Adirondack Park Aquatic Nonindigenous Species Management Program

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Statement of the Problem

A growing constituency is concerned about the changes occurring in the quality of Adirondack water resources, particularly the more than 2,800 lakes and ponds. Water resources are an important aspect of the cherished natural heritage of the Adirondacks and perhaps in no other region of the State are they as important to an area=s economic and ecological well being.

Although New York State has a Statewide Aquatic Nonindigenous Species (NIS) Plan[1], there are reasons to develop a NIS Management Program that is specific to the Adirondacks. First, unlike the Park, much of the remainder of New York State has already experienced significant invasions of NIS, such as Water chestnut, Eurasian watermilfoil and zebra mussels. The Statewide Plan is geared towards controlling existing NIS populations and coping with the widespread impacts caused by these organisms. The Adirondack region's unique geography has protected its waterbodies from the onslaught of (NIS). However, in the last decade, some Adirondack waterbodies, such as Lake George, have been invaded by NIS such as Eurasian watermilfoil and zebra mussels. An Adirondack-specific program has the opportunity to focus on both prevention and control. The time is now to develop a comprehensive approach, before the Adirondack's aquatic NIS problems get out of hand.

There are several problems with aquatic NIS which have been identified by the public and resource managers as exemplary of the ebb and flow of the ecological health of the Adirondack Park=s water resources. As a global process, the influx of invasive species in general and aquatic plants in specific has been identified by the Nature Conservancy as one of the most critical conservation issues preventing the sustenance of the Nation=s biodiversity -- a growing concern too for the Park=s biodiversity. Unwanted growth of exotic aquatic vegetation interferes with recreational use of waterbodies and decreases shore land valuations. On the other hand, native aquatic vegetation in waterbodies is essential for the support of critical ecological processes; and, there is growing concern that acidification of water and cultural eutrophication is diminishing or adversely changing the composition and extent of this life giving vegetation.

New York State, including citizen groups, academia and public agencies has an opportunity to fill a gap in our collective response to these identified problems. We need complete data, better coordination of ongoing efforts, delivery of tools to volunteers and local governments and a State policy framework within which to focus limited resources. Because this issue touches upon natural resources of the Adirondack Park, which include both the aquatic and wetland environments, it affords an obvious partnership between the DEC and APA.

State of the Science of Aquatic NIS

At present there are diverse organizations and agencies responsible for and dealing with aquatic NIS management in the Park. There is also widespread concern over the state of and trends of both exotic aqutic plants and zebra mussels.

The Ecology and Dynamics of NIS in the Adirondack Park

Aquatic NIS are spread by a variety of mechanisms, including:

1. **Hydraulic connection**. When an infested waterbody is hydraulically connected to another waterbody, the unaffected waterbody may receive fragments, seeds or other fruiting bodies of the aqutic NIS.
2. **Airborne dispersal of seeds and immature forms**. This mechanism is considered less important for aquatic NIS.
3. **Introduction by waterfowl and other aquatic animals**. Birds and aquatic mammals have been indicated as vectors in the transfer of aquatic NIS, although defensible studies of this mechanism are limited. The supposition is that the feathers and fecal material of waterfowl act as a storage location for seeds and fragments of aquatic plants and possibly mature and immature forms of organisms such as zebra mussels.
4. **Accidental Human introductions**. These occur when watercraft are transported from infected waterbodies to other sites. Aquatic NIS may be attached to the outside of the hulls, or contained in bilge water. Sometimes, aquatic NIS are introduced to a waterbody, when exotics kept as pets or in ornamental aquatic plantings are discarded. The occurrence of Fanwort (*Cabomba caroliniana*) in three small lakes in the southeast Adirondacks appears to be a result of an "aquarium" release.
5. **Purposeful Plantings.** Most NIS in North America have been introduced on purpose and have been economically beneficial. Agricultural crops are the best example of purposeful introductions. Purposeful aquatic NIS introductions are far less common, but the most obvious examples are the stocking of gamefish. Gamefish may be considered "Nonindigenous", either when they are not native to the continent of country or not native to the region (such as the Adirondacks). It is beyond the scope of this white paper to discuss all of the fish NIS in the Adirondacks, but suffice it to say, that a good example of this issue is the introduction and control of sea lamprey in the tributaries of Lake Champlain.

In contrast, the Adirondacks are "protected" from the invasions of aquatic NIS by a variety of factors, including:

1. The Adirondacks are mountainous and it is unlikely that hydraulic connection mechanisms are important in spreading aquatic NIS from lowland waters. In addition, although the Park has many ponded waters, the hydraulic connections between these waters are quite seasonal and limited in flow.
2. The climate is severe and the growing season is short. NIS that may thrive in more temperate climates, cannot survive the harsh Adirondack winters.
3. The waterbodies of the region are generally unproductive and the native species that inhabit the Adirondacks have adapted to this situation. Other similar factors include the unproductive nature of bottom muds in the region's waterbodies, low levels of many dissolved ions, such as calcium, the elevated levels of humic material and increased levels of acidity, caused by atmospheric deposition.
4. There are few major transportation corridors that bisect the Park. These corridors surround the Park and they include Interstates 81 and 87, the New York State Thruway, the Saint Lawrence Seaway and the New York State Canal System. Major rail lines also bypass the Park.

5. The level of land development is low and the human population density is sparse. The human population of the Adirondack Park is only about 100,000. However this may swell substantially due to the influx of summer visitors and seasonal inhabitants. There is little agricultural land, little industry and commercial development is limited to small hamlets, such as Lake George Village, Saranac Lake, Lake Placid and Old Forge.

There are many exotic aquatic species, which are known to be a nuisance in Adirondack systems. Chief among these are the aquatic plants Eurasian watermilfoil, Curly leaf pondweed and Water chestnut. To a lesser, extent, Fanwort and European Frog bit have attracted some attention in specific Adirondack waterbodies. Because of the separation and insulation offered the Park by its geography, other parts of the Northeast have had a longer period of experience with these species and our knowledge of their potential effect on the Park benefits from this experience. At the same time the more or less pristine nature of all or portions of the Park offers an opportunity for control and management not afforded elsewhere.

In many ways we are 45 years behind the times with the added benefit of knowledge that allows us to look to the future. Some states report enough experience with invasive species to note natural population cycles and Acrashes@ in nuisance populations not yet experienced in the active zones of biotic invasion. At the same time scientists are just beginning to recognize important aspects of population dynamics of invasive species. Normal declines of milfoil in Adirondack lakes are reported due to herbivory by weevils (e.g., *Euhrychriopsis lecontei*) and moths (*Acentria ephemerella*). In addition to biocontrol, there is a wide variety of conventional control measures available including physical (drawdown), mechanical (dredging, hand harvesting, cutting, benthic mats) and chemical (dyes and herbicides).

As the list of NIS has grown and their impacts reached greater heights, concern among scientists together with natural areas managers has led to increased interest in affecting public policy with sound science. The Ecological Society of America recently targeted the problem of biological invasions in one of its six current issue papers[1].

In addition there is growing concern that these same natural communities, which are the subject of biotic invasions, are being widely modified and stressed by external factors such as climate change and acid precipitation. Some watersheds are also subject to excessive levels of nutrients from cultural sources, leading to ecologically undesirable levels of productivity in wetlands and waterbodies, which may also adversely affect the biological diversity of these systems.

Existing Aquatic NIS Management Programs and Expertise

The Adirondack Park Agency administers the New York State Freshwater Wetlands Act in the Adirondack Park. DEC issues permits for aquatic herbicide use and also for the control of nuisance fish and invertebrates. Because of its long history with issuing permits for the control of aquatic vegetation in wetlands and interest in monitoring, the Adirondack Park Agency asked staff to prepare an analysis of past Agency permits. This analysis was reported to the Agency in August.

The report seeks to analyze the effectiveness of the Agency=s regulatory program in jurisdictional wetlands and is entitled "Nuisance Aquatic Plant Control: An Evaluation of Efficacy

and Proposed Recommendations Regarding Adirondack Park Agency Permitted Programs.@[2] It identified a growing interest from landowners in responding to unwanted growth of aquatic plants in lakes. The report identifies a number of areas where a need for extensive follow up work exists and served to initiate this discussion. The recommendations call for increased sharing of information and more policy focus on the problems.

DEC's role in NIS management in the Park is also limited. DEC has conducted aquatic vegetation surveys (or funded surveys with cooperators, such as the Adirondack Aquatic Institute and the Darrin Freshwater Institute) of a number of Adirondack Lakes, but its control experience in the Park is primarily limited to testing various management techniques for controlling Eurasian watermilfoil in Lake George. As stated above, DEC issues permits for aquatic herbicide use, but few permits are issued in the Park in any given year and these permits are for the use of copper sulfate to control nuisance algae.

At present, there are many organizations dealing with the management of Adirondack waterbodies. Their experience could be utilized in a well-coordinated Adirondack initiative. In addition they are important sources of information and often represent the very constituencies, which are so important to success of any effort to manage and monitor aquatic vegetation. Some groups and programs include:

$ NYSDEC Division of Water; Lakes Management
$ NYS Federation of Lake Associations (NYSFOLA, the local chapter of the North American Lake Management Society)
$ NYSDEC Citizen Statewide Lake Assessment Program (CSLAP)
$ Coalition of Lake Associations Against Milfoil (COLAM)
$ Northeast Chapter of the Aquatic Plant Management Society (NEAPMS)
$ New York Natural Heritage Program
$ Darrin Freshwater Institute (DFWI) -- Aquatic Plant Identification Program
$ Adirondack Aquatic Institute (AAI) -- Watershed Initiative Program
$ Lake Assessment Program -- Resident=s Committee
$ Adirondack Research Institute -- Invasive Species Initiative
$ Warren, Franklin, Hamilton, Essex County Water Quality Coordinating Committees
$ St Regis Stewardship Program -- St. Regis Property Owners Association
$ Lake George Park Commission (LGPC)
$ Lake George Association (LGA)
$ Individual lake shore property owners associations
$ Lake Champlain Basin Program (LGBP)

These organizations are sources for data collection, volunteers, public policy information, funding, pollution control technology, regulatory standards, data storage, technical expertise, and communication.

Problem Analysis

It is in New York State=s interest to facilitate better coordination of efforts related to the management of aquatic vegetation in the Adirondack Park, to enhance the exchange of information

and to facilitate the discussion and documentation of a policy which would help to establish priorities for vegetation control and management and data development to assess water quality. Following are the tasks for which there exists the greatest need for such a coordination and policy development effort:

A. **Early Coordination and Detection** B A small initial effort is needed to establish the boundaries of the appropriate geographic area for an Adirondack Park effort, identify the potential volunteer participants and organizations, begin data sharing and coordination, build a shared geographic database, and provide scientific support. This effort would serve to initiate and organize a multi-year program.

B. **Sharing of information on control measures** - This task is aimed at preventing the introduction of invasive plant species into lakes where they are not now present by disseminating information to heighten public awareness and explain the precautions that can be taken to minimize the chance of introduction. At the same time we propose developing educational material which will explain how to identify invasive species, and if found the best approaches for removal. In instances where hand harvesting of recently discovered Eurasian water milfoil plants is warranted, for example, the public should be aware that the plants could fragment as they are pulled from lake sediments. Without properly containing the plants it is possible to actually enhance the spread of the problem species. We intend to make a variety of services available ranging from brochures on these subjects to the assistance of scientists to customize removal techniques and help with plant identification.

C. **Monitor trends in NIS in selected lakes** - Using field work and remote sensing techniques to map vegetation, this task will establish baseline conditions of beds of aquatic vegetation, including the detection of plant species or natural plant communities with restricted distribution. These plants with restricted distribution may be listed endangered species and are important elements of bio-diversity that are threatened by competition from invasive species.

D. **Build a database of NIS information** - Using the Internet as a medium for information dissemination and communication between disparate sets of organizations and volunteers, this task will compile, digitize and format data from different lakes. This will enable individual volunteers to see the importance of data they are collecting in the context of a wider geographic area and will improve detection techniques.

E. **Integrated management: Communicating an ecosystem approach to managing sources of watershed disturbance** - Using case by case watershed and lake evaluation this task will develop the baseline information needed to identify causes of NIS occurrence and growth. Noxious levels of NIS are often symptomatic of existing conditions in the watershed and lake basin and in the long term can only be successfully addressed by watershed wide approaches to the environment. In this way, appropriate responses can be developed in conjunction with local governments and lake associations to target the appropriate environmental condition.

F. **Develop regional scale management strategy** - Critics have indicated that there is no regional assessment and evaluation of the status of Adirondack lakes, especially with respect to important issues such as the spread of exotic plants or cultural eutrophication. Hence there can not be an evaluation of trends nor aspects of ecosystem health. Using the powerful capabilities of GIS, this task seeks to provide a framework for landscape analysis of watersheds and lakes to detect sensitive systems; measure health and assist in the evaluation of regional trends and provide a policy framework for efficient allocation of resources.

SFY 2001 Proposal

It is recommended that an integrated program of NIS management be established for the Adirondack Park and that initially, it have the following elements:

1. The first year of the program and the focus of staffing needs should be on conducting an inventory of information on NIS and natural communities, based on current existing information sources. This type of inventory would lead to kind of an assessment similar to the scoping done through the DEC RIBS program, i.e., which water bodies have what information, when documented, and so on. The size of the database, the level of detail in the inventory regarding plant types and distribution at each lake, etc, will help to determine the next step of the program. Done on a case-by-case basis, this will likely break into priority classes. Each class will then have a common strategy. The priority classes are:

    a. No information. Needs a quick visit by professional staff.
    b. Some water quality/fisheries information exists. Needs CSLAP-like presence/absence survey by either professionals or volunteers.
    c. NIS and animal/plant community information exists. Needs detailed survey if NIS present.
    d. Detailed NIS survey exists. Needs a site-specific Management Program to be developed.
    e. A site-specific Management Program exists. Needs implementation funds.

    All sites will need educational materials and outreach effort to prevent future infestation or expansion of existing NIS populations.

2. Based on this inventory assessment, the size and extent of the five priority groups could be determined. Some of the simple surveys (1b) may be undertaken during the 2001 field season, if possible. The best candidates for these surveys would be either CSLAP lakes or lakes that have a DEC campground, with no vegetation/NIS information.

3. Additional program elements would include establishing an Advisory Committee for the project, developing a web site (using existing DEC and/or APA websites), developing new (or reprinting existing) educational materials (signage, brochures etc.), conducting research projects on new management technologies and conducting a review of the present DEC/APA regulatory program for aquatic herbicide usage and other NIS control technologies.

4. Staffing. A Research Scientist/Program Coordinator (Research Scientist 2, SG-22) would be hired by DEC to manage the program. This person should be located in Ray Brook and would supervise field staff and cooperators. Two assistants (Environmental Program, Specialist Trainee, SG-13/14) would also be hired either by NYSDEC or APA. Lastly, a number of seasonal staff could be hired by cooperating agencies to conduct fieldwork, but these positions will not be needed until year 2 and beyond.

Budget

The budget for the first State Fiscal Year (April 1, 2001 to March 31, 2002) of the project is shown in Table 1. The total budget for the first year is $ 250,000. In-kind expenses provided by existing APA and DEC staffs are not included, although the workload is estimated at about 0.5 work-years for SFY2001.

Item	SFY2001
1. Personnel. Program Coordinator, RS 2 (SG-22), Program Assistants (2) (EPS Trainee, SG-13/14)	$105,000
2. Fringe Benefits (estimated at 0.30 * Personnel costs)	$ 31,500
3. Travel	$ 10,000
4. Supplies. Field and office supplies	$ 10,000
5. Equipment. Three desktop computers and one laptop computer, software and field equipment (boat, motor, Secchi disks, dissolved oxygen meters, etc.)	$ 26,500
6. Contracts	
a. Analytical Services	$ 5,000
b. Taxonomic and Field Support (as needed). Adirondack Lake Survey Corporation, Darrin Freshwater Institute, County SWCDs, Cornell University Water Resources Institute, State University College at Plattsburgh, NY Natural Heritage Program, Adirondack Aquatic Institute, Massachusetts College of Liberal Arts (B. Hellquist) and others	$ 57,000
c. Printing, mailing and shipping costs, cell phone charges and other contractual costs	$ 5,000
TOTAL BUDGET	$ 250,000

Funds from the project may come from a variety of sources, including new DEC and APA State Purposes funds, USEPA Wetland grants and Department of State Environmental Protection Fund grants to local waterfront communities. The budgets for future years will be larger, as the field program and the level of implementation of control programs both increase.

Deliverables and Schedule

The project will begin on April 1, 2001. Other program elements/deliverables are:

1. Staff will be hired by October 1, 2001. In the interim period, existing APA and DEC staff will organize and manage the project.

2. The project web site will be activated in a preliminary fashion by June 1, 2001 and will be updated throughout SFY 2001.
3. The project Advisory Committee will be established by July 1, 2001.
4. A preliminary aquatic NIS inventory will completed by March 1, 2002 and will be included in the Annual report for the Project, which will be issued April 1, 2002.

References-- Footnotes

[1] Nonindigenous Aquatic Species Comprehensive Management Plan, November, 1993, Timothy J. Sinnott and Eric Paul, NYDEC, 39 pp

[2] Issues in Ecology. Number 5, Spring 2000. Biotic Invasions: Causes, Epidemiology, Global Consequences and Control. by Richard N. Mack, Chair, Daniel Simberloff, W. Mark Lonsdale, Harry Evans, Michael Clout, and Fakhri Bazzaz. Ecological Society of America. Washington, D. C. 20 pp.

[3] Nuisance Aquatic Plant Control: An Evaluation of Efficacy and Proposed Recommendations Regarding Adirondack Park Agency Permitted Programs. Prepared by: Christopher Buerkett, Adirondack Lakes Survey Corporation. August 2, 2000.