Champlain Basin and develop or redesign new signs as needed.

Potential key players: LCBP, NYSDEC, USFWS, VTANR, VTCI, APIPP, lake groups

B1e. Develop and Utilize PSA's

Distribute PSA's to media outlets throughout the Basin. Purchase air time to increase their exposure. Develop or redesign PSA's as needed.

Potential key players: LCBP, NYSDEC, LCSG, USFWS, VTANR, NYIPC, VTIPC, APIPP

B1f. Develop and Deliver Displays and Presentations

Using information gathered in Action B1b, develop, distribute, or present ANS visual displays and presentations at appropriate venues and events throughout the Lake Champlain Basin. Develop or redesign new materials as needed.

Potential key players: LCBP, LCSG, USFWS, VTANR, NYIPC, VTIPC, APIPP

B1g. Encourage Development of Hazard Analysis and Critical Control Point Plans

Support a full-time appointment to encourage and provide training to private and public organizations in developing hazard analysis and critical control point plans to prevent the spread of ANS in their daily business and resource management operations.

Lead: USFWS, LCSG

Strategy B2. Increase Opportunities for the Sharing of ANS Information throughout the Lake Champlain Basin and Beyond

Issue Statement: Although there is a substantial amount of information currently being collected regarding ANS and associated management activities within the Lake Champlain Basin, there is no established site at which the information can be stored and readily accessed by entities involved in ANS management and the public. Establishing such a repository will facilitate the timely transfer of ANS information between all such entities, help prevent duplication of efforts, and promote a more educated public. A process should also be developed to ensure that information is distributed to all appropriate entities in an expeditious manner. The database should also be coordinated with other regional and national nonindigenous species databases.

Actions

B2a. Develop ANS Database Strategy

Convene ANS Subcommittee of the LCBP TAC to develop strategy for sharing ANS distribution data throughout the Basin in coordination with ongoing local and regional ANS database efforts.

Potential key players: LCBP, LCRC, LCSC, NYSDEC, NYIPC, LCSG, USFWS, USGS, VTANR, APIPP, universities, lake groups

B2b. Create and Maintain ANS Database

Create and maintain a central repository for ANS-related information and make these materials readily available to the public and professionals.

Potential key players: LCBP

Strategy B3. Enforce Existing Laws Controlling the Transport of ANS and Consider New Legislation and/or Regulations Controlling the Propagation, Sale, Collection, Possession, Importation, Purchase, Cultivation, Distribution, and Introduction of ANS

Issue Statement: Currently, numerous laws and regulations in Vermont, New York, and Quebec pertain to the propagation, importation, sale, possession, and release of ANS (see Appendix J). There is a lack of resources to adequately implement many of these authorities. There are also significant gaps in the laws and regulations which could allow the introduction or spread of ANS within the Lake Champlain Basin. For example, successfully prohibiting the introduction of a particular species into one part of the Basin may ultimately be of little value if the species is legally allowed to be introduced into another part of the Basin. Consistency in the laws is also important for presenting a clear message to the public about the importance of ANS spread prevention.

For ANS laws to be effective, greater efforts need to be taken throughout the Basin to inform both the public and law enforcement officials of them. Law enforcement officials must be encouraged to enforce the laws, and the public needs to be encouraged to voluntarily comply with the laws to protect the Basin's water resources.

Actions

B3a. Educate Public About ANS Regulations

Educate the public about laws pertaining to the propagation, sale, collection, possession, importation, purchase, cultivation, transport, distribution, and introduction of ANS, the reasoning behind the laws and regulations, and the environmental consequences of not complying with them.

Potential key players: LCBP, NYSDEC, NYSDOT, APIPP, LCSG, USFWS, VTANR, VTRANS, VTDAFM, lake groups, watershed associations

B3b. Provide Training to Officials About ANS Regulations

Provide training to state and local officials, fish and wildlife wardens, and other appropriate law enforcement officials about ANS and laws and regulations pertaining to the propagation, sale, collection, possession, importation, purchase, cultivation, distribution, and introduction of ANS.

Lead: VTANR

Potential key players: NYSDEC, LCSG, APIPP, USFWS, LCBP, NY State Police, VT State Police

B3c. Review, Evaluate, and Pursue Changes to ANS Regulations

Review and evaluate existing ANS laws, regulations, and permit review processes throughout the Lake Champlain Basin. Pursue changes and coordinate new legislation as appropriate, striving to make them consistent and efficient throughout the Basin.

Potential key players: LCBP, NYSDEC, APIPP, QME, USFWS, VTANR, VTAAFM, VTANR, VTRANS, NYSDEC, NYSDOT, LCSG, lake groups

B3d. Increase Enforcement of ANS Laws and Regulations

Increase enforcement of laws and regulations controlling the propagation, sale, collection, possession, importation, purchase, cultivation, transport, distribution, and introduction of ANS.

Potential key players: NYSDEC, NYSDOT, USFWS, VTANR, VTDAFM, lake groups, local law enforcement officials, NY State Police, VT State Police

Objective C. Early Detection, Monitoring, and Research

A number of monitoring and survey programs within and adjacent to the Lake Champlain Basin (Basin) currently acquire information on the occurrence and distribution of ANS populations. Research efforts are also underway that examine the ecological role of ANS within habitats they invade. Information from these programs is, or could be, used to:

- ✍ periodically assess the current level of the ANS problem within the Basin;
- ✍ conduct risk assessments to determine ANS management priorities;
- ✍ evaluate the effectiveness of management efforts;
- ✍ identify ANS poised to enter the Basin; and
- ✍ establish management priorities for pathways by which ANS are introduced to, and spread throughout, the Basin.

To accomplish these tasks, however, monitoring and research program data need to be compiled and evaluated to determine if there are species that have not been adequately documented, or regions of the Basin that are not sufficiently monitored. In addition, much of the monitoring data collected throughout the Basin could be used in new ways to further our understanding of the ecological role and impacts of current ANS populations on ecosystems and human activities. Monitoring and research programs could then be modified or developed and literature searches conducted to target identified information gaps and current information needs. Ideally, monitoring protocols would also be standardized to facilitate data exchange and comparability.

Strategy C1. Identify and Monitor ANS and Pathways

Issue Statement: While the distribution and extent of several ANS populations in the Basin are well-known, the status of many other ANS is largely unknown. Developing a comprehensive understanding of the presence and distribution of all ANS in the Basin through early detection surveys and monitoring programs is a prerequisite for formulating effective strategies to prevent new introductions of ANS, to limit the spread of existing ANS, and to abate the negative impacts of established ones. Filling these ANS distributional information gaps is, therefore, essential to the fulfillment of all three Plan Goals.

Actions

C1a. VTDEC Aquatic Nuisance Plant Control Program – ED/Monitoring

Continue to monitor Eurasian watermilfoil and water chestnut populations throughout Vermont as part of the VTDEC *Aquatic Nuisance Control Program* and other plant inventories.

Lead: VTANR

Potential key players: lake groups

C1b. Monitor and Map Eurasian Watermilfoil in Lake George

Continue to monitor the spread and locations of new Eurasian watermilfoil sites in Lake George. Conduct studies in the efficacy of using remote sensing to map milfoil locations in Lake George.

Lead: DFWI

Potential key players: FLG

C1c. VTDEC Purple Loosestrife Program - Monitoring

Continue to monitor purple loosestrife populations throughout Vermont as part of the VTDEC Purple Loosestrife Biological Control Program.

Lead: VTDEC

Potential key players: VTANR, USFWS, USDA, lake groups, landowners

C1d. Adirondack Park Invasive Plant Program - Monitoring

Continue and expand APIPP's citizen training and ANS early detection and monitoring program in the Adirondack region.

Lead: APIPP

Potential key players: DFWI, HCSWCD, PSC, BRASS, ASRA, watershed groups, lake groups, local governments

C1e. Sea Lamprey Surveys

Continue to conduct annual electrofishing surveys on tributaries of Lake Champlain to determine the abundance of sea lamprey.

Lead: USFWS

Potential key players: NYSDEC, VTFWD, UVM

C1f. Alewife Monitoring in Lake St. Catherine

Continue monitoring the population status of alewife in Lake St. Catherine, Vermont and nearby waters.

Lead: VTFWD

Potential key players: USFWS

C1g. Alewife Monitoring in Lake Champlain

Document and thoroughly investigate the status of alewives in Lake Champlain; determine if a viable population exists.

Lead: VTFWD

Potential key players: USFWS

C1h. General Fish Surveys

Continue to survey and document the range of nuisance fish species and help detect the occurrence of newly introduced fish species as part of the ongoing fish surveys.

Lead: VTFWD, NYSDEC, USFWS

C1i. Lake Champlain Forage Fish Surveys

Continue annual pelagic forage fish surveys in Lake Champlain to help detect the occurrence of newly introduced fish species.

Lead: VTFWD, USFWS

Potential key players: LCFWC

C1j. Lake Champlain Zebra Mussel Monitoring

Continue the *Lake Champlain Zebra Mussel Monitoring Program* as part of the *Lake Champlain Long-term Water Quality and Biological Monitoring Project*. The Program monitors veligers, settled juveniles and adults at openwater and nearshore stations in Lake Champlain, and surveys for veligers in Lake tributaries and inland lakes. In 2004, the Program will explore methods to quantify adult densities.

Lead: VTANR

Potential key players: NYSDEC, USFWS, LCBP, EPA

C1k. Richelieu River Zebra Mussel Monitoring

Re-establish a zebra mussel monitoring program on the Richelieu River.

Lead: EC

Potential key players: Canadian Coast Guard, QME, non-profit organizations

C1l. Lake George Zebra Mussel Veliger and Juvenile Monitoring

Continue monitoring Lake George for the presence of veligers and juvenile zebra mussels. Lead: DFWI

Potential key players: LGA, LGPC

C1m. Lake George “Drop-A-Brick” Zebra Mussel Monitoring

Continue the volunteer zebra mussel monitoring program, “Drop-A-Brick”, in Lake George.

Lead: LGA

C1n. Identify Locations and Optimal Habitats for Mollusks in Lake George

Expand side-scan sonar benthic mapping on a whole-lake scale to characterize sediment type and plant coverage of the littoral zone and identify optimal habitat types for and locations of native and non-native mollusk populations.

Lead: DFWI, SKIO, ZMTF

Potential key players: FSU

C1o. VTDEC Biological Monitoring Program

Continue to survey for ANS as part of the *VTDEC Monitoring, Assessment and Research Program*, which samples macroinvertebrate, fish, and other biotic communities in dozens of rivers and lakes both within and outside the Basin of

Vermont. In addition, continue to monitor the relative abundance of zebra mussels associated with rare native mussel populations in several Lake Champlain delta areas.
Lead: VTDEC

C1p. LC Long-Term Monitoring Program – Zooplankton

Continue to note the occurrences of nonindigenous aquatic species while analyzing zooplankton samples taken regularly at 12 stations throughout Lake Champlain as part of the *Lake Champlain Long-term Water Quality and Biological Monitoring Project*, a cooperative Vermont/New York effort coordinated through the LCBP.

Lead: NYSDEC

Potential key players: LCRI, VTDEC, LCBP, USEPA

C1q. VT Lay Monitoring Program

Continue to visually track new occurrences of ANS or changes in existing ANS populations in Lake Champlain and 25 other lakes within the Vermont's portion of the Basin as part of the VTDEC Lay Monitoring Program.

Lead: VTDEC

Potential key players: citizens

C1r. NY CSLAP Monitoring Program

Continue to track new occurrences of ANS or changes in existing ANS populations in lakes within the New York portion of the Basin as part of New York's Citizens Lake Assessment Program.

Lead: NYSDEC, NYSFOLA

Potential key players: citizens

C1s. Additional Monitoring Programs

Utilize, develop, or expand other existing ANS monitoring programs or develop new monitoring programs, as appropriate, including citizen-based ANS watcher programs.

Potential key players: LCBP, APIPP, NYSDEC, USFWS, VTANR, LCSG, universities, lake associations

C1t. Maintain List of ANS in the Basin

Compile information from ANS monitoring and survey programs to maintain a list of aquatic nuisance species and their distributions both within the Basin and those with the potential to enter it in coordination with other local and regional ANS panels.

Lead: LCBP

Potential key players: EC, LCBP, NYSDEC, USFWS, VTANR, UVM, PSU, APIPP, USEPA, LCSG, NEANS Panel, APIPP, VTIEPC, NYIPC

C1u. Identify Pathways

Continue to identify all existing and potential pathways of ANS introduction to and within the Lake Champlain Basin. Utilize existing working groups and information from Lake Champlain Basin monitoring programs, as well as research conducted in other regions to assist in identifying and examining potential pathways in coordination with other local and regional ANS panels.

Potential key players: DFWI, LCBP, NYSDEC, NYSCC, NYSDOT, VTRANS, QME, USCG, USFWS, USGS, VTANR, VTAAFM, VTIEPC, NEANS Panel, APIPP, NYIPC, universities

Strategy C2. Study the Ecological Role of Aquatic Nuisance Species

Issue Statement: Developing an understanding of how each nonindigenous aquatic species interacts with the ecosystem it invades and identifying factors contributing to its success are essential for assessing the impacts a species has, or may have, on both the ecosystem and the people who use the ecosystem. It is also critical to the development of effective management techniques and is a necessary piece for risk assessments to determine which species merit management.

While there are numerous programs within the Lake Champlain Basin that currently provide information that could be used to study the ecological role of ANS within the Basin, much of the information is not specifically used for this purpose. This information should be compiled and used to develop an understanding of the ecological role ANS play within the Lake Champlain Basin. As necessary, additional parameters should be added to existing monitoring programs or new programs should be developed. A comprehensive literature search should be conducted for species that are believed to have the potential for entering the Lake Champlain Basin to ascertain to what extent they would impact the Basin ecosystems if introduced.

Actions

C2a. Research Impact of Eurasian Watermilfoil in Lake George

Conduct experiments on the expansion of specific milfoil beds and to better understand the impact of milfoil on native plant species and nutrient pumping by milfoil in Lake George.

Lead: DFWI

C2b. Evaluate Ecological Role of Zebra Mussels

Using data from the Lake Champlain Long-term Water Quality and Biological Monitoring Project, evaluate changes in water quality parameters before and after zebra mussel infestation in Lake Champlain.

Lead: VTDEC

Potential key players: NYSDEC, LCRI, LCBP, universities

C2c. Evaluate Effects of Zebra Mussels on Benthic Community

Continue to document the effects of zebra mussel colonization on the zoobenthic community - especially the shale-cobble zone community. Look at effects on nutrient cycling through and biodiversity of lake benthos.

Lead: VTDEC

C2d. Research Zebra Mussel Adaptability

Conduct experiments to better understand zebra mussel adaptability to changing environmental conditions (e.g. calcium, pH, phytoplankton, etc.)

Lead: DFWI

Potential key players: SKIO

C2e. Research the Ecological Role of Alewives

Research the ecological role and assess the potential impacts alewives will have on Lake Champlain if they successfully invade the Lake.

Lead: LCBP, universities

C2f. Determine Background Thiaminase Levels in Lake Champlain Salmonids

Determine background levels of thiaminase in lake trout and Atlantic salmon in Lake Champlain to compare with future levels if alewives invade Lake Champlain.

Lead: VTDFW and UVM

C2g. Compile Monitoring Data to Determine Ecological Role of ANS

Compile information from existing monitoring and research programs, such as the Long-term Water Quality and Biological Monitoring Project for Lake Champlain, to determine the ecological role of ANS within the Lake Champlain Basin.

Potential key players: LCBP, LCRC, NYSDEC, USFWS, VTANR, LCSG, universities

C2h. Evaluate and Modify Programs Examining Ecological Role of ANS

Evaluate existing programs, recommend modifications to existing programs, and/or recommend new programs and/or research to obtain additional necessary information for determining the ecological role of ANS.

Potential key players LCBP, LCRC, NYSDEC, APIPP, USFWS, VTANR, LCSG, universities

C2i. New Monitoring and Research Programs

Conduct new monitoring and research programs that study the ecological role of ANS, based on priorities identified in Objective D.

Potential key players: LCBP, LCRC, NYSDEC, APIPP, USFWS, VTANR, LCSG, universities

C2j. Literature Searches on Role of Potential Invaders

Conduct a comprehensive literature search for priority species (identified in Objective D) that are suspected to have the potential for entering the Lake Champlain Basin to determine to what extent and in what ways they would impact the Lake Champlain Basin ecosystems if introduced.

Potential key players: LCBP, USFWS, UVM, VTDEC, LCSG

Objective D. Develop, Evaluate, and Prioritize ANS and Management Actions

Several species presently in the Basin are actively managed to limit their distribution and to minimize their ecological, social and economic impacts. ANS management activities, however, are costly to implement and, in most cases, will not result in complete eradication of an invasive species population. Water chestnut, for example, is actively managed in the extreme south and north ends of the Basin; in recent years, over \$400,000 has been expended annually to contain the southern population. Because resources for managing nuisance species are limited, and because of the potential impacts on nontarget species, existing management alternatives, as well as new techniques and approaches, should be evaluated carefully for their effectiveness at producing the desired results as well as for their secondary impacts.

Current ANS management approaches in the Basin include mechanical, chemical, and biological controls and physical barriers. Often multiple approaches are used together and repeated over time to achieve and maintain desired results. For example, Eurasian watermilfoil has been managed through the use of bottom barriers, suction harvesting, mechanical harvesting, hand-pulling, lake drawdowns, hydroraking, chemicals, and biological controls. In addition, several chemicals have been used to control Eurasian watermilfoil in bodies of water within New York and, as of 2004, SONAR A.S. (active ingredient fluridone) has been applied to 5 lakes and ponds in Vermont. Many of these approaches are still used on a trial basis for specific sites and require continual evaluation for their effectiveness and practicality.

The majority of ANS control technologies currently in use within the Lake Champlain Basin are mechanical. These controls: 1) are labor intensive and costly to implement, 2) usually need to be repeated on an annual basis, and 3) may negatively impact native ecosystems. By contrast, biological control technologies, if properly developed and implemented, can: 1) have a relatively low cost, 2) be more effective in the long-term, and 3) minimize impacts to non-target organisms.

Before any biological control program is implemented, however, extensive research must be conducted to ensure that the control will not have adverse impacts on the ecosystem or public health and safety. This research should include literature searches, consultation with experts in other regions, and laboratory and controlled field testing, as appropriate. In recent years, VTDEC and Middlebury College have experimented with using an aquatic weevil, *Euhrychiopsis lecontei*, and Cornell Cooperative Extension along with several New York partners have experimented with an aquatic moth, *Acentria ephemerella*, to control Eurasian watermilfoil. While both studies have shown some encouraging results, further research is needed to determine which factors limit weevil and moth densities in the field (such as fish predation and overwintering conditions), what densities are needed to control Eurasian watermilfoil, and how native plant community response affects the longevity of Eurasian watermilfoil declines.

Once a nuisance species becomes established, management is complicated and expensive. One management approach focuses on ANS prevention by managing pathways of ANS introduction. The Champlain Barge Canal and the Chambly Canal, for example, are essentially open conduits

for nonindigenous aquatic species to enter the Lake Champlain Basin from the Great Lakes and St. Lawrence River regions, respectively. Preventing the passage of nonindigenous species through these pathways, such as the installation of an exclusion device, would help to protect the Lake Champlain Basin from future ANS invasions. In the long-term, such preventive measures would likely prove more cost-effective than managing the impacts once ANS are introduced. Electronic barriers and other exclusion device technologies continue to be implemented, evaluated, and refined in various applications around the world. These technologies should continue to be studied and evaluated for potential use in the Champlain Barge Canal and other waterways within the Basin.

These are several existing ANS issues in need of further research and evaluation to determine the most appropriate management action. To the greatest extent possible, selected management actions should: 1) optimize the use of limited resources; 2) have negligible negative impacts on nontarget species, natural ecological communities, ecological processes, and human activities; and 3) not threaten public health or safety. Management actions may focus on a species (e.g., water chestnut harvesting), on the associated pathways of introduction (e.g., the Champlain Canal, aquarium trade), groups of people potentially associated with the species introduction or transport (e.g., boaters, bait dealers), or groups of people negatively impacted by the species (e.g., lakeshore residents, anglers). Lastly, to the greatest extent practicable, evaluations of ANS management activities in other regions should be used to determine the potential usefulness of such activities within the Lake Champlain Basin. Similarly, evaluations of management activities conducted within the Basin should be made readily available to resource managers in other regions to assist with their development of ANS management strategies.

Strategy D1. Research, Evaluate, and Demonstrate ANS and Pathway Management Alternatives

Issue Statement: Resources available for managing ANS within the Lake Champlain Basin are limited. Consequently, to achieve all three goals of this management plan, it is essential that resources are used for management activities that will produce the greatest net positive results. The potential costs, impacts, and effectiveness of available management techniques for each species or pathway should be examined. At the same time, new approaches should be identified, demonstrated, and evaluated for applicability in the Basin.

Actions

D1a. Evaluate Existing ANS Controls for Aquatic Plants

Continue to evaluate the effectiveness, efficiency, and impacts of past and ongoing ANS control activities within the Lake Champlain Basin, including the use of bottom barriers, suction harvesting, mechanical harvesting, hand-pulling, lake drawdowns, hydroraking, biological controls, and chemicals.

Potential key players: LCBP, LCRC, NYSDEC, USFWS, VTANR, TNC, USDA, VTRANS, LCSG, VTAAFM, APA, lake groups, lakeshore facility operators, marina operators, universities

D1b. Research Use of Weevils and Aquatic Moths

Continue research on the use of a weevil (*Euhrychiopsis lecontei*) and an aquatic moth (*Acentria ephemerella*) as a biological control method for Eurasian watermilfoil and accelerate efforts to demonstrate and evaluate biocontrol effectiveness.

Lead: VTANR, CCEEC

Potential key players: LCRC, NYSDEC, SUNY, USACE, USFWS, lake groups, universities

D1c. Research and Demonstrate Non-chemical Sea Lamprey Controls

Conduct research and experimental projects to explore opportunities for and effectiveness of non-chemical sea lamprey control options.

Lead: USFWS, UVM, TNC, LCSG, LCBP

Potential key players: USACE, NYSDEC, VTFWD, universities

D1d. Evaluate White Crappie and White Perch Impacts and Management Options

Conduct research to evaluate impacts of white crappie and white perch on walleye population in southern Lake Champlain; evaluate management alternatives.

Potential key players: USFWS, VTFWD, NYSDEC

D1e. Develop New Zebra Mussel Controls

Develop and evaluate new zebra mussel control methods (e.g. utilization of benthic mats) in Lake George.

Lead: DFWI

D1f. Cost-Benefit Analyses of Champlain Canal Barrier Options

Use results of feasibility studies of the Cost-Benefit Analyses of the Feasibility of Champlain Canal Barrier Options study and the Chicago Ship and Sanitary Canal Barrier Project to develop and demonstrate an ANS exclusion project for the Champlain Barge Canal.

Lead: LCSG, VTANR, UVM, LCBP

Potential key players: LCRC, NYSDEC, NYSCC, USACE, USFWS, universities

D1g. Study Exclusion Program Options for Chambly Canal

Study the feasibility of implementing an ANS exclusion program in the Chambly Canal.

Potential key players: LCBP, LCRC, NYSDEC, NYSCC, LCSG, VTANR, USACE, USFWS, universities

D1h. Research Secondary Benefits of ANS Control Activities

Research the secondary benefits of ANS control activities, such as mechanical harvesting of plant material for removing nutrients from a lake or for use as biodiesel fuels.

Potential key players: LCRA, lake associations, universities

D1i. Research and Evaluate Additional Controls

Conduct research, feasibility studies and demonstration projects that will inform ANS management decisions, and evaluate the use of new ANS and pathway management alternatives with the potential for use in the Lake Champlain Basin based on priority setting process in Strategy D2.

Potential key players: LCBP, LCRC, NYSDEC, APIPP, NYSCC, LCSG, VTANR, USACE, USFWS, lake groups, universities

D1j. Conduct Literature Searches on Controls

On an ongoing basis, conduct literature searches, network with organizations in other regions, and attend technology conferences to identify potential ANS control strategies for use within the Lake Champlain Basin.

Potential key players: LCBP, LCRC, NYSDEC, APIPP, USFWS, VTANR, lake groups, universities

D1k. Develop BMP's

Develop Best Management Practice guidelines for use by community members and state and local officials to help prevent the spread of ANS throughout the Basin.

Potential key players: APIPP, APA, BRASS, VTANR, VTDEC, LCBP, TNC, lake groups, universities, LCSG

Strategy D2. Prioritize and Select Target Management Implementation Goals

Issue Statement: Numerous management activities which target specific ANS or particular pathways of introduction are ongoing within the Lake Champlain Basin. New approaches to managing ANS and pathways are also being developed and researched. Meanwhile, new introductions of ANS populations into and throughout the Basin occur regularly.

Prioritizing nuisance species for management and prioritizing management alternatives for a given species are necessary to expend limited resources in the most efficient manner possible.

A consistent approach to prioritizing species and management alternatives needs to be developed and implemented on a regular basis by a team of resource managers throughout the Basin. When necessary, full or modified risk assessments should be conducted on select ANS to determine the extent of the impacts caused or potentially caused by each species or specific populations of a species. Factors to be considered when conducting the assessments include: the species' colonization potential, ecological impacts, socioeconomic impacts, management costs, and likelihood of success. A prioritization method should also consider all potential pathways of introduction of ANS identified in Action C1r to determine which pathways pose the greatest risk of introduction of new ANS to the Lake Champlain Basin or spread of existing ANS throughout the Lake Champlain Basin. In some cases, targeting one or more pathways of introduction associated with the ANS may be the most efficient method for preventing the spread of an ANS. Targeting pathways may also have the added benefit of reducing the introduction or spread of multiple ANS.

Actions

D2a. Develop Prioritization Framework

Convene ANS Subcommittee of LCBP TAC to develop decision-making framework to prioritize ANS infestations and pathways for management actions and research considering habitats and species at high risk and those with high social or ecological value.

Lead: LCBP

Potential key players: LCC, NYSDEC, LCSG, USFWS, VTANR, VTAAFM, QME, universities, APIPP, TNC, lake groups

D2b. Apply Prioritization Framework

Apply prioritization framework developed in D2a to create, and periodically update, prioritized list of management implementation activities. Conduct comprehensive risk assessments on select species and pathways, when appropriate.

Potential key players: LCBP, LCC, NYSDEC, LCSG, USFWS, VTANR, VTDAFM, QME, universities, APIPP, TNC, lake groups

D2c. Inform and Direct Research Activities

Use information from D2a and D2b to inform and direct research activities in Strategy D1.

Potential key players: LCBP, USFWS, APIPP, VTANR, VTDAFM, QME, NYSDEC, LCSG, universities.

Objective E. Implement Rapid Response and Management Actions

Strategy E1. Continue or Accelerate Existing ANS Control and Other Management Programs

Issue Statement: Currently, the primary ANS control programs being implemented in the Basin address nuisance populations of sea lamprey, Eurasian watermilfoil, water chestnut, and purple loosestrife. These control programs seek to reduce both short and long-term economic, social, and ecological impacts of nuisance species by reducing their populations and by minimizing their potential spread to uninfested waters. Control programs, however, should also consider restoring the ecological integrity of a habitat to ensure the long-term success of the program. Control programs require consistent funding and personnel to maintain their current levels of success. In addition, new technologies and methods developed and evaluated in Strategy D must be incorporated into existing programs to strengthen their efforts and achieve greater levels of success. Implementing, strengthening, and developing management programs for ANS populations and pathways are necessary to fulfill all three Plan goals.

Actions

E1a. Water Chestnut Management

Using information gathered in Strategy D1a, implement and expand the water chestnut management program on Lake Champlain and other Lake Champlain Basin waters.

Lead: VTANR, NYCC, NYSDEC, TNC, FAPAQ

Potential key players: LCBP, USFWS, lake groups

E1b. Eurasian Watermilfoil Management

Continue control programs for established populations of Eurasian watermilfoil throughout the Basin in order to maintain the plant populations at below nuisance levels and to prevent further spread. Using information gathered in Strategy D1a, modify programs as appropriate.

Potential key players: LGPC, DFWI, NYSDEC, USFWS, VTANR, lake groups, independent contractors

E1c. Vermont Purple Loosestrife Biocontrol Program

Continue to implement VTDEC's purple loosestrife monitoring and biological control program in Vermont. Using information gathered in Strategy D1a, modify program as appropriate.

Lead: VTDEC

Potential key players: VTANR, USFWS, USDA, lake groups, landowners

E1d. New York Purple Loosestrife Biocontrol Program

Continue to implement the purple loosestrife biological control and monitoring program at four New York sites in Plattsburgh, Wadhams, Elizabethtown, and Peru.

Lead: SUNY Plattsburgh, NYSDEC

Potential key players: BRASS, CCEEC, Master Gardeners

E1e. APIPP's Control Program

Continue to implement APIPP's purple loosestrife and Japanese knotweed monitoring and control program in New York. Using information gathered in Strategy D1a, modify program as appropriate.

Lead: APIPP

Potential key players: lake groups, landowners

E1f. Sea Lamprey Management Program

Continue to implement, evaluate, and modify a long-term sea lamprey management program for Lake Champlain. Utilize information from C1b and D1e, as appropriate.

Lead: NYSDEC, USFWS, VTFWD

E1g. Alewife Control in Lake St. Catherine

Implement Lake St. Catherine reclamation project to control alewife population, if Task C1g determines the absence of a viable population of alewife in Lake Champlain.

Lead: USFWS

Potential key players: VTFWD

E1h. Zebra Mussel Control in Lake George

Remove zebra mussels at high-risk Southern Lake George site.

Lead: DFWI

Potential key players: BB, local volunteers

E1i. Additional ANS Management

Implement additional ANS management actions as identified in Strategy D2.

Potential key players: LCBP, USFWS, APIPP, VTANR, TNC, QME, NYSDEC, LCSG, lake groups.

Strategy E2. Develop and Implement a Rapid Response Protocol for Addressing New Populations of ANS throughout the Lake Champlain Basin

Issue Statement: Once ANS populations become established, eradication is nearly impossible and ongoing management is costly and complicated. New infestations must be detected early and acted upon swiftly to minimize economic, social, and ecological impacts, as well as to allow for the possibility of eradication. This requires coordination among multiple agencies and organizations, advance planning, and available resources and personnel. Formulating a rapid response protocol and designating a rapid response team to take action once a new infestation is reported will help to minimize future impacts of advancing ANS populations in the Basin.

Actions

E2a. Develop Rapid Response Protocol

In coordination with state, regional, and national rapid response plan development processes, develop a Lake Champlain Basin Rapid Response Protocol for addressing new introductions of ANS populations. Hire support staff to work with ANS subcommittee to develop protocol and pursue grant proposals and other funding sources.

Potential key players: LCBP, NYSDEC, APIPP, NYAPA, USFWS, VTANR, LCSG, TNC

E2b. Employ Rapid Response Team

Form and utilize ANS Rapid Response Teams to detect new ANS populations and to implement emergency control activities to eliminate new populations or to prevent populations from reaching nuisance levels. Hire support staff to work with ANS subcommittee to coordinate activities of rapid response teams.

Potential key players: LCBP, NYSDEC, USFWS, APIPP, NYAPA, VTANR, LCSG, TNC, lake groups, watershed groups

VI. Implementation Table

Actions/Tasks		Lead Organization(s)	Funding Needs ^ FY05	Funding Needs ^ FY06	Future Funding ^ Needs	Status	Priority
Task ID	Short Description						
Objective A. Strengthen Coordination of ANS Efforts							
A1a.	Regional ANS Coordinator	LCBP	\$75,000	\$78,750	\$82,688	Ongoing	High
A1b.	Additional Regional ANS Staff	several partners	\$75,000	\$78,750	\$82,688	Ongoing	High
A1c.	ANS Advisory Committee *	LCBP	\$7,500	\$7,875	\$8,269	Needed	High
A1d.	Coordination with NYS Plan *	LCBP	\$3,750	\$3,938	\$4,134	Ongoing	High
A1e.	Northeast Coordination *	LCBP, LCSG, VTDEC, NYDEC	\$7,500	\$7,875	\$8,269	Ongoing	High
A1f.	National Coordination *	LCBP	\$7,500	\$7,875	\$8,269	Ongoing	High
Objective B. Education, Outreach, and Legislation							
B1a.	Expand ANS E&O Programs *	several partners	\$150,000	\$157,500	\$165,375	Ongoing	High
B1b.	Evaluate ANS E&O Programs *	several partners	\$22,500	\$23,500	\$25,000	Ongoing	High
B1c.	Develop or Acquire New ANS Educational Materials *	several partners	\$22,500	\$23,500	\$25,000	Ongoing	High
B1d.	Post ANS Advisory Signs	several partners	\$130,000	\$136,500	\$143,325	Ongoing	High
B1e.	Develop and Utilize PSA's *	several partners	\$22,500	\$23,500	\$25,000	Ongoing	High
B1f.	Develop and Deliver Displays and Presentations *	several partners	\$22,500	\$23,500	\$25,000	Ongoing	High
B1g.	Encourage Development of Hazard Analysis and Critical Control Point Plans	USFWS, LCSG		\$75,000	\$75,000	Needed	High
B2a.	Develop ANS Database Strategy	several partners	\$15,000			Year 1	High
B2b.	Create and Maintain ANS Database	several partners		\$7,875	\$8,269	Ongoing	High
B3a.	Educate Public About ANS Regulations *	several partners	\$22,500	\$23,500	\$25,000	Ongoing	High
B3b.	Provide Training to Officials About ANS Regulations	VTANR	\$22,500	\$23,500	\$25,000	Ongoing	High
B3c.	Review, Evaluate, and Pursue Changes to ANS Regulations	several partners	\$22,500	\$23,500	\$25,000	Ongoing	High
B3d.	Increase Enforcement of ANS Laws and Regulations	several partners	\$22,500	\$23,500	\$25,000	Ongoing	High

Objective C. Early Detection, Monitoring and Research		Lead Organization(s)	Funding Needs ^ FY05	Funding Needs ^ FY06	Future Funding ^ Needs	Status	Priority
C1a.	VTDEC Aquatic Nuisance Plant Control Program – ED/Monitoring	VTANR	\$20,000	\$20,000	\$25,000	Ongoing	High
C1b.	Monitor and Map Eurasian Watermilfoil in Lake George	DFWI	\$100,000	\$50,000	\$15,000	Ongoing	High
C1c.	VTDEC Purple Loosestrife Program - Monitoring	VTDEC	\$8,500	\$8,500	\$8,500	Ongoing	High
C1d.	Adirondack Park Invasive Plant Program - Monitoring	APIPP	\$100,000	\$100,000	\$100,000	Ongoing	High
C1e.	Sea Lamprey Surveys	USFWS	\$275,000	\$275,000	\$275,000	Ongoing	High
C1f.	Alewife Monitoring in Lake St. Catherine	VTFWD	\$100,000	\$100,000	\$100,000	Ongoing	High
C1g.	Alewife Monitoring in Lake Champlain	VTFWD, USFWS	\$225,000	\$225,000		Year 1 & 2	High
C1h.	General Fish Surveys	VTFWD, NYSDEC, USFWS	\$4,000	\$4,000	\$4,000	Ongoing	High
C1i.	Lake Champlain Forage Fish Surveys	VTFWD, USFWS	\$2,000	\$2,000	\$2,000	Ongoing	High
C1j.	Lake Champlain Zebra Mussel Monitoring	VTANR	\$15,000	\$15,000	\$15,000	Ongoing	Medium
C1k.	Richelieu River Zebra Mussel Monitoring	EC	\$8,000	\$8,000	\$8,000	Needed	High
C1l.	Lake George Zebra Mussel Veliger and Juvenile Monitoring	DFWI	\$37,000	\$37,000	\$37,000	Ongoing	High
C1m.	Lake George "Drop-a-Brick" Zebra Mussel Monitoring Program	LGA	\$15,000	\$15,000	\$15,000	Ongoing	High
C1n.	Identify Locations and Optimal Habitats for Mollusks in Lake George	DFWI, SKIO, ZMTF	\$250,500	\$80,500	\$80,500	Ongoing	High
C1o.	VTDEC Biological Monitoring Program	VTDEC	\$4,000	\$4,000	\$4,000	Ongoing	High
C1p.	LC Long-term Monitoring Program - Zooplankton	NYSDEC	\$1,500	\$1,500	\$1,500	Ongoing	High
C1q.	VT Lay Monitoring Program	VTDEC	\$5,000	\$5,000	\$5,000	Ongoing	High
C1r.	NY CSLAP Monitoring Program	NYSDEC, NYSFOLA	\$2,500	\$2,500	\$2,500	Ongoing	High
C1s.	Additional Monitoring Programs	several partners				As needed	High
C1t.	Maintain List of ANS in the Basin *	LCBP	\$3,750	\$3,938	\$4,134	Annual	Medium
C1u.	Identify ANS Pathways	several partners	\$5,000	\$5,000	\$5,000	Ongoing	High
C2a.	Research Impacts of Eurasian Watermilfoil in Lake George	DFWI	\$45,000	\$45,000	\$45,000	Ongoing	High
C2b.	Evaluate Ecological Role of Zebra Mussels	VTDEC	\$3,000			Year 1	Medium
C2c.	Evaluate Effects of Zebra Mussels on Benthic Community	VTDEC	\$30,000			Year 1	Medium

C2d.	Research Zebra Mussel Adaptability	DFWI	\$55,000	\$55,000	\$55,000	Ongoing	High
C2e.	Research the Ecological Role of Alewives	LCBP, universities		\$50,000	\$50,000	Needed	High
C2f.	Determine Background Thiaminase Levels in Lake Champlain Salmonids	VTDFW, UVM	\$13,000			Ongoing	High
C2g.	Compile Monitoring Data to Determine Ecological Role of ANS	several partners	\$10,000	\$10,000	\$10,000	Ongoing	Medium
C2h.	Evaluate and Modify Programs Examining Ecological Role of ANS	several partners	\$5,000	\$5,000	\$5,000	Ongoing	Medium
C2i.	New Monitoring and Research Programs	several partners				As needed	Medium
C2j.	Literature Searches on Role of Potential Invaders *	several partners	\$3,750	\$3,938	\$4,134	Ongoing	High
Objective D. Develop, Evaluate, and Prioritize ANS and Management Actions		Lead Organization(s)	Funding Needs ^ FY05	Funding Needs ^ FY06	Future Funding ^ Needs	Status	Priority
D1a.	Evaluate Existing ANS Controls for Aquatic Plants	several partners	\$10,000	\$10,000	\$10,000	Ongoing	High
D1b.	Research Use of Weevils and Aquatic Moths	VTANR, CCEEC	\$20,000	\$20,000	\$20,000	Ongoing	High
D1c.	Research and Demonstrate Non-chemical Sea Lamprey Controls	USFWS, UVM, TNC, LCSG, LCBP	\$50,000	\$50,000	\$50,000	Ongoing	High
D1d.	Evaluate White Crappie and White Perch Impacts and Management Options	No lead identified	\$70,000	\$70,000		Year 1 and 2	High
D1e.	Develop New Zebra Mussel Controls	DFWI	\$35,000	\$35,000	\$35,000	Ongoing	High
D1f.	Cost-Benefit Analyses of Champlain Canal Barrier Options	LCSG, VTANR, UVM, LCBP		\$900,000	\$100,000	Year 2 and 3	High
D1g.	Study Exclusion Program Options for Chambly Canal	No lead identified		\$100,000		Year 2	High
D1h.	Research Secondary Benefits of ANS Control Activities	No lead identified				As needed	Medium
D1i.	Research and Evaluate Additional Controls	several partners				As needed	High
D1j.	Conduct Literature Searches on Controls *	several partners				As needed	High
D1k.	Develop BMP's	several partners	\$7,500	\$7,875	\$8,269	Ongoing	High
D2a.	Develop Prioritization Framework *	LCBP	\$4,500			Year 1	High
D2b.	Apply Prioritization Framework	several partners	\$3,000	\$3,000	\$3,000	Annual	High
D2c.	Inform and Direct Research Activities	several partners				Ongoing	High
Objective E. Implement Rapid Response and Management Actions		Lead Organization(s)	Funding Needs ^ FY05	Funding Needs ^ FY06	Future Funding ^ Needs	Status	Priority
E1a.	Water Chestnut Management	VTANR, NYCC, NYSDEC,	\$175,000	\$175,000	\$175,000	Ongoing	High

		TNC, FAPAQ					
E1b.	Eurasian Watermilfoil Management	several partners	\$1,500,000	\$1,500,000	\$1,500,000	Ongoing	High
E1c.	Vermont Purple Loosestrife Biocontrol Program	VTDEC	\$25,500	\$25,500	\$25,500	Ongoing	High
E1d.	New York Purple Loosestrife Biocontrol Program	SUNY Plattsburgh, NYSDEC	\$5,000	\$5,000	\$5,000	Ongoing	High
E1e.	APIPP's Control Program	APIPP	\$5,600	\$5,600	\$5,600	Ongoing	High
E1f.	Sea Lamprey Management Program	NYSDEC, USFWS, VTFWD	\$600,000	\$600,000	\$600,000	Ongoing	High
E1g.	Alewife Control in Lake St. Catherine	USFWS	\$50,000	\$50,000	\$700,000	Year 1, 2 & 3	High
E1h.	Zebra Mussel Control in Lake George	DFWI	\$36,000	\$36,000	\$36,000	Ongoing	High
E1i.	Additional ANS Management	several partners				As needed	High
E2a.	Develop Rapid Response Protocol *	several partners	\$20,000	\$20,000	\$20,000	Needed	High
E2b.	Employ Rapid Response Team	several partners				As needed	High

* Task and funding needs also part of Task A1a.

^ Funding estimates are approximate and include only the ANS related portion of several programs.

VII. Appendices

A. Section 1204 of the National Invasive Species Act of 1996

(a) STATE OR INTERSTATE INVASIVE SPECIES MANAGEMENT PLANS.--

(1) IN GENERAL.--After providing notice and opportunity for public comment, the Governor of each State may prepare and submit, or the Governors of the States and the governments of Indian Tribes involved in an interstate organization, may jointly prepare and submitB

(A) a comprehensive management plan to the Task Force for approval which identifies those areas or activities within the State or within the interstate region involved, other than those related to public facilities, for which technical, enforcement, or financial assistance (or any combination thereof) is needed to eliminate or reduce the environmental, public health, and safety risks associated with aquatic nuisance species, particularly the zebra mussel; and

(B) a public facility management plan to the Assistant Secretary for approval which is limited solely to identifying those public facilities within the State or within the interstate region involved for which technical and financial assistance is needed to reduce infestations of zebra mussels.

(2) CONTENT.--Each plan shall, to the extent possible, identify the management practices and measures that will be undertaken to reduce infestations of aquatic nuisance species. Each plan shallB

(A) identify and describe State and local programs for environmentally sound prevention and control of the target aquatic nuisance species;

(B) identify Federal activities that may be needed for environmentally sound prevention and control of aquatic nuisance species and a description of the manner in which those activities should be coordinated with State and local government activities;

(C) identify any authority that the State (or any State or Indian Tribe involved in the interstate organization) does not have at the time of the development of the plan that may be necessary for the State (or any State or Indian Tribe involved in the interstate organization) to protect public health, property, and the environment from harm by aquatic nuisance species; and

(D) a schedule of implementing the plan, including a schedule of annual objectives, and enabling legislation.

(3) CONSULTATION.--

(A) In developing and implementing a management plan, the State or interstate organization should, to the maximum extent practicable, involve local governments and regional entities, Indian Tribes, and public and private organizations that have expertise in the control of aquatic nuisance species.

(B) Upon the request of a State or the appropriate official of an interstate organization, the Task Force or the Assistant Secretary, as appropriate under paragraph (1), may provide technical assistance in developing and implementing a management plan.

(4) PLAN APPROVAL.--Within 90 days after the submission of a management plan, the Task Force or the Assistant Secretary in consultation with the Task Force, as appropriate under paragraph (1), shall

review the proposed plan and approve it if it meets the requirements of this subsection or return the plan to the Governor or the interstate organization with recommended modifications.

(b) GRANT PROGRAM.--

(1) STATE GRANTS.--The Director may, at the recommendation of the Task Force, make grants to States with management plans approved under subsection (a) for the implementation of those plans.

(2) APPLICATION.--An application for a grant under this subsection shall include an identification and description of the best management practices and measures which the State proposes to utilize in implementing an approved management plan with any Federal assistance to be provided under the grant.

(3) FEDERAL SHARE.--

(A) The Federal share of the cost of each comprehensive management plan implemented with Federal assistance under this section in any fiscal year shall not exceed 75 percent of the cost incurred by the State in implementing such management program and the non-Federal share of such costs shall be provided from non-Federal sources.

(B) The Federal share of the cost of each public facility management plan implemented with Federal assistance under this section in any fiscal year shall not exceed 50 percent of the cost incurred by the State in implementing such management program and the non-Federal share of such costs shall be provided from non-Federal sources.

(4) ADMINISTRATIVE COSTS.--For the purposes of this section, administrative costs for activities and programs carried out with a grant in any fiscal year shall not exceed 5 percent of the amount of the grant in that year.

(5) IN-KIND CONTRIBUTIONS.--In addition to cash outlays and payments, in-kind contributions of property or personnel services by non-Federal interests for activities under this section may be used for the non-Federal share of the cost of those activities.

(c) ENFORCEMENT ASSISTANCE.--Upon request of a State or Indian tribe, the Director or the Under Secretary, to the extent allowable by law and in a manner consistent with section 141 of title 14, United States Code, may provide assistance to a State or Indian tribe in enforcing an approved State or interstate invasive species management plan.

B. Opportunities for Action; An Evolving Plan for the Future of the Lake Champlain Basin (OFA)

The Lake Champlain Basin Program (LCBP) was established to coordinate the activities envisioned by the Special Designation Act (see Appendix C). The LCBP is a federally-funded initiative working in partnership with agencies, organizations and individuals to develop and implement *Opportunities for Action* (OFA). During the development of OFA, the program was guided by the Management Conference (LCMC), a 31-member board representing a broad spectrum of Lake-Basin interests and organizations from both New York and Vermont, including local government and citizen representatives, scientists, state legislators, state government and federal agencies (See Appendix F). The Management Conference was advised by a Technical Advisory Committee, composed of resource managers, physical and social scientists and business and economic experts, and by the New York and Vermont Citizens Advisory Committees (CACs). The Management Conference was also advised by two subcommittees, the Education and Outreach Committee and the Plan Formulation Team, and it worked with the Lake Champlain Research Consortium (LCRC), formed by seven academic institutions in the Lake Champlain Basin. Formal involvement of Quebec is through the Lake Champlain Steering Committee, which meets at least twice per year, to coordinate Lake related management activities.

The LCBP worked hard to involve the public and respond to research results in developing OFA. Twenty-eight public input meetings, citizen perception surveys, focus group discussions, technical workshops, and research, monitoring and demonstration projects all helped to identify the issues and priority actions presented in the Plan.

In the fall of 1994, a draft of *OFA* was released to the public. In the spring of 1995, a series of six public input meetings were held throughout the Basin to receive feedback on the Draft Plan. Hundreds of written comments along with input from the public meetings and focus group sessions provided the Management Conference and its subcommittees with the information needed to revise the Draft Plan. Many of the revisions in this Plan are a direct result of recommendations by the citizens of the Basin. Some of these recommendations (in bold) include:

- **The Plan should be shorter and easier to read.**
The Plan was changed to focus only on the issues and recommended actions. The majority of background information and research results have been included in a separate technical report published by the LCBP.
- **The actions presented in the Plan should be prioritized.**
The LCMC discussed the actions at length and agreed on priorities, which are indicated in this Plan.
- **Additional economic information should be presented with the Plan.**
Chapter 6 focuses specifically on this issue and provides additional economic information. A supplemental economic analysis of the Plan is also available.
- **The Plan should oppose any inclusion of unfunded mandates.**
The LCMC worked hard to ensure that the actions presented in this Plan do not include unfunded mandates.
- **The Plan should emphasize education rather than expanded regulation.**
The LCMC agreed that education is preferable to regulation and emphasized it along with action at the local level as the primary means for implementing the Plan (See Chapter 5).
- **The Plan should promote and foster the vitality of existing organizations.**
The LCMC recommends that existing organizations should be responsible for the implementation of the Plan.

Final formal public hearings on the draft Plan were held in New York and Vermont in the summer of 1996 and *Opportunities For Action* was completed in October 1996. The Plan was revisited and revised in April 2003. The governors of New York and Vermont and by the EPA Regional Administrators of New England and Region 2 signed both the 1996 Plan and the 2003 revision. The Premier of Quebec provided a letter of endorsement for the 2003 revision.

Existing agencies and organizations are responsible for implementing the priority actions of the Plan. Following completion of the 1996 Plan, the Lake Champlain Management Conference was dissolved and the Steering Committee assumed the oversight of Plan implementation. The Steering Committee is also responsible for revisiting the Plan every two years to update the Plan priorities based on new knowledge and changing environmental conditions.

C. Lake Champlain Special Designation Act

On November 5, 1990, the *Lake Champlain Special Designation Act* was signed into law. Sponsored by Senators Leahy and Jeffords from Vermont and Senators Moynihan and D'Amato from New York, this legislation designated Lake Champlain as a resource of national significance. The goal of the Act was to bring together people with diverse interests in the Lake to create a comprehensive pollution prevention, control and restoration plan for protecting the future of Lake Champlain and its surrounding watershed. The act specifically required examination of water quality, fisheries, wetlands, wildlife, recreational and cultural resource issues. The challenge was both to identify particular problems requiring management action and to chart an integrated plan for the future of the Lake Champlain Basin. *Opportunities for Action: An Evolving Plan for the Future of the Lake Champlain Basin*, covers a broad range of issues and incorporates the views of citizens, economic advisors, scientists and others.

PUBLIC LAW 101- 596 B Nov 16, 1990

TITLE III--LAKE CHAMPLAIN

SHORT TITLE

SEC. 301. This title may be cited as the 'Lake Champlain Special Designation Act of 1990'.

DEMONSTRATION PROGRAM

SEC. 302. Paragraph (2) of section 314(d) of the Federal Water Pollution Control Act (33 U.S.C. 1324(d)) is amended by inserting 'Lake Champlain, New York and Vermont;' before 'Lake Houston, Texas'.

lake champlain management conference

SEC. 303. Title I of the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.) is amended by adding at the end thereof the following new sectionB

'Lake Champlain Management Conference

'SEC. 120. (a) ESTABLISHMENT- There is established a Lake Champlain Management Conference to develop a comprehensive pollution prevention, control, and restoration plan for Lake Champlain. The Administrator shall convene the management conference within ninety days of the date of enactment of this section.

'(b) MEMBERSHIP- The Members of the Management Conference shall be comprised ofB

'(1) the Governors of the States of Vermont and New York;

'(2) each interested Federal agency, not to exceed a total of five members;

'(3) the Vermont and New York Chairpersons of the Vermont, New York, Quebec Citizens Advisory Committee for the Environmental Management of Lake Champlain;

'(4) four representatives of the State legislature of Vermont;

'(5) four representatives of the State legislature of New York;

'(6) six persons representing local governments having jurisdiction over any land or water within the Lake Champlain basin, as determined appropriate by the Governors; and

'(7) eight persons representing affected industries, nongovernmental organizations, public and private educational institutions, and the general public, as determined appropriate by the trigovernmental Citizens Advisory Committee for the Environmental Management of Lake Champlain, but not to be current members of the Citizens Advisory Committee.

'(c) TECHNICAL ADVISORY COMMITTEE- (1) The Management Conference shall, not later than one hundred and twenty days after the date of enactment of this section, appoint a Technical Advisory Committee.

'(2) Such Technical Advisory Committee shall consist of officials of: appropriate departments and agencies of the Federal Government; the State governments of New York and Vermont; and governments of political subdivisions of such States; and public and private research institutions.

'(d) RESEARCH PROGRAM- (1) The Management Conference shall establish a multi-disciplinary environmental research program for Lake Champlain. Such research program shall be planned and conducted jointly with the Lake Champlain Research Consortium.

'(e) POLLUTION PREVENTION, CONTROL, AND RESTORATION PLAN- (1) Not later than three years after the date of the enactment of this section, the Management Conference shall publish a pollution

prevention, control, and restoration plan (hereafter in this section referred to as the `Plan') for Lake Champlain.

`(2) The Plan developed pursuant to this section shallB

`(A) identify corrective actions and compliance schedules addressing point and nonpoint sources of pollution necessary to restore and maintain the chemical, physical, and biological integrity of water quality, a balanced, indigenous population of shellfish, fish and wildlife, recreational, and economic activities in and on the lake;

`(B) incorporate environmental management concepts and programs established in State and Federal plans and programs in effect at the time of the development of such plan;

`(C) clarify the duties of Federal and State agencies in pollution prevention and control activities, and to the extent allowable by law, suggest a timetable for adoption by the appropriate Federal and State agencies to accomplish such duties within a reasonable period of time;

`(D) describe the methods and schedules for funding of programs, activities, and projects identified in the Plan, including the use of Federal funds and other sources of funds; and

`(E) include a strategy for pollution prevention and control that includes the promotion of pollution prevention and management practices to reduce the amount of pollution generated in the Lake Champlain basin.

`(3) The Administrator, in cooperation with the Management Conference, shall provide for public review and comment on the draft Plan. At a minimum, the Management Conference shall conduct one public meeting to hear comments on the draft plan in the State of New York and one such meeting in the State of Vermont.

`(4) Not less than one hundred and twenty days after the publication of the Plan required pursuant to this section, the Administrator shall approve such plan if the plan meets the requirements of this section and the Governors of the States of New York and Vermont concur.

`(5) Upon approval of the plan, such plan shall be deemed to be an approved management program for the purposes of section 319(h) of this Act and such plan shall be deemed to be an approved comprehensive conservation and management plan pursuant to section 320 of this Act.

`(f) GRANT ASSISTANCE- (1) The Administrator may, in consultation with the Management Conference, make grants to State, interstate, and regional water pollution control agencies, and public or nonprofit agencies, institutions, and organizations.

`(2) Grants under this subsection shall be made for assisting research, surveys, studies, and modeling and technical and supporting work necessary for the development of the Plan and for retaining expert consultants in support of litigation undertaken by the State of New York and the State of Vermont to compel cleanup or obtain cleanup damage costs from persons responsible for pollution of Lake Champlain.

`(3) The amount of grants to any person under this subsection for a fiscal year shall not exceed 75 per centum of the costs of such research, survey, study and work and shall be made available on the condition that non-Federal share of such costs are provided from non-Federal sources.

`(4) The Administrator may establish such requirements for the administration of grants as he determines to be appropriate.

`(g) DEFINITION- For the purposes of this section, the term `Lake Champlain drainage basin' means all or part of Clinton, Franklin, Warren, Essex, and Washington counties in the State of New York and all or part of Franklin, Grand Isle, Chittenden, Addison, Rutland, Lamoille, Orange, Washington, Orleans, and

Caledonia counties in Vermont, that contain all of the streams, rivers, lakes, and other bodies of water, including wetlands, that drain into Lake Champlain.

^(h) STATUTORY INTERPRETATION- Nothing in this section shall be construed so as to affect the jurisdiction or powers of--

^(1) any department or agency of the Federal Government or any State government; or

^(2) any international organization or entity related to Lake Champlain created by treaty or memorandum to which the United States is a signatory.

^(i) AUTHORIZATION- There are authorized to be appropriated to the Environmental Protection Agency to carry out this section \$2,000,000 for each of fiscal years 1991, 1992, 1993, 1994, and 1995'.

D. Lake Champlain Basin ANS Management Plan – Review Committees and Writing Staff

2000 Plan Review Committee

Susan Bulmer
VT Department of Forests, Parks and Recreation

Lori Fisher
Lake Champlain Committee

Ginny Garrison
VT Department of Environmental Conservation

Barry Gruessner/Eric Perkins (former)
Lake Champlain Basin Program

Tim Hess
VT Department of Fish and Wildlife

Ken Kogut
NY State Dept. of Environmental Conservation

Yves de Lafontaine
Environment Canada

Gérard Massé
Quebec Ministry of the Environment

James McCardell
NY State Soil and Water Conservation Committee

Scott Pfister
VT Department of Agriculture, Food and Markets

Bob Reinhardt
NY State Parks, Recreation and Historic Preservation

Lee Steppacher
United States Environmental Protection Agency

David Tilton
United States Fish and Wildlife Service

Mary Watzin
University of Vermont

2000 Plan Writing Staff

Ann Bove
VT Department of Environmental Conservation

Holly Crosson
VT Department of Environmental Conservation

Michael Hauser
VT Department of Environmental Conservation

Tim Sinnott
NY State Dept. of Environmental Conservation

2004 Plan Revision Review Committee

Erik Beck

US Environmental Protection Agency

Pierre Bilodeau

Société de la Faune et des Parcs du Québec

Ann Bove

VT Department of Environmental Conservation

Sean Connin

Adirondack Park Agency

Mary Droege/Paul Marangelo

The Nature Conservancy

John Galvez/Craig Martin

US Fish and Wildlife Service

Shawn Good

VT Department of Fish and Wildlife

Ken Kogut

NYS Department of Environmental Conservation

Miranda Lescaze

Lake Champlain Basin Program

Mark Malchoff

Lake Champlain Sea Grant

J. Ellen Marsden

University of Vermont

Tim Mihuc

Lake Champlain Research Institute

Hilary Oles

Adirondack Park Invasive Plant Program

Scott Pfister

VT Agency of Agriculture, Food, and Markets

Robert Reinhardt

NYS Office of Parks Recreation, and Historic Preservation

Tim Sinnott

NYS Department of Environmental Conservation

Michael Winslow

Lake Champlain Committee

2004 Plan Revision Writing Staff

Michael Hauser

VT Department of Environmental Conservation

Lisa Windhausen

Lake Champlain Basin Program

E. 2000 Lake Champlain Basin ANS Management Plan – Public Comments

Following is a list of comments regarding the 2000 Lake Champlain Basin ANS Management Plan and general Lake Champlain Basin ANS issues recorded at public meetings in July and August 1999. Responses to specific comments are listed where appropriate:

1. What degree of water chestnut funding is proportional to the Northward migration of plants? Increased funding for water chestnut harvesting would push the plants further south, but shouldn't the problem be addressed at the south end of the Lake first, then move north?

The Lake Champlain water chestnut population extends from the extreme southern end of the Lake northward. Its northward spread is facilitated by the northwardly flow of the Lake. The Lake Champlain water chestnut harvesting program is limited by availability of funds. Each year the harvesting starts at the northernmost edge of the water chestnut population and moves southward to prevent the population from expanding further northward in the Lake. If the limited available funds were first applied to the dense population in the southernmost portion of the Lake,

there would be insufficient funds to also harvest the northern populations and those populations would increase in density and advance northward. Funding for each of the last two years has been adequate to halt the northward advance of the water chestnut population and to begin to harvest further south than in the many previous years. Sustained funding at current or higher levels should allow for some further reductions in the southern population. Higher funding levels would be necessary to reduce the entire Lake water chestnut population below nuisance levels.

2. I still feel the water chestnut harvesting program does not address the problem in the South Lake.

(See response to 1.)

3. Why does the harvesting stop at Benson Landing boat access?

(See response to 1.)

4. Recently the NY CAC hosted a tour of the South Lake. Representatives from the New York State Canal Authority were present. Since water chestnut congestion in the South Lake inhibits the full use of the canal, perhaps New York state agency involvement/funding should be forthcoming. Water chestnut control is one of key issues that the NY CAC receives comments about on a regular basis.

5. Chestnuts are also a problem for waterfowl hunting in the marshes, resulting in a decrease in potential revenue.

6. How much funding would be needed to control the population?

It is difficult to estimate the cost of completely controlling the water chestnut population in Lake Champlain due to the magnitude of the population in the southernmost portions of the Lake. To harvest all of the current Lake Champlain population accessible to mechanical harvesters in one summer season would likely exceed \$1 million. A large bank of viable seeds exists in the sediment in the southern portion of the Lake, necessitating comparable expenditures for at least several consecutive years to cause a long-term decline in the population. Harvesting will not completely remove water chestnut from the Lake as there are plants (and seeds) established in adjacent wetland areas that are difficult to locate and remove. A long-term management program would need to be maintained to prevent these isolated plants and seeds from expanding into larger populations

7. Suggestion: A resolution should be coordinated for South Lake towns to send to the legislators so that a consistent message can emphasize the need to address water chestnut and Eurasian watermilfoil issues.

8. Why does the milfoil harvesting machine not go into Owl=s Point Bay? Stays in main lake-how much would it cost to have harvester come in?

The harvesting machine seen on the Lake is specifically targeting populations of water chestnut. At the present time there is no mechanical harvesting program for Eurasian watermilfoil on Lake Champlain. A survey would have to be conducted of the bay to develop an estimate for harvesting the Eurasian watermilfoil population there, but it is likely to be very expensive.

9. Any reason to believe that I=ll be able to ever use my waterfront in Bridport? It is very difficult to access because of the weeds and it seems to get worse each year.

Through the Lake Champlain Basin ANS Management Plan a number of actions will be taken to identify viable control methods for Eurasian watermilfoil, including additional research on the Eurasian watermilfoil weevil. Pending the results of these studies and the availability of funds, management of Eurasian watermilfoil populations in Lake Champlain may be possible to reclaim the bays.

10. If phosphorus is what causes milfoil, why is milfoil greater when we are doing so well with phosphorus reduction?

Eurasian watermilfoil gets the majority of the phosphorous needed for growth from the sediments as opposed to the water column. Although phosphorous levels may be reduced in the water column, levels can remain higher in the

sediments for a longer period. There are a number of other factors that affect Eurasian watermilfoil plant growth as well. Climatic conditions can cause significant changes in Eurasian watermilfoil population size and health from year to year. An improvement in water clarity can lead to increased growth of aquatic plants such as Eurasian watermilfoil by allowing for greater light penetration which is often a limiting factor in the growth of submerged aquatic plants. A significant increase in water clarity has been detected in the southern portion of Lake Champlain since the introduction of zebra mussels.

11. *Are they [Canadians] paying money towards milfoil and phosphorus reduction relative to their use of Lake?*

Quebec recognizes the importance of the health of the whole Lake and has committed resources to phosphorous reduction in Missisquoi Bay, part of which is in Quebec.

12. *Milfoil in Bridport creates a solid mass. We=re unable to get boats through. What can be done?*

(See response to 9.)

13. *The State of VT should come up with dollar amount to give to congress and legislature to pursue funding sources for nuisance aquatic species control, be specific.*

14. *What do the weevils eat after the Eurasian watermilfoil is gone?*

The feeding behavior of weevils (*Euhrychiopsis lecontei*) was investigated in experiments with numerous common aquatic plants. Of all the native plants, weevils fed only on native watermilfoil plants, and unlike the nonnative Eurasian watermilfoil (*Myriophyllum spicatum*), the native watermilfoil species do not appear to be significantly impacted. The weevils thrive on Eurasian watermilfoil, so when the plant is abundant, a large population of the weevil can be supported. If the Eurasian watermilfoil population declines due to the feeding of the weevil and/or other factors, a decline in the weevil population will follow as there will be less food available for the weevils.

15. *Lappan Bay- 5 yrs ago, there was no visible growth. If you wait until \$1 million is available you will lose the battle, if something is not done in the South Lake boats will not be able to get through including boats leading to the canal and NYC.*

F. Lake Champlain Management Conference (1991-1996)

Thomas E. Audet

Orwell, VT
Farmer

Mark Barie

Rouses Point, NY
Champlain Development Corporation

Eleanor Berger

Plattsburgh, NY
New York Citizens Advisory Committee Chair

Wayne H. Byrne

Plattsburgh, NY
New York Citizens Advisory Committee
Education & Outreach Committee

Gregory Campbell

Keesville, NY
Adirondack Conservation Council
Adirondack Park Agency Chair

Robert E. Carroll

Westport, NY
Marina Owner

David Coen

Shelburne, VT
Business Owner

James Dawson

Peru, NY
SUNY Plattsburgh
Plan Formulation Team Chair

Garry Douglas

Plattsburgh, NY
Plattsburgh - North Country Chamber of Commerce

Jennifer Ely

Burlington, VT
Winooski Valley Park District

R. Montgomery Fischer

Montpelier, VT
National Wildlife Federation
Vermont Citizens Advisory Committee Chair

Lori Fisher

Burlington, VT
Lake Champlain Committee

Lawrence K. Forcier

Burlington, VT
School of Natural Resources, UVM

Robert Genter*

Johnson, VT
Lake Champlain Research Consortium

Joseph Giroux

Plattsburgh, NY
Farmer

Ronald Lambertson

Newton, MA
US Fish & Wildlife Service
Designee: Dave Tilton

Jay LePage

Peru, NY
Clinton County Legislature

Ron Manfredonia

Boston, MA
USEPA, Region 1, Lake Champlain
Management Conference Chair

Don McIntyre

Westport, NY
Town of Westport

James Monahan

Burlington, VT
USDA-Farm Services Agency

Helen Riehle

South Burlington, VT
Vermont Senate

Barbara Ripley

Waterbury, VT
VT Agency of Natural Resources

Hammond Robertson

Cleverdale, NY
Former Chair of Warren County Board of
Supervisors

Betsy Rosenbluth

Burlington, VT
City of Burlington

Bruce Steadman
Plattsburgh, NY
Business Owner

Mary Sullivan
Burlington, VT
Vermont House of Representatives

Mike Sullivan
Vergennes, VT
Vergennes/Panton Water District

Susan Sweetser
Essex, VT
Vermont Senate

William Talbott
North Ferrisburgh, VT
Vermont House of Representatives

John Titchner
Winooski, VT
USDA-Natural Resources Conservation Service

Robert Vaughn
New York, NY
USEPA, Region 2

Jennifer Waite
Woodstock, VT
National Park Service

Mary Watzin*
Burlington, VT
School of Natural Resources, UVM

Thomas York
New York, NY
US Army Corps of Engineers

Michael Zagata
Albany, NY
NYS Department of Environmental Conservation
Designee: Sandra LeBarron

*Ex-officio member

Past Members

Chuck Clark
Patrick Durack
Jan Eastman
John Finn
Donald Garrant
Maurice Harvey
Peter L. Jacob
Doug Lindsay
George Little

Felix Locicero
John Malleck
Langdon Marsh
Richard Mazza
Tom Monroe
David Newton
Pat Robbins
Sandy Treadwell

G. LCBP Steering Committee, Technical Advisory Committee, and Citizen Advisory Committees

Lake Champlain Steering Committee – current members

Tamsen Benjamin

(designee for Patricia McDonald, Secretary)

Randy Beach

(designee for Charles Gargano, Commissioner)
NYS Dept of Economic Development

Jean-Roberge Boucher (Chair, Quebec CAC)

SITE du Lac-Champlain Inc

Gerard Boutin

(Directeur regional, Direction regionale de la
Monteregie – Est)
Ministere de l’Agriculture, des Pecheries et de
l’alimentation

Gerard Cusson

(designee for Paul Begin, Minister)
Directrice regionale
Direction regionale de la Montérégie

Stuart Buchanan

(designee for Erin Crotty, Commissioner)
NYSDEC

Louise Calderwood

(designee for Steve Kerr, Secretary)
VT Dept of Agriculture

Peter Clavelle

Mayor of Burlington

Canute Dalmasse

(designee for Elizabeth McLain, Secretary)
VT ANR

Joe DelVecchio

USDA – NRCS

Mario DelVicario

USEPA Region 2

Garry Douglas, (Vice Chair, NY CAC)

Plattsburgh-North Country COC

Deborah Doyle-Schechtman

Buzz Hoerr (Chair, Vermont CAC & E&O)

Larry Forcier

UVM School of Natural Resources

Fran Keeler

USDA, NRCS

Steven Lanthier

(designee for Nathan L. Rudgers, Commissioner)
NYS Department of Agriculture and Markets

Gerard Masse

(Director, Direction de l’amenagement de la faune)
Societe de la faune et des parcs du Quebec

Gerald Potamis

USEPA, New England

Robert Reinhardt

(designee for Bernadette Castro, Commr)
NYS OPRHP

Dan Stewart

Mayor of Plattsburgh

Dave Tilton

USFWS

Mary Watzin

Chair, Technical Advisory Committee
UVM Natural Resources

Lake Champlain Technical Advisory Committee

The Lake Champlain Steering Committee appoints a Technical Advisory Committee (TAC) composed of resource managers, physical and social scientists, and business and economic experts from Vermont, New York and Quebec. The TAC advises the Steering Committee about emerging issues with management implications and the necessary research or action to address those issues. It also oversees and facilitates the technical aspects of implementation

projects and interprets the results of monitoring programs and other technical information to help determine success or redirection of projects. Groups and organizations, such as the Lake Champlain Fish and Wildlife Management Cooperative, the Agricultural Advisory Council, the Lake Champlain Basin Zebra Mussel and ANS Task Force, and the Lake Champlain Research Consortium may provide input to the TAC.

Citizens Advisory Committees

Citizen Advisory Committees (CACs) were initially created in New York, Vermont, and Quebec by the Lake Champlain Steering Committee to make recommendations to the Steering Committee on the condition and management of Lake Champlain, and to serve as liaisons between the Steering Committee and the public. During the development of *OFA*, the CACs also advised the Lake Champlain Management Conference. The Vermont CAC has fourteen members appointed by the Governor and the Legislature. The fourteen members of the New York CAC are appointed by the Commissioner of the New York State Department of Environmental Conservation. The Quebec CAC has eight members appointed by the Minister of Environment. *OFA* requires the states and Quebec to strive to ensure that representatives from environmental groups, agriculture, business/industry, sports groups, and local government be included on the CACs as well as two citizens at large and two legislative appointees.

The CACs will continue to advise the Steering Committee about public concerns; inform and involve the public in issues concerning the Lake Champlain Basin; link the Steering Committee to state legislative bodies and groups implementing *OFA*; provide a regular forum for interest groups and local governments to discuss the issues facing Lake Champlain; provide recommendations to the Steering Committee about the reassessment of Plan recommendations; and advise and encourage agencies which accept responsibility for implementing *OFA* recommendations to follow through with their commitments.

H. Federal Agencies Regulating the Transport of Live Aquatic Products

(Olson and Linen, 1997)

Organization	Description
APHIS	The Animal and Plant Health Inspection Service, U.S. Department of Agriculture, has broad mandates related to the importation and interstate movement of exotic species, under the Federal Plant Pest Act, the Plant Quarantine Act, and several related statutes. The primary concern is species that pose a risk to agriculture. Restricts the movements of agricultural pests and pathogens into the country by inspecting, prohibiting, or requiring permits for the entry of agricultural products, seeds, and live plants and animals. Restricts interstate movements of agricultural plant pests and pathogens by imposing domestic quarantines and regulations. Restricts interstate transport of noxious weeds under the Federal Noxious Weed Act.
AMS	The Agricultural Marketing Service, U.S. Department of Agriculture, works closely with states in regulating interstate seed shipments. Regulations require accurate labeling and designation of “weeds” or “noxious weeds” conforming to the specific state's guidelines.
ARS	The Agricultural Research Service, U.S. Department of Agriculture, the research branch of USDA, conducts and funds research on the prevention, control, or eradication of harmful exotic species often in cooperation with APHIS. Projects include aquaculture techniques and disease diagnosis and control.
DEA	The Drug Enforcement Agency restricts imports of a few non-indigenous plants and fungi because they contain narcotics substances.
DOD	The Department of Defense has diverse activities related to non-indigenous species. These relate to its movements of personnel and cargo and management of land holdings. Armed forces shipments are not subject to APHIS inspections. Instead, the DOD uses military customs inspectors trained by APHIS and the Public Health Service.
FWS	The Fish and Wildlife Service, U.S. Department of the Interior, has responsibility for regulating the importation of injurious fish and wildlife under the Lacey Act. Maintains a limited port inspection program. In 1990, FWS inspectors inspected 22 percent of the wildlife shipments at international ports of entry. Interstate movement of state-listed injurious fish and wildlife is a federal offense and therefore potentially subject to FWS enforcement. Also provides technical assistance related to natural resource issues and fish diseases to state agencies and the private sector (aquaculture in particular). Helps control the spread of fish pathogens.
NOAA and NMFS	The National Oceanic and Atmospheric Administration and National Marine Fisheries Service, U.S. Department of Commerce, inspect imported shellfish to prevent the introduction of non-indigenous parasites and pathogens. Cooperative agreements with Chile and Australia; Venezuela has requested a similar agreement.
PHS	The Public Health Service, U.S. Department of Health and Human Services, regulates entry of organisms that might carry or cause human disease.
CUSTOMS	Customs Service, U.S. Department of the Treasury. Customs personnel inspect passengers, baggage, and cargo at U.S. ports of entry to enforce the regulations of other federal agencies. They inform interested agencies when a violation is detected and usually detain the suspected cargo for an agency search.
USCG	The Coast Guard, U.S. Department of Treasury, was given certain responsibilities under the Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990, relating to preventing introductions (mostly dealing with ballast water exchange).

I. State and Provincial Regulatory Statutes

The following are statutes, rules and regulations, and their provisions relevant to aquatic nuisance species.

New York Statutes

General Functions, Powers and Duties of the Department and the Commissioner - Chapter 43-B Article 3 § 3-0301 (partial)

1. It shall be the responsibility of the department [Environmental Conservation], in accordance with such existing provisions and limitations as may be elsewhere set forth in law, by and through the commissioner to carry out the environmental policy of the state set forth in section 1-0101 of this chapter. In so doing, the commissioner shall have power to:

- j. Promote control of pests and regulate the use, storage and disposal of pesticides and other chemicals which may be harmful to man, animals, plant life, or natural resources;
- k. Promote control of weeds and aquatic growth, develop methods of prevention and eradication, and regulate herbicides;

2. To further assist in carrying out the policy of this state as provided in section 1-0101 of the chapter the department, by and through the commissioner, shall be authorized to:

w. Shall prepare and submit to the federally appointed "Aquatic Nuisance Species Task Force" two comprehensive management plans, after notice and opportunity for public comment, for funding of New York state activities under the Federal Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990, Public Law 101-646, by January 1, 1992. One such plan shall identify those areas or activities within the state, other than those related to public facilities, where technical and financial assistance is needed within the state to eliminate or reduce environmental, public health and safety risks and to mitigate the financial impact upon the state associated with non-indigenous aquatic species, particularly zebra mussels. The other plan shall be a "public facility management plan" which is limited solely to identifying those public facilities within the state for which technical and financial assistance is needed to reduce infestations of zebra mussels. Each plan shall identify the management practices and measures that will be undertaken to reduce infestations of aquatic nuisance species, especially zebra mussels, and include the following: (1) a description of the state and local programs for environmentally sound prevention and control of the target species; (2) a description of federal activities that may be needed for environmentally sound prevention and control of aquatic nuisance species and a description of the manner in which those activities should be coordinated with state and local government activities; and (3) a schedule for implementing the plan, including a schedule of annual objectives. In developing and implementing these management plans, the department shall, to the maximum extent practicable, involve local governments, regional entities and public and private organizations that have expertise in the control of aquatic nuisance species. Copies of these plans shall also be submitted to the temporary president of the senate and the speaker of the assembly, and the department shall annually, on or before January first, submit to the temporary president of the senate and speaker of the assembly a report on the activities of the department under these plans.

Liberation of Fish, Shellfish and Wildlife - Chapter 43-B, Article 11 § 11-0507

1. Fish or fish eggs shall not be placed in any waters of the state unless a permit is first obtained from the department [Environmental Conservation]; but no permit shall be required to place fish or fish eggs in an aquarium.
2. No person shall liberate or import or cause to be imported for the purpose of liberation within the state any European hare (*Lepus europaeus*), European or San Juan rabbit (*Oryctolagus cuniculus*), Texas or jack rabbit (*Lepus californicus*), gray fox (*Urocyon cinereoargenteus*), including captive bred gray fox, red fox (*Vulpes vulpes*), including captive bred red fox or nutria (*Myocastor coypus*), whether taken from within or without the state. Nutria may be imported only by permit of the department for scientific, exhibition or for breeding purposes.
3. No person shall willfully liberate within the state any wildlife except under permit from the department. The department may issue such permit in its discretion, fix the terms thereof and revoke it at pleasure. These provisions

do not apply to migratory game birds, importation of which is governed by regulation of the department.

4. No person shall intentionally liberate zebra mussels (*Dreissena polymorpha*) into any waters of the state. No person shall buy, sell, or offer to buy or sell, or intentionally possess or transport zebra mussels except under a license or permit issued pursuant to section 11-0515. Zebra mussels, except those lawfully held pursuant to a license or permit, may be destroyed by any person at any time.

Water Chestnut – Chapter 43-B, Article 11 § 11-0509

No person shall plant, transport, transplant or traffic in plants of the water chestnut or the seeds or nuts thereof nor in any manner cause the spread or growth of such plants.

Possession and Transportation of Wildlife – Chapter 43-B, Article 11 § 11-0511

No person shall, except under a license or permit first obtained from the department [Environmental Conservation] containing the prominent warning notice specified in subdivision nine of section 11-0917 of this article, possess, transport or cause to be transported, imported or exported any live wolf, wolfdog, coyote, coydog, fox, skunk, venomous reptile or raccoon, endangered species designated pursuant to section 11-0535 hereof, species named in section 11-0536 or other species of native or non-native live wildlife or fish where the department finds that possession, transportation, importation or exportation of such species of wildlife or fish would present a danger to the health or welfare of the people of the state, an individual resident or indigenous fish or wildlife population. Environmental conservation officers, forest rangers and members of the state police may seize every such animal possessed without such license or permit. No action for damages shall lie for such seizure, and disposition of seized animals shall be at the discretion of the department.

Taking for propagation and stocking; fish hindering – Chapter 43-B, Article 11 § 11-0511 (partial)

1. The department [Environmental Conservation] may take, or it may permit any person to take wildlife for propagation or stocking purposes, or fish or shellfish for propagation purposes.
2. It may also remove, or permit to be removed, in any manner it may prescribe, from either public or private waters, fish or shellfish which hinder the propagation of food fish or shellfish, or which are in imminent danger of being killed by pollution or otherwise. Such fish or shellfish shall be disposed of as the department may direct.

Farm fish ponds – Chapter 43-B, Article 11 § 11-1911 (partial)

1. "Farm fish pond" means a body of water, impounded by a dam, of not more than ten acres of water surface when full, lying wholly within the boundaries of privately owned or leased lands. It does not include any pond used in connection with any private camp, boarding house, hotel or other establishment catering to the public.
2. The department [Environmental Conservation] may issue to the owner or lessee of a farm fish pond a license, effective for a period of five years, entitling the holder to manage such fish pond for the production of fish. The department shall fix the terms of each such license and may include therein (a) permission to control undesirable fish, aquatic vegetation and insect life, interfering with the production of fish and (b) permission, notwithstanding any other provisions of this chapter to the contrary, to release, stock and propagate fish in the licensed pond. The department may specify in the license methods of control to be used and the manner of taking and type, size and mesh of gear to be used in taking fish. The department may, for cause, revoke or suspend any license issued pursuant to this section.
3. No person shall release any species of fish into a farm fish pond unless permission to do so is first obtained from the department.

Taking and sale of bait fish – Chapter 43-B, Article 11 § 11-1315 (partial)

1. a. Except as provided in subdivision 2, no person, without first obtaining the appropriate license from the department [Environmental Conservation], shall take for sale as bait, nor sell as bait the following fish: minnows

(family *Cyprinidae*), except carp or goldfish; top minnows or killifish (family *Cyprinodontidae*); mudminnows (family *Umbriidae*); darters (family *Estheostomidae*); sticklebacks (genus *Eucalia*); tadpole stone cats (genera *Noturus* and *Schilbeodes*); smelt or ice fish (*Osmerus mordax*); alewives, saw bellies or blueback herring (family *Clupeidae*); suckers (family *Catostomidae*).

b. Fish taken pursuant to such license shall be used only for bait in hook and line fishing. All carp, goldfish, and lamprey larvae (family *Petromyzonidae*) taken in nets operated pursuant to such license shall be destroyed immediately.

Control of Aquatic Plant Growth - Chapter 24, Article 5 § 99-j

Every municipal corporation is, and any two or more municipal corporations jointly are, hereby authorized and empowered to take such action as may be required to adopt plans and specifications and enter into a contract or contracts, or take such other action as may be required for the control of aquatic growth as it may deem to be necessary or desirable, in the case of a joint project by two or more municipal corporations, the share of the cost of such project or activity to be borne by each such municipal corporation shall be fixed by contract. The expenditure of moneys for such purpose by a municipal corporation shall be deemed a lawful municipal purpose and the moneys appropriated therefor shall be raised by tax upon the taxable real property within the municipal corporation in the same manner as moneys for other lawful municipal purposes. Each municipal corporation is hereby authorized to accept and disburse grants of public or private money or other aid paid or made available by the state or federal government for any such purpose.

Establishment or Extension of Improvement Districts - Chapter 62, Article 12 §190 (partial, summarized)

Upon petition, a town board may establish or extend an aquatic growth plant district. Expenses will be borne by the district. No such district shall be established in a city. No such district shall be established in an incorporated village, unless consent is expressed by a local law, ordinance, or resolution, subject to a referendum.

Powers of Town Boards with Respect to Improvement Districts - Chapter 62, Article 12 § 198.10-e

After an aquatic growth control district has been established, the town board may take such action as may be required to adopt plans and specifications and enter into a contract or contracts, or take such other action as may be required, for the control of aquatic growth within the district as it may deem to be necessary or desirable.

Expenses of Improvement; How Raised - Chapter 62, Article 12 § 202.3 (partial, summarized)

The expense of establishing an aquatic plant growth control district, and of providing improvements and/or services, shall be assessed, levied, and collected from the lots and parcels of land in the district.

Notice of Hearing; Cost to Typical Property - Chapter 62, Article 12-A § 209-d (partial, summarized)

In its order describing the aquatic growth control district, the town board may state that the costs of obtaining lands for the aquatic growth control shall be assessed by the town board as proportionally as possible to the benefit that each lot or parcel will derive from the control.

Prevention of Introduction of Injurious Insects, Noxious Weeds, and Plant Diseases – Chapter 69, Article 14 § 163

1. The commissioner [Department of Agriculture & Markets] shall take such action as he may deem necessary to prevent the introduction into this state of injurious insects, noxious weeds, and plant diseases, provided that he shall consult with the commissioner of environmental conservation prior to the commencement of any action to eradicate noxious weeds.

2. All nursery stock shipped into this state shall bear or carry on the container thereof an unexpired certificate, or copy thereof, to the effect that (a) the contents of such container have been inspected by a duly authorized official and that the contents appear to be free from all injurious insects or plant diseases, or (b) that the nursery stock of the grower of such contents had been examined by a duly authorized official and had been found to be apparently free from all injurious insects or plant diseases. Such certificate shall be the certificate of the chief horticultural inspector,

by whatever name known, of the country, province or state in which such shipment originated. There shall be shown in the certificate or by a separate tag attached hereto the name and address of the consignor or shipper, the name and address of the consignee or person to whom the nursery stock is shipped, and the general nature of the contents together with labels upon each variety of nursery stock declaring the name thereof and a statement by the consignor or shipper that such nursery stock is in a live and vigorous condition.

3. Any person within the state receiving nursery stock from without the state not accompanied by the certificate described in subdivision two of this section, shall immediately notify the commissioner of the receipt of such nursery stock and shall not unpack the same unless permitted by the commissioner so to do, and shall not allow such nursery stock to leave his possession until it has been inspected and released by the commissioner.

4. It shall be unlawful for any person to offer for sale or to sell dead nursery stock.

Control and Eradication of Injurious insects, Noxious Weeds, and Plant Diseases - Chapter 69, Article 14 §164

1. The commissioner [Department of Agriculture & Markets] shall take such action as he may deem necessary to control or eradicate any injurious insects, noxious weeds, or plant diseases existing within the state.

2. All trees, shrubs, plants and vines or other material, including soil infected or infested with injurious insects or plant diseases, or which have been exposed to injurious insects or plant diseases, or which are hosts of such insects or plant diseases or other material including soil, and noxious weeds are hereby declared public nuisances and may be destroyed or ordered destroyed by the commissioner.

3. The commissioner may order the owner or person in charge of any infected or infested trees, shrubs, plants and vines or other material including soil or host plants, and noxious weeds or the owner or person in charge of the farm or premises upon which they have been grown or on which they exist or in which they have been stored, or of the vehicles or cars in which they have been conveyed, to take such measures to eradicate or control the said infestation, infection, or noxious weeds as the commissioner may deem necessary or proper. Such orders may be communicated by personal service, service through the mails, or by newspaper publication, as the commissioner deems expedient. Such owner or person in charge shall promptly carry out the order of the commissioner within the period of time designated in the order. If such owner or person in charge shall refuse or neglect to carry out any such order, the commissioner may apply such eradication or control measures at the expense of the owner. Upon the completion of such eradication or control measures the owner shall, upon demand of the commissioner, forthwith pay the cost thereof into the state treasury, and upon his neglect or refusal so to do, the amount thereof shall be recovered in a civil action to be brought and prosecuted by the attorney-general in the name of the people of the state.

Shipment of Live Pests – Chapter 69, Article 14 §164-a

No person, shall sell, barter, offer for sale, or move, transport, deliver, ship, or offer for shipment, into or within this state any living insects in any state of their development, or noxious weeds, living fungi, bacteria, nematodes, viruses or other living plant parasitic organisms without first obtaining a permit from the commissioner [Department of Agriculture & Markets]. Such permit shall be issued only after the commissioner has determined that the insects, noxious weeds or living bacteria, fungi, nematodes, viruses or other plant parasitic organisms in question are not injurious to plants or plant products, if not already present in the state, or have not been found to be seriously injurious to warrant their being refused entrance or movement, if known to be already established within the borders of the state; provided, that the commissioner may at his discretion exempt the sale and transportation of specific insects, noxious weeds, fungi, bacteria, and other plant parasitic organisms from the provisions of this section if such sale and transportation is not considered harmful to the health and welfare of the people of the state, or for scientific purposes under specified safeguards determined by the commissioner.

Access to Premises; Quarantines; Rules and Regulations – Chapter 69, Article 14 §167 (partial)

1. The commissioner [Department of Agriculture & Markets] or his representatives shall have full access to all

premises, places, farms, buildings, vehicles, airplanes, vessels and cars for the purpose of enforcing the provisions of this article. The commissioner or his representatives may examine trees, shrubs, plants and vines, soil, or host plants or any other material which are infested or infected or susceptible to infestation or infection by injurious insects or plant diseases, or contaminated by noxious weed. He or they may open any package or other container, the contents of which may have been so infested or infected or contaminated with noxious weed or which have been exposed to such infestation, infection or contamination. It shall be unlawful to hinder or defeat such access or examination by misrepresentation, concealment of facts or conditions, or otherwise.

2. The commissioner is hereby authorized to make, issue, promulgate and enforce such orders, by way of quarantines or otherwise, as he may deem necessary or fitting to carry out the purposes of this article.

3. The commissioner may adopt and promulgate such rules and regulations to supplement and give full effect to the provisions of this article as he may deem necessary including, but not limited to, the designation of any plant as a noxious weed.

New York Invasive Species Task Force - Chapter 324, 2003 Law (partial, summarized)

The New York Invasive Species Task force is created. It will assess the invasive species problem, respond to the problem, and by November 30, 2005 prepare a report that makes specific recommendations for the governor and the legislature.

New York Rules/Regulations

Fish Dangerous to Indigenous Fish Populations - 6 NYCRR §180.9

(a) Purpose. The purpose of this section is to list species of native or non-native fish that present a danger to the health or welfare of indigenous fish populations, and to the health or welfare of people of the state.

(b) Prohibitions.

(1) Except as provided in subdivisions c and d of this section, no person shall buy, sell or offer for sale, possess, transport, import or export, or cause to be transported, imported or exported live individuals or viable eggs of the following species of fish, which the Department of Environmental Conservation (department) has determined present a danger to indigenous fish populations:

(i) Silver carp (*Hypophthalmichthys molitrix*)

(ii) Bighead carp (*Hypophthalmichthys nobilis*)

(iii) Black carp (*Mylopharyngodon piceus*)

(iv) Snakehead fish of the genera *Channa* and *Parachanna* (or the generic synonyms of *Bostrychooides*, *Opicephalus*, *Ophiocephalus*, and *Parophiocephalus*) of the Family *Channidae*, including but not limited to:

(a) *Channa amphibeus* (Chel or Borna snakehead)

(g) *Channa barca* (barca or tiger snakehead)

(b) *Channa argus* (Northern or Amur snakehead)

(h) *Channa bleheri* (rainbow or jewel snakehead)

(c) *Channa asiatica* (Chinese or Northern Green snakehead)

(i) *Channa cyanospilos* (bluespotted snakehead)

(d) *Channa aurantimaculata*

(j) *Channa gachua* (dwarf, gaucha, or frog snakehead)

(e) *Channa bankanensis* (Bangka snakehead)

(k) *Channa harcourtbutleri* (Inle snakehead)

(f) *Channa baramensis* (Baram snakehead)

(l) *Channa lucius* (shiny or splendid snakehead)

- (m) *Channa maculata* (blotched snakehead)
- (n) *Channa marulius* (bullseye, murrel, Indian, great, or cobra snakehead)
- (o) *Channa maruloides* (emperor snakehead)
- (p) *Channa melanoptera*
- (q) *Channa mela soma* (black snakehead)
- (r) *Channa micropeltes* (giant, red or redline snakehead)
- (s) *Channa nox*
- (t) *Channa orientalis* (Ceylon or Ceylonese Green snakehead)
- (u) *Channa panaw*
- (v) *Channa pleurophthalmus* (ocellated, spotted, or eyespot snakehead)
- (w) *Channa punctata* (dotted or spotted snakehead)
- (x) *Channa stewartii* (golden snakehead)
- (y) *Channa striata* (chevron or striped snakehead)
- (z) *Parachanna africana* (Niger or African snakehead)
- (aa) *Parachanna insignis* (Congo, square-spotted African, or light African snakehead)
- (bb) *Parachanna obscura* (dark African, dusky or square-spotted snakehead)

(2) No person shall liberate to the wild any species listed in this section, cause such species to be liberated to the wild or allow such species to exist in a state or condition where it is likely to escape into the wild.

(c) Exceptions. Notwithstanding the prohibitions contained in this section, Bighead carp may be sold, possessed, transported, imported and exported in the five boroughs of the City of New York (Manhattan, Bronx, Queens, Brooklyn, and Staten Island) and the Westchester County Towns of Rye, Harrison, and Mamaronek and all the incorporated cities or villages located therein. Bighead carp offered for sale in any retail establishment shall be killed by the seller before the purchaser takes possession of said fish.

(d) Permits. The department may issue permits, the term of which shall not exceed one year, to possess, transport, import or export species of live fish listed in this section only for educational, exhibition or scientific purposes, as defined in section 175.2 of this chapter. Permits issued pursuant to this section may contain terms, conditions and standards designed to prevent escapement while fish species listed in the permit are held in captivity, and to ensure safe disposition of those species following expiration of the permit or cessation of the permitted activity. The permit fee shall be \$500, except that the fee may be waived for bona fide employees, representatives or affiliates of accredited colleges or universities, research institutions, government agencies, or public museums or aquariums.

(e) Seizure. Environmental conservation officers, forest rangers and members of the state police may seize species of fish listed in this section that are possessed without a permit. No action for damages shall lie for such seizure, and disposition of seized animals shall be at the discretion of the department.

Round Goby

Part 10, paragraph 10.1(c)(3): no person when fishing in the waters of the state shall use or possess as bait round goby, *Neogobius melanostomus*.

Chinese Mitten Crabs

Part 44, paragraph 44.8: Chinese Mitten Crabs (*Eriocheir sinensis*).

- (a) No person shall liberate Chinese Mitten Crabs (*Eriocheir sinensis*) into the waters of the State.
- (b) No person shall possess, import, transport, buy, sell or offer to buy or sell Chinese mitten crabs, whether alive or dead, in New York State.
- (c) Chinese mitten crabs, except those lawfully held pursuant to a license or permit issued under section 11-0515, shall be destroyed.

Vermont Statutes

Aquatic Nuisance Control Permits – Title 10, Chapter 47 § 1263a (partial)

- (a) No person may use pesticides, chemicals other than pesticides, biological controls, bottom barriers, structural

controls or powered mechanical devices in waters of the state to control nuisance aquatic vegetation, insects or other aquatic life including lamprey unless that person has been issued a permit by the secretary [Agency of Natural Resources].

Aquatic Nuisance Control Program - Title 10, Chapter 37, § 921

- (a) The department of environmental conservation shall establish and maintain an aquatic nuisance control program.
- (b) The aquatic nuisance control program shall perform the following services:
 - (1) receive and respond to aquatic nuisance complaints;
 - (2) work with municipalities, local interest organizations, and private individuals and agencies of the state to develop long-range programs regarding aquatic nuisance controls;
 - (3) work with federal, state and local governments to obtain funding for aquatic nuisance control programs;
 - (5) administer a grant-in-aid program under section 922 of this title.
 - (6) place a sign at least 2' by 2' in size which states that the water is infected with an aquatic nuisance and that a person transporting the nuisance in violation of section 1266 of this title may be subject to a penalty of up to \$1,000.00 pursuant to 23 V.S.A. § 3317, so that the sign is easily visible from a ramp used to launch vessels at any fish and wildlife access area on a body of water infected with an aquatic nuisance;
 - (7) provide the commissioner of fish and wildlife and the commissioner of motor vehicles with written educational information about aquatic nuisances, which can be included in an envelope containing a boat registration and in a fish and wildlife publication pertaining to fishing and boating.
- (c) For the purposes of an aquatic nuisance control program, "aquatic nuisance" means undesirable or excessive substances or populations that interfere with the recreational potential of a body of water. Aquatic nuisances include, but are not limited to, rooted aquatic vegetation, algal populations and sediment deposits.

General Duties of Commissioner – Title 10, Chapter 103 § 4132 (partial)

(b) The commissioner [Department of Fish & Wildlife] may publish such bulletins as he or she deems advisable for information and instruction concerning the work of the department and shall keep an account of the business and proceedings of the department. Any publication available to the general public which describes rules and regulations regarding boating and fishing shall include information about aquatic nuisances provided to the commissioner pursuant to subdivision 921(b)(7) of this title.

Grant-in-aid to Municipalities and Agencies of the State - Title 10, Chapter 37 § 922 (partial)

- (a) A municipality or agency of the state which desires state assistance to control aquatic nuisance may apply in writing to the department of environmental conservation in a manner prescribed by the department.
- (b) When the department finds that a proposed aquatic nuisance control program is suitable to control or minimize the effect an aquatic nuisance has on water quality and water use, it may award a grant of 75 percent or less of the project costs as determined by the department. Recurring maintenance projects may be awarded grants of 75 percent or less of the annual project cost.

Fees Collected; Special Fund - Title 23, Chapter 29 § 3319 (partial)

- (a) There is hereby established a special fund to be known as the motorboat registration fund for the purposes of ensuring that the fees and penalties collected under this subchapter are utilized in the protection and maintenance of the state's water resources. Any interest earned on the monies in this fund will be deposited in the general fund.
- (b) The fees and penalties collected under the provisions of this subchapter, excluding surcharges collected under subsection 3305(b) and subdivisions 3305(c)(3)(A) and (B) of this title, shall be deposited in the motorboat registration fund and shall be allocated as follows:
 - (3) 25 percent to the department of environmental conservation for the purpose of aquatic nuisance control pursuant to 10 V.S.A. §§ 921, 922, 923, and 1263a;

(c) The surcharges collected under subsection 3305(b) and subdivisions 3305(c)(3)(A) and (B) of this title shall be credited to the special fund established under subdivision (b)(3) of this section for the purpose of an aquatic nuisance control grant program pursuant to sections 921, 922, and 923 of Title 10.

Fish Propagation -10 App., Chapter 2 § 117 (partial)

(A) A person shall not rear for sale or distribution, any species of live fish within this state without first procuring a permit from the Commissioner [Department of Fish & Wildlife] to do so (10 V.S.A. Chapter 119, §§ 5207-5209). Persons maintaining fish in a closed rearing aquarium (no water discharge) may request exemptions (on the fish propagation application form) from the Annual Fish Health Inspection and/or the Breeders License.

Pest Survey, Quarantines - Title 6, Chapter 84 § 1034

The secretary [Agency of Agriculture] may establish and maintain quarantines and adopt other orders and rules pursuant to 3 V.S.A. chapter 25 concerning the planting, exposing, sale, importation and transportation of all plants and plant products and regulated articles capable of carrying plant pests of an injurious nature in any living stage within the state.

Pest Survey, Permits - Title 6, Chapter 84 § 1035

No person may sell, offer for sale, barter, expose, move, transport, deliver, ship or offer for shipment into or within this state any plant pest or biological control agent in any living stage without first obtaining either a federal permit, where applicable, and a state permit from the secretary [Agency of Agriculture]. A state permit may only be issued after it has been determined by the secretary that the plant pests or biological control agents are not injurious, are generally present already, or are for scientific purposes subject to specified safeguards.

Zebra Mussel; Eurasian Watermilfoil; Water Chestnut; Quagga Mussel - Title 10, Chapter 47 V.S.A. § 1266

(a) No person shall transport zebra mussels (*Dreissena polymorpha*), Eurasian watermilfoil (*Myriophyllum spicatum*), quagga mussels (*Dreissena bugensis*), or water chestnuts (*Trapa natans*) to or from any Vermont surface water. This section shall not restrict proper harvesting or other control activities undertaken for the purpose of eliminating or controlling the growth or propagation of zebra mussels, Eurasian watermilfoil, quagga mussels, or water chestnuts.

(b) The secretary [Agency of Natural Resources] may grant exceptions to persons to allow the transport of zebra mussels, Eurasian watermilfoil, quagga mussels, or water chestnuts for scientific or educational purposes. When granting exceptions, the secretary shall take into consideration both the value of the scientific or educational purpose and the risk to Vermont surface waters posed by the transport and ultimate use of the specimens. A letter from the secretary authorizing the transport must accompany the specimens during transport.

Penalties - Title 23, Chapter 29 § 3317 (partial)

(b) A person who violates section 1266 of Title 10 shall be subject to a penalty of not more than \$1,000.00 for each violation.

Control of Fish, Game; Powers of Commissioner - Title 10, Chapter 103 § 4138 (partial)

(a) The commissioner [Department of Fish & Wildlife] may take, permit or cause to be taken at any time from any waters, and in any manner, fish which hinder or prevent the propagation of game or food fish and may take, permit or cause to be taken at any time wild animals which are doing damage. Such removal or taking and the possession and disposition of such fish or wild animals shall be under such regulations as the commissioner may prescribe.

(b) The commissioner may take necessary measures to control, in public waters, aquatic vegetation, insects or aquatic life, for the purpose of improving such waters as a habitat.

(c) Any measures which involve temporary pollution of waters shall be carried out in accordance with the provisions of section 1263a of chapter 47 of this title.

Placing Fish in Waters - Title 10, Chapter 111 § 4605

(a) A person shall not introduce or attempt to introduce pickerel or great northern pike into any waters, or any fish, except trout or salmon, into public waters frequented by trout or salmon.

(b) A person shall not bring into the state for the purpose of planting or introducing, or to plant or introduce, into any of the inland or outlying waters of the state any live fish or the live spawn thereof, unless, upon application in writing therefor, the person obtains from the commissioner [Department of Fish & Wildlife] a permit so to do. Applicants shall pay a permit fee of \$50.00. The commissioner or duly authorized agents, shall make such investigation and inspection of the fish as they may deem necessary and then the importation permit may be granted pursuant to regulations which the board shall prescribe. The commissioner or duly authorized agents shall make a determination on the permit within 10 days of receiving the application. The department may dispose of unlawfully imported fish as it may judge best, and the state may collect damages from the violator of this subsection for all expenses incurred.

(c) Nothing in this section shall prohibit the board, the commissioner or their duly authorized agents from bringing into the state for the purpose of planting, introducing or stocking, or from planting, introducing or stocking any fish in the state.

Importation, Stocking Wild Animal - Title 10, Chapter 113 § 4709 (partial)

(a) A person shall not bring into the state or possess any live wild bird or animal of any kind, unless, upon application in writing therefor, the person obtains from the commissioner [Department of Fish & Wildlife] a permit to do so. The importation permit may be granted under such regulations therefor as the board shall prescribe and only after the commissioner has made such investigation and inspection of the birds or animals as she or he may deem necessary. The department may dispose of unlawfully imported wildlife as it may judge best, and the state may collect treble damages from the violator of this subsection for all expenses incurred.

(b) Nothing in this section shall prohibit the commissioner or duly authorized agents of the fish and wildlife department from bringing into the state for the purpose of planting, introducing or stocking, or from planting, introducing or stocking in the state, any wild bird or animal.

Vermont Rules/Regulations

Rule Governing the Taking, Possessing, Transporting, Use and Selling of Baitfish - Title 10 App., Chapter 2 §106 (partial)

A person may take, transport, buy, sell, and use as bait, only the following species of fish:

- Eastern silvery minnow (*Hybognathus regius*)
- Fathead minnow (*Pimephales promelas*)
- Bluntnose minnow (*Pimephales notatus*)
- Emerald shiner (*Notropis atherinoides*)
- Golden shiner (*Notemigonus crysoleucas*)
- Spottail shiner (*Notropis hudsonius*)
- Common shiner (*Luxilus cornutus* previous *Notropis cornutus*)
- Mimic shiner (*Notropis volucellus*)
- Creek chub (*Semotilus atromaculatus*)
- Fallfish (*Semotilus corporalis*)
- Blacknose dace (*Rhinichthys atratulus*)
- Longnose dace (*Rhinichthys cataractae*)
- Northern redbelly dace (*Phoxinus eos*)

White sucker (*Catostomus commersoni*)
Longnose sucker (*Catostomus catostomus*)
Rainbow smelt (*Osmerus mordax*) - Rainbow smelt may only be taken by angling or by fishing through the ice, as per Regulations 105 and 122.

Yellow perch (*Perca flavescens*) - Yellow perch, or parts thereof, may be used for bait only in those waters where taken and shall not be transported alive from those waters.

All other species of fish are prohibited for use as bait.

Any person who buys bait for resale or sells bait is required to obtain a Commercial Bait Dealers Permit from the Commissioner [Fish & Wildlife].

Use of live bait is prohibited in certain bodies of water as specified in 10 App. V.S.A. § 109a.

Vermont Department of Agriculture, Food & Markets Quarantine #3 - Noxious Weeds (partial)

The movement, sale, possession, cultivation, and / or distribution of the following aquatic/wetland plants is prohibited:

All weeds listed in 7 C.F.R. 360.200 as amended, which is hereby incorporated by reference including subsequent amendments and editions.

Cabomba caroliniana (fanwort)
Egeria densa (Brazilian elodea)
Hydrilla verticillata (hydrilla)
Hygrophila polysperma (Roxb.) T. Anderson (E. Indian hygrophila)
Myriophyllum aquaticum (Vell.) Verdc. (Parrot feather)
Myriophyllum heterophyllum (variable-leaved milfoil)
Salvinia auriculata (giant salvinia)
Salvinia biloba (giant salvinia)
Salvinia herzogii (giant salvinia)
Salvinia molesta (giant salvinia)

The movement, sale, and / or distribution of the following aquatic/wetland plants is prohibited:

Butomus umbellatus (flowering rush)
Fallopia japonica (*Polygonum cuspidatum*) (Japanese knotweed)
Hydrocharis morsus-ranae L. (frogbit)
Lythrum salicaria (purple loosestrife)
Myriophyllum spicatum (Eurasian watermilfoil)
Nymphoides peltata (Gmel.) Ktze. (yellow floating heart)
Phragmites australis (common reed)
Potamogeton crispus L. (curly leaf pondweed)
Trapa natans L. (water chestnut)

Violation of any of the prohibitions listed in Section V of this regulation may result in:

- (1) The issuance of cease and desist orders; and / or,
- (2) Temporary or permanent injunctions; and / or,
- (3) Administrative penalties not to exceed \$1,000 per violation, as specified in 6 V.S.A., Chapter 84, Sections 1037 and 1038.

Exemptions:

(A) Scientific, economic and educational exemptions may be granted by the Commissioner to allow for the movement, possession and field experimentation of noxious weeds for scientific and educational purposes under such conditions as may be prescribed by the commissioner. When granting exemptions, the commissioner shall take into consideration the value of the scientific, economic or education purpose and the risk to Vermont's environment, economy and citizens.

(B) Transportation of any Class A or B Noxious weed on any road or highway of the state is exempt if any of the following is true:

- (1) It is for disposal as part of a management control activity; or
- (2) It is for the purpose of identifying a species or reporting the presence of a species, and the Class A or B Noxious weed is in a sealed container; or

(C) Preserved specimens in the form of herbaria or other preservation means are not subject to this regulation.

(D) Varieties, cultivars, hybrids and/or subspecies that have been shown through scientific research and analysis not to be invasive.

Quebec

Fisheries Act

The Government of Quebec enforces federal fishing regulations which control the transportation, possession and use of bait-fish. "Fish" is defined as any fish, the eggs, and sexual products of such fish, or any mollusc or crustacean. A by-law requires a permit for the importation of breeding fish and wild eggs in order to reduce the risk of the introduction of diseases.

Conservation and Development of Wildlife

A by-law controls the buying, selling, importation, transport, and stocking of all fish species, alive or dead, except non-indigenous species for use in aquariums.

J. Glossary

aquatic nuisance species - a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters.

anadromous fish - those fish that spend the greater share of their lives in salt water but migrate into fresh water streams for reproduction.

biodiversity - the variety of plants and animals, their genetic variability, and their interrelationships and ecological processes, and the communities and landscapes in which they exist.

biofouling - the undesirable accumulation of microorganisms, plants and animals on artificial surfaces.

ecosystem - a community of living organisms and their interrelated physical and chemical environment.

herbaceous - green and leaflike in appearance or texture. Not woody.

invasive exotic plant - a nonindigenous plant species which is able to proliferate and aggressively alter or displace native biological communities.

invasive species - a plant or animal which is able to proliferate and aggressively alter or displace native biological communities.

macroinvertebrate - invertebrate animals (animals without backbones) large enough to be observed without the aid of a microscope or magnification.

monoculture - an ecosystem dominated by a single species.

nonindigenous species - any species or other viable biological material that enters an ecosystem beyond its historic range.

K. Abbreviations

APA	Adirondack Park Agency
APIPP	Adirondack Park Invasive Plant Program
ASRA	AuSable River Association
BB	Bateau Below, Inc.
BRASS	Boquet River Association
CCEEC	Cornell Cooperative Extension Essex County
DFWI	Darrin Fresh Water Institute - Rensselaer Polytechnic Institute
EC	Environment Canada
ECHO	ECHO at the Leahy Center for Lake Champlain
FAPAQ	Société de la Faune et des Parcs du Québec
FLG	Fund for Lake George
FSU	Florida State University
HCSWCD	Hamilton County Soil and Water Conservation District
LCBP	Lake Champlain Basin Program
LCC	Lake Champlain Committee
LCFWC	Lake Champlain Fish and Wildlife Cooperative
LCMM	Lake Champlain Maritime Museum
LCRC	Lake Champlain Research Consortium
LCRI	Lake Champlain Research Institute
LCSC	Lake Champlain Steering Committee
LCSG	Lake Champlain Sea Grant
LGPC	Lake George Park Commission
NEANS Panel	Northeast Aquatic Nuisance Species Panel
NYIPC	New York Invasive Plant Council
NYSCC	New York State Canal Corporation
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York Department of Transportation
NYSFOLA	New York State Federation of Lake Associations
PSC	Paul Smiths College
QME	Quebec Ministry of the Environment
SKIO	Skidaway Institute of Oceanography
TNC	The Nature Conservancy
USACE	United States Army Corp of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VTANR	Vermont Agency of Natural Resources
VTRANS	Vermont Agency of Transportation
VTAAFMM	Vermont Agency of Agriculture, Food and Markets
VTCL	Vermont Correctional Industries
VTDEC	Vermont Department of Environmental Conservation
VTDFW	Vermont Department of Fish and Wildlife
VTIEPC	Vermont Invasive Exotic Plant Committee
ZMTF	Zebra Mussel Task Force (Lake George)

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