Out of the Blue

A Newsletter of the Lakes and Ponds Unit

Spring/Summer 1992 No. 4 Vermont Department of Environmental Conservation

Lay Monitoring Data Helps Establish New Phosphorus Standards

When the Vermont Lay Monitoring Program began collecting data on Vermont's lakes in 1979, the goals were relatively modest. Lay Monitoring was seen as a way to involve lake residents in the State's lake management programs by providing an opportunity for citizen volunteers to monitor water quality in their own lakes. It was expected that lakes included in the Lay Monitoring Program would receive greater attention from the State's lake biologists, participants would become more educated on water quality issues, and water quality data would be generated at low cost to supplement other State monitoring efforts.

Now that the Lay Monitoring Program has run continuously for 13 years, the value and importance of the monitoring data has far exceeded the original expectations. Nowhere is this more true than on Lake Champlain, where major lake management decisions have

See "Data" on page 9

In This Issue...

Water Chestnut - A Problem Aquatic Plant You Should Know

In addition to Eurasian watermilfoil, there is another introduced exotic plant that is a severe nuisance in southern Lake Champlain and a threat to other Vermont lakes. This foreign invader is water chestnut (scientific name: *Trapa natans*), named for its single seeded, horned fruits or "chestnuts". Water chestnut, native to Europe, was introduced into New York in 1874. In the 1940's water chestnut entered Lake Champlain through the Hudson River Canal.

Water Chestnut fruit

Water chestnut is an annual aquatic plant with both floating and submersed leaves. The floating leaves, which are triangular with toothed edges, form a rosette on the water's surface. A bladder-like swelling filled with air and spongy tissue, found on each floating leaf stalk, provides buoyancy. The submersed, feather-like leaves are attached to the plant's cord-like stem. White blossoms appear along the floating leaf axils (the place where the leaf stalk joins the plant stem) in July.

Water chestnut is an extremely prolific plant. Pollinated flowers give rise to chestnuts, which typically have four sharp barbed spines. Individual nuts germinate in the spring and can give rise to 10 to 15 rosettes, each of which can then produce 15 to 20 nuts. One nut has the potential to

See "Chestnuts" on page 12

Lake Iroquois Watershed Project

An exciting new project has begun at Lake Iroquois in Williston, Hinesburg, Richmond, and St. George, Vermont. Through comprehensive watershed restoration, the project's goal is to protect and improve the water quality of Lake Iroquois by 1) correcting existing pollution problems, 2) preventing new sources of pollution through town programs, and 3) establishing a landowner information program to demonstrate pollution prevention measures. This will be one of the the first times in Vermont that all sources of pollution from a lake's watershed, both present and future, will be addressed at once with an eye to improving lake water quality.

In 1984, a study funded by the U.S. Environmental Protection Agency found that phosphorus pollution was the cause of increasing weed and algal growth in the lake. The watershed sources of phosphorus included eroding soil from construction sites; road and driveway ditches; unstable streambanks; excessive clearing near waterways; and farm runoff. No specific land use was identified as the primary culprit, but rather a combination of land uses was to blame. It was determined that phosphorus from many sources had accumulated in the lake over the years, resulting in the water quality problems beginning to be evident.

The Lake Iroquois Watershed Project will seek to improve the condition of the lake and prevent future problems by correcting existing phosphorus sources and preventing new ones from developing. Landowner information and education will be emphasized, since most pollution sources in the watershed can be corrected through proper land management techniques. Small cost-share grants will be available to land owners to fund correction measures at the worst pollution sites. Watch for further reports about this project in *Out of the Blue*.

Fairfield Pond Diagnostic Study

In 1987, severe algal blooms began occurring at Fairfield Pond, a large warmwater lake located in northwestern Vermont. The lake is eutrophic (relatively high in phosphorus and supporting a large algal population) but blooms had never been a problem there before. In 1988, a two-year study was undertaken by the Lakes and Ponds Unit to identify the sources of phosphorus to the lake. Lake residents contributed greatly to the study by volunteering to do much of the sampling over the two year period.

The study found that while some of the phosphorus in the lake currently results from land runoff, the majority comes from "internal loading" (recycling out of the bottom sediments). This internal source of phosphorus undoubtedly is the result of decades of accumulated phosphorus runoff from the watershed. Recommendations for future action are being compiled in cooperation with the Fairfield Pond Recreation Corporation (Lake Association), and a final report on the study will be available soon.

Contact Susan Warren for further information on either the Lake Iroquois Watershed Project, or the Fairfield Pond Study.

OUT OF THE BLUE

Is produced semi-annually by the Lakes and Ponds Unit. Our purpose is to share information on lake environments, water quality and state activities through articles on lake ecology and Unit programs. Feel free to let us know what articles you would like to see in future issues. To be placed on the mailing list, or to receive extra copies, please contact:

Vermont DEC
Water Quality Division
Lakes and Ponds Unit
103 So. Main Street, 10N
Waterbury, VT 05671-0408
802-244-5638

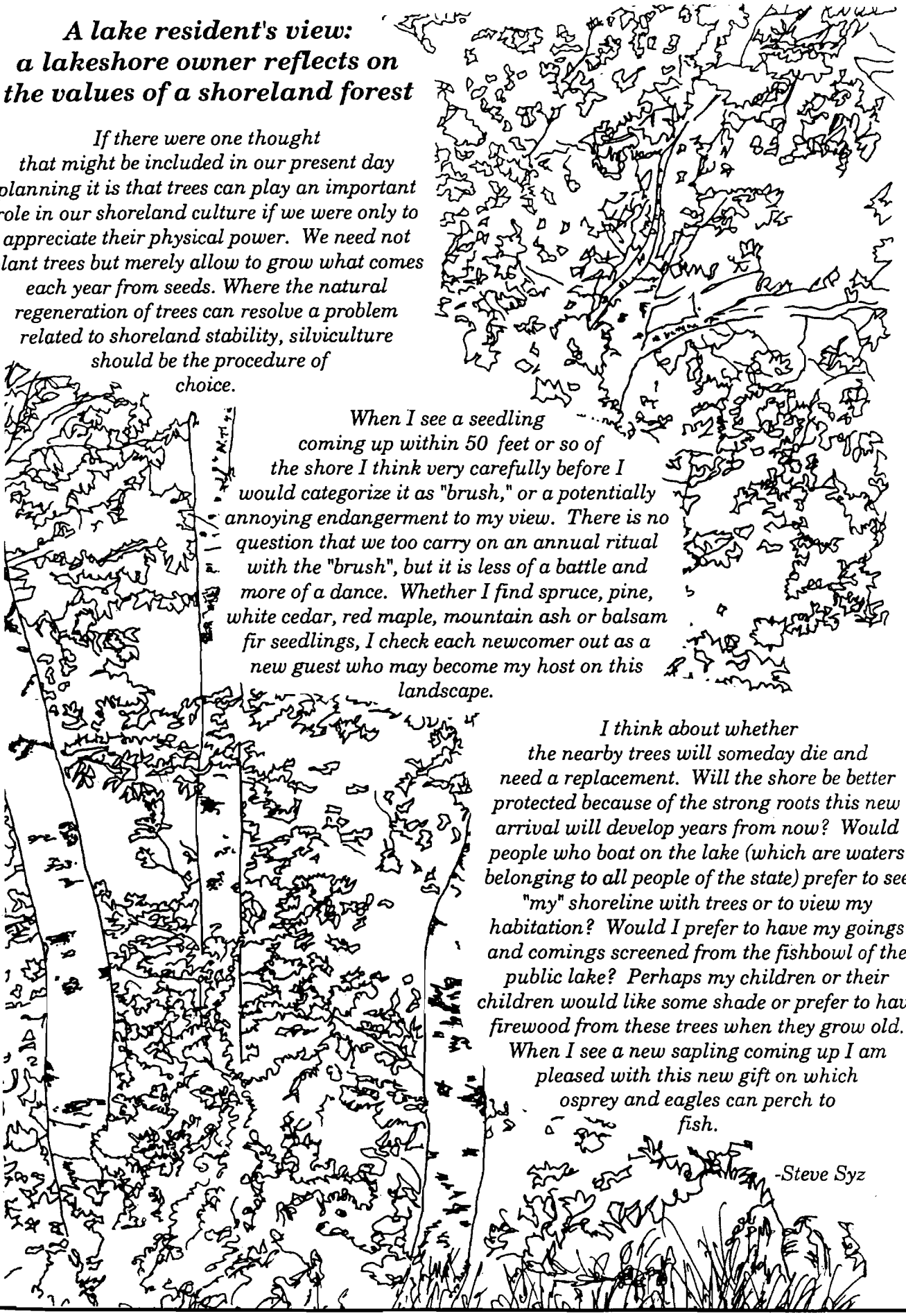
NEWSLETTER STAFF
Linda Lohner, Editor
Ann Bove

CONTRIBUTORS
Victoria Barney
Ann Bove
Sharon Dingee
Virginia Garrison
Cathy Kashanski
Eric Smeltzer
Steve Syz
Susan Warren

ARTWORK
Jonathan Baranick
Ann Bove
Gary Durkee
Linda Lohner
Susan Warren

A lake resident's view: a lakeshore owner reflects on the values of a shoreland forest

If there were one thought that might be included in our present day planning it is that trees can play an important role in our shoreland culture if we were only to appreciate their physical power. We need not plant trees but merely allow to grow what comes each year from seeds. Where the natural regeneration of trees can resolve a problem related to shoreland stability, silviculture should be the procedure of choice.



When I see a seedling coming up within 50 feet or so of the shore I think very carefully before I would categorize it as "brush," or a potentially annoying endangerment to my view. There is no question that we too carry on an annual ritual with the "brush", but it is less of a battle and more of a dance. Whether I find spruce, pine, white cedar, red maple, mountain ash or balsam fir seedlings, I check each newcomer out as a new guest who may become my host on this landscape.

I think about whether the nearby trees will someday die and need a replacement. Will the shore be better protected because of the strong roots this new arrival will develop years from now? Would people who boat on the lake (which are waters belonging to all people of the state) prefer to see "my" shoreline with trees or to view my habitation? Would I prefer to have my goings and comings screened from the fishbowl of the public lake? Perhaps my children or their children would like some shade or prefer to have firewood from these trees when they grow old. When I see a new sapling coming up I am pleased with this new gift on which osprey and eagles can perch to fish.

-Steve Syz

RE-ESTABLISHING A LAKESHORE BUFFER STRIP

Articles in earlier editions of *Out of the Blue* have emphasized the value of vegetated buffer strips for lake water quality protection and their importance cannot be overemphasized. Buffer strips filter sediments, sediment-bound nutrients and contaminants from surface water runoff. The vegetation and soils of a buffer remove nutrients from infiltrating surface water. The root systems of the undisturbed vegetation also stabilize the shoreline and eliminate the need for artificial stabilization structures.

This article seeks to provide some practical information on how to re-establish a buffer strip if your lakeshore property does not currently have one. The information also can be used to enhance the area adjacent to the lake shoreline if, for example, you have lawn down to the lake and have only scattered clusters of birch trees remaining. Following are some general considerations for planning and designing a vegetated buffer strip with native plant species and then a listing of some native species suitable for planting in both wet and dry locations along a lakeshore. A more extensive listing and description of plants as well as a listing of nurseries that can provide these plants will be available soon from the Water Quality Division of the DEC.

General Considerations

Native Species

Many trees, shrubs and herbaceous (non-woody) species used in landscaping are exotic or non-native species from Europe or Asia. A number of these plants have escaped from cultivation and threaten native species and diversity. Trees and shrubs that are native to North America are resistant to most diseases and insects, provide good food and habitat for wildlife, have all of the landscape values that non-native species have and are available from Vermont nurseries.

Silky dogwood

Planting Scheme

For an effective as well as aesthetically pleasing buffer strip, the mature planting (which you have to visualize knowing a little about plant growth rates and forms) would be a diverse, multi-layered community that is deep enough to provide water quality protection and that is self-perpetuating. Your personal preference will determine the types and arrangement of plants, but following information may help with your decisions:

- the larger the plant material used, the sooner the plants will become established and the faster you will have a mature community (of course, larger plants are more expensive which is another important consideration).

- grouping several of the same plants together can result in a "strong visual statement." Another attractive combination includes using evergreens and deciduous shrubs and trees of varying heights.

- trees planted 15 feet on center, shrubs planted 5 feet on center and groundcovers planted 1-3 feet on center will result in a dense buffer at maturity. Larger spacing distances could still provide water quality protection but would allow better views to the lake.

Planting Technique

All trees and shrubs obtained for the buffer should be planted in holes twice as big as the root ball. Partially fill the hole with good topsoil or aged compost and some of the soil that was removed from the hole. Be sure that the point where the stem emerged from the soil originally (appears as a dark stain on the stem) is at the soil level in its new location. The soil should be firmed around the plant to eliminate air holes but it shouldn't be compacted so much that root spread is inhibited (i.e. use your hands but not your feet to firm the soil). The plant should be watered well at the time of planting but not fertilized.

Site Conditions

Be sure that you know the site conditions for which your plants are best suited. The following tables give some of that information and your local nursery or source of plants should be able to provide more specifics. A buffer strip booklet being prepared by the Water Quality Division will also provide more detail as well as a list of additional trees, shrubs, and herbaceous species. Many Vermont nurseries also have information on native species that would be attractive and effective in a lakeshore planting.

Continued on the next page

Selected Shrubs for Lakeshore Buffers

SHRUBS				
NAME	SOIL CONDITIONS	LIGHT TOLERANCE	MATURE HEIGHT	COMMENTS
American hazel nut *Corylus americana*	drier soils	adapted to shade but does well on an edge or in more open situations	-	reddish and ornamental
Silky dogwood *Cornus amomum*	wet to dry	full sun but has fair shade tolerance	6-8 ft.	relatively rapid growth, good food and cover for birds
Red-osier dogwood *Cornus stolonifera*	moist to wet	fair shade tolerance	6-10 ft.	bright red stems that are especially distinct in winter, spreads rapidly by underground stems
Witch hazel *Hamamelis virginiana*	moist	shade tolerant	large spreading shrub or tree	delicate clusters of yellow flowers in fall after the leaves fall off, good as an understory species for moist areas
Winterberry *Ilex verticillata*	wet to moist	full or partial sun	6-8 ft.	bright red berries persist into winter
Highbush blueberry *Vaccinium corymbosum*	acid, wet soils to drier situations	sun or shade	up to 10 ft.	attractive form, berries
Nannyberry *Viburnum lentago*	drier soils but tolerant of some wet conditions	-	up to 20 ft.	spreads relatively aggressively, retains berries late into winter and thus good for birds

(*continued from the previous page*)

Selected Trees for Lakeshore Buffers

TREES				
NAME	SOIL CONDITIONS	MATURE HEIGHT	AERIAL SPREAD	COMMENTS
Red maple *Acer rubrum*	wet to dry	75-100 ft.	50-75 ft.	bright red fall foliage
Shadbush *Amelanchier canadensis*	drier soils	10-15 ft.	-	early flowering fruits (a favorite of birds), colorful foliage
Paper birch *Betula papyrifera*	well-drained, tolerant of less well drained situations	75+ ft.	-	white attractive bark
Green ash *Fraxinus pennsylvanica*	moist, tolerant of periodic flooding	60-80 ft.	35-50 ft.	relatively rapid growth
White pine *Pinus strobus*	moderately well drained	75-100 ft.	-	long lived evergreen, good for wildlife
Red oak *Quercus rubra*	drier soils	70-90 ft.	-	grand tree with reddish-brown bark, dark green leaves

SURFACE USE POLICY DRAFTED

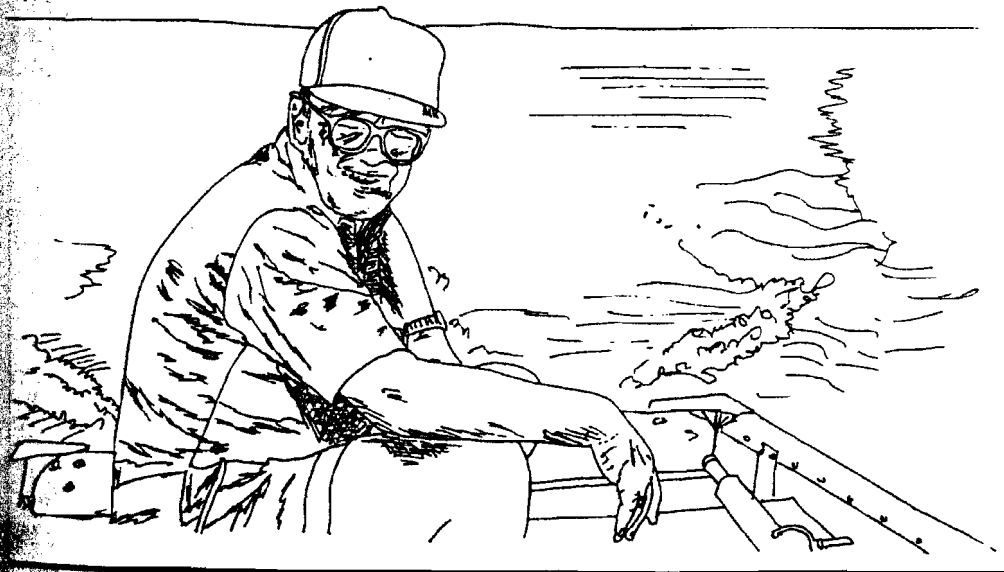
Under 10 V.S.A. § 1424, the Water Resources Board can be petitioned to adopt rules to regulate the surface use of Vermont's public waters. Such petitions are generally in response to some existing or potential conflict between user groups. In its consideration of the nearly 70 petitions it has received over the past 20 years, the Board has interpreted its authority to mean that Vermont's public waters are to be managed to allow for all normal or established uses in the manner that best insures that no one use preempts or substantially diminishes another existing use.

When the Board determines that a conflict involves established uses that cannot coexist, the Board will consider rules that separate the uses either spatially or temporally to ensure the preservation of each established use. For example, if the Board determines that an established use such as canoeing is in conflict with established high speed boating uses, the Board might consider limiting high speed boating uses to certain hours of the day. A spatial or temporal separation thereby preserves the established uses but also allows the inherently conflicting interests to enjoy the water resource safely and without continuing conflict.

From 1988-1991, the Board received 15 petitions requesting the adoption of specific rules for the use of particular lakes and ponds. In July 1991, the Board conducted hearings on petitions from the following lakes: Lake Morey (Fairlee), Lewis Pond (Lewis), Lake Greenwood (Woodbury), Sunrise Lake (Benson), Halls Lake (Newbury), Cole Pond (Jamaica), Gale Meadows Pond (Winhall and Londonderry), Willoughby Lake (Westmore), and Caspian Lake (Greensboro). The Board issued decisions regarding these lakes in November 1991. Some petitions were denied and some were granted as requested, but most were modified in response to public comment. The rules adopted generally addressed nighttime speed limits, daytime speed limits ranging from five to forty miles per hour, and/or the prohibition of internal combustion motors.

Given the physical diversity of Vermont's public water resources, not all uses can be accommodated on each body of public water. In recent years, it has become increasingly apparent to the Board that some sort of policy framework is needed to insure that the issues raised in individual petitions are dealt with in a comprehensive manner. Accordingly, the Board developed a draft statewide surface use policy, in cooperation with the Agency of Natural Resources, the Department of Public Safety and numerous individuals representing the user groups most directly affected. The development of the draft was assisted by, and coordinated with, the Department of Forests, Parks and Recreation's Lakes and Ponds Recreational Study, a study mandated by 10 V.S.A. § 1423.

The draft surface use policy is intended to serve as a framework for avoiding where possible, and resolving when necessary, conflicts in the use of public waters. The Board considers this draft policy to be a "work in progress" document which will continue to evolve in response to public review and comment.



The policy has two main sections. The first section outlines the general management policies that the Board has followed in its previous consideration of petitions. The intent is to make the management of Vermont's public water resources uniform and predictable.

The second section outlines in conceptual

Continued on the next page

Do you have free time that you don't know what to do with?
DO WE HAVE A VOLUNTEER POSITION FOR YOU!

Milfoil Watchers

Volunteers are needed to search Vermont's lakes and ponds for Eurasian watermilfoil. Early detection of milfoil growth is crucial to prevent lakewide spread. Help us locate new populations **before** this aggressive pest spreads further in Vermont. To become trained as a Milfoil Watcher this summer contact Ann Bove at 802-244-5638.

Vermont Lay Monitoring Program

Volunteer water quality monitors are currently needed for 8 Lake Champlain stations. An available station may be near you! Anyone can be equipped and trained to collect water quality samples as long as they have the following:

1. interest in contributing to the protection of this great resource
2. one to two hours a week June 1st through September 1st
3. a boat, anchor, and gas.

Stations currently available:

#5 Thompson's Point
#7 Burlington-Broad Lake
#9 Colchester Shoals
#13 Cumberland Bay
#14 Treadwell Bay
#18 Butler Island
#32 Valcour Island
#35 Dresden Narrows

For more information contact Linda Lohner at 802-244-5638.

Gauge Monitors

Volunteers are needed to collect data on lake water levels on the following lakes: Cedar Lake (Monkton Pond), Fern Lake, Howe Pond, Center Pond, Kettle Pond, Newark Pond, Lake Iroquois, Shelburne Pond, Island Pond, Shadow Lake (Concord), Wallace Pond, Fairfield Pond, Halls Lake, Lake Morey, Brownington Pond, Caspian Lake, Daniels Pond, Lake Elligo, McAllister Pond, Tildy's Pond (Clark Pond), Lake Willoughby, Lake Salem, Black Pond, Chipman Lake (Tinmouth Pond), Danby Pond, Half Moon Pond, Bliss Pond, Buck Lake, Coits Pond, Lake Greenwood, Nelson Pond (Forest Lake), Sabin Pond (Woodbury Lake), and Echo Lake (Plymouth).

Weekly observations, requiring only a few minutes, will assist the State in updating old water level data and provide valuable information for determining jurisdiction over shoreline projects. If you are interested in monitoring a lake water level gauge, please call Andy Rouleau at 802-244-5638.

SURFACE USE POLICY DRAFTED (*continued from previous page*)

terms the types of general management rules the Board is currently considering. The general rules are intended to protect the currently established uses of most lakes, ponds and reservoirs by setting appropriate speed limits and prohibiting conflicting uses from becoming established without an opportunity for public review and comment. Those seeking to introduce new uses that may conflict with established uses could petition the Board. Thus, the burden to petition would be on those seeking to change the status quo.

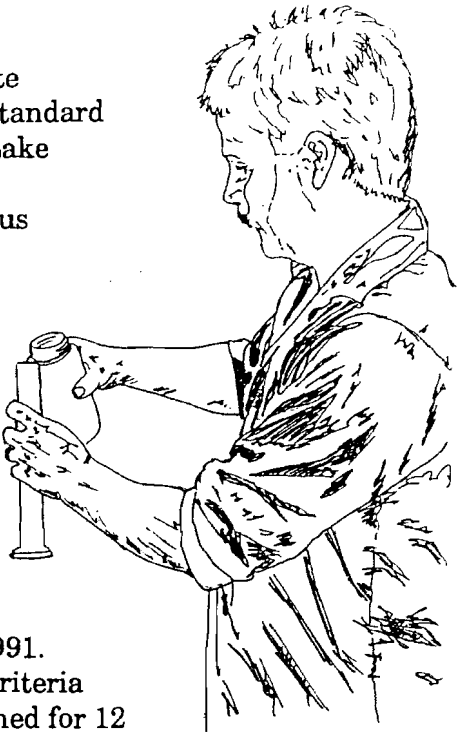
The proposed draft policy has been reviewed by several Legislative committees. After any revisions are made based on comment by the Legislature, the policy will be circulated to local officials, lake associations and interested user groups for their review and comment. For more specific information, contact the Water Resources Board at 802-828-2871.

DATA *(continued from page 1)*

been based on the Lay Monitoring Program data. Here is an example.

The Vermont Water Resources Board is a five member appointed authority charged with the task of developing State water quality standards. In 1989, the Water Resources Board began the process of developing numeric standards for phosphorus to protect Vermont's lakes and rivers from excessive eutrophication. The Board sought advice from the Department of Environmental Conservation on what phosphorus standards would be proper for Lake Champlain.

Fortunately, in 1987 the Lay Monitoring Program incorporated a user survey to relate public perception to water quality. The survey was completed by monitors each time water samples were taken for phosphorus analysis. The tabulated results of hundreds of individual user survey forms provided a basis for linking actual phosphorus measurements with user perceptions of algal levels and recreational suitability. The results for Lake Champlain indicated that if the summer average total phosphorus concentration was below 14 ug/l, then essentially no lake users perceived "high algal levels" or found their enjoyment of the lake "substantially reduced" more than 1% of the time during the summer. The 14 ug/l criterion was accepted by the Water Resources Board as an appropriate phosphorus standard for much of Lake Champlain.



Phosphorus criteria for Vermont's portion of Lake Champlain were incorporated into Vermont's new Water Quality Standards, effective in 1991. Phosphorus criteria were established for 12 segments of the lake, as shown in Table 1. In some cases, a stricter criterion of 10 ug/l was applied to protect parts of the lake where existing water quality is better than the general 14 ug/l standard. In some of the more eutrophic bay areas of the lake, it was doubtful whether the 14 ug/l value was realistically attainable or even natural, so the criteria were revised upwards in those cases.

Lake Segment	Phosphorus Criterion (ug/l)	Existing Phosphorus Conc. (ug/l)
Malletts Bay	10	11
Main Lake	10	14
Shelburne Bay	14	16
Burlington Bay	14	17
Isle LaMotte	14	18
Northeast Arm	14	19
Otter Creek	14	20
Port Henry	14	28
St. Albans Bay	17	39
Missisquoi Bay	25	40
South Lake A	25	42
South Lake B	54	54

Table 1. Total phosphorus criteria for Lake Champlain in Vermont's Water Quality Standards, compared with the 1979-1988 mean phosphorus concentration in each lake segment (Vermont Lay Monitoring Program data).

Table 1 shows that the new phosphorus criteria are lower than the currently existing phosphorus concentrations in nearly all the lake segments. Substantial phosphorus reduction efforts will be needed in Vermont to meet these criteria by 1998, as required by the Water Quality Standards. It is hoped that New York and Quebec will be encouraged to reduce phosphorus loadings to Lake Champlain as well.

The Vermont Lay Monitoring Program data played a key role in providing the technical justification for the new in-lake phosphorus criteria. As phosphorus control measures are implemented in the future, the Lay Monitoring Program will continue to provide an important source of water quality data for determining whether the phosphorus criteria in Lake Champlain are actually achieved.

For more information on the Lay Monitoring Program contact Linda Lohner at 802-244-5638.

Original Secchi disk experiments held on papal fleet in Mediterranean Sea

Have you ever wondered why "Secchi" is always capitalized and "disk" is not? For those of you readers who have been curious (and the rest of you will find out anyway), it goes back to our grammar school lessons in capitalization. The disk is named after its inventor - Pietro Angelo Secchi.

Secchi is primarily known as an astronomer of some note. He was born in Italy in 1818, trained to be a Jesuit priest and spent the early years of his career teaching physics. During 1848, political storms swept Europe, and strong anticlerical sentiments forced the Jesuits to close their houses in Rome and send their members into exile. Secchi fled to England and then the United States, where he taught at Georgetown University in Washington, D.C.

When the Jesuits were able to return home at the end of 1849, Secchi took over direction of the observatory at the Roman College.

Secchi quickly realized the observatory was poorly equipped and poorly located. He moved it to the roof of the Church of San Ignacio, where supports for a planned-but-never-built dome provided stability for the installation of new telescopes. It was here that Secchi was able to develop the first classification of stars by their spectra, observing and classifying 4,000 stars. Secchi was also the first astronomer to use the new art of photography. He photographed the sun during an eclipse and had a complete set of photographs of the moon by 1859.

As head of the Roman Observatory, Secchi was the Pope's scientific advisor and was often called upon to perform other duties away from his telescopes. For instance, he might be called upon to give advice on the construction of lighthouses along the coast or to investigate the reliability of water supplies in the Papal States.

It was probably such a duty when the commander of the papal fleet asked Secchi to help measure the transparency of the nearby coastal waters of the Mediterranean. At 4 p.m. on April 20, 1865, Secchi began his first optical experiment with water clarity by lowering two submersible disks over the side of the papal yacht, *l'Immacolata Concezione*. One disk was 43 centimeters in diameter and made of white clay. The other was white-painted sail cloth stretched on an iron ring of 60 centimeters in diameter.

During the next six weeks, Secchi and the ship's commander took turns lowering the disk, on the sunny and then the shady side of the boat, in calm weather and in rough seas. After two weeks, they also tried using yellow and brown disks. The ship's crew enjoyed the sport of clambering up and down the rigging and into launches to see what difference height made in judging when the disks had disappeared from view. They also used umbrellas and hats to shade the spot of sea where the disk was being lowered so they could more easily track its descent.

After collecting his data, Secchi went back to Rome to mull over what it all meant. He recorded his conclusions in the commander's reports on the experiments. Secchi considered that critical factors in the disk readings were: the diameter of the disk; the spectral reflectance of the submerged disk; surface of the sea -choppy or calm; the reflected radiance of the sun and sky on the surface of the water; the height of the observer; shadows and sunlight along the submerged path of sight; and the amount of plankton below the surface.

In a discussion of Secchi's listing of the optical factors - light reflecting in, on and above the water - that can affect disk readings, Rudolph Preisendorfer, with the Pacific Marine Environmental Laboratory, wrote, "In summary, then, good Secchi opticians will use black umbrellas in becalmed row boats, when peering over the side at the descending white

disk. Enterprising Secchi diskers just may go on to construct rowboats with hooded cabins and glass bottoms."

Although we do not ask that volunteer lake monitors haul out their black umbrellas, it is a good reminder of how important it is to monitor at the same time of day, and at the same spot, to eliminate as many variables as possible.

Going back to Secchi's comments on his experiments aboard the *l'Immacolata Concezione*, we find his own words elaborating on the final factor that he considered affected transparency readings. "We do not wish to pass over a circumstance which is pointed out to us that in these months (April and May) the sea is more transparent than in summer, perhaps owing to the lesser amount of animalcules and other organisms which grow there in the summer season."

Surely the famed astronomer might well be surprised to find that in these high-tech times of satellite-transmitted data, his simple measuring device remains a mainstay in water quality monitoring.

This article reprinted with permission from Lake Watch, a publication of the Minnesota Citizen's Lake Monitoring Program. Quoted material in the story is from: "Eyeball Optics of Natural Waters: Secchi Disk Science," published by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration. The portrait of Pietro Angelo Secchi is based on a photograph from the Library of Congress.

LAKE LINGO

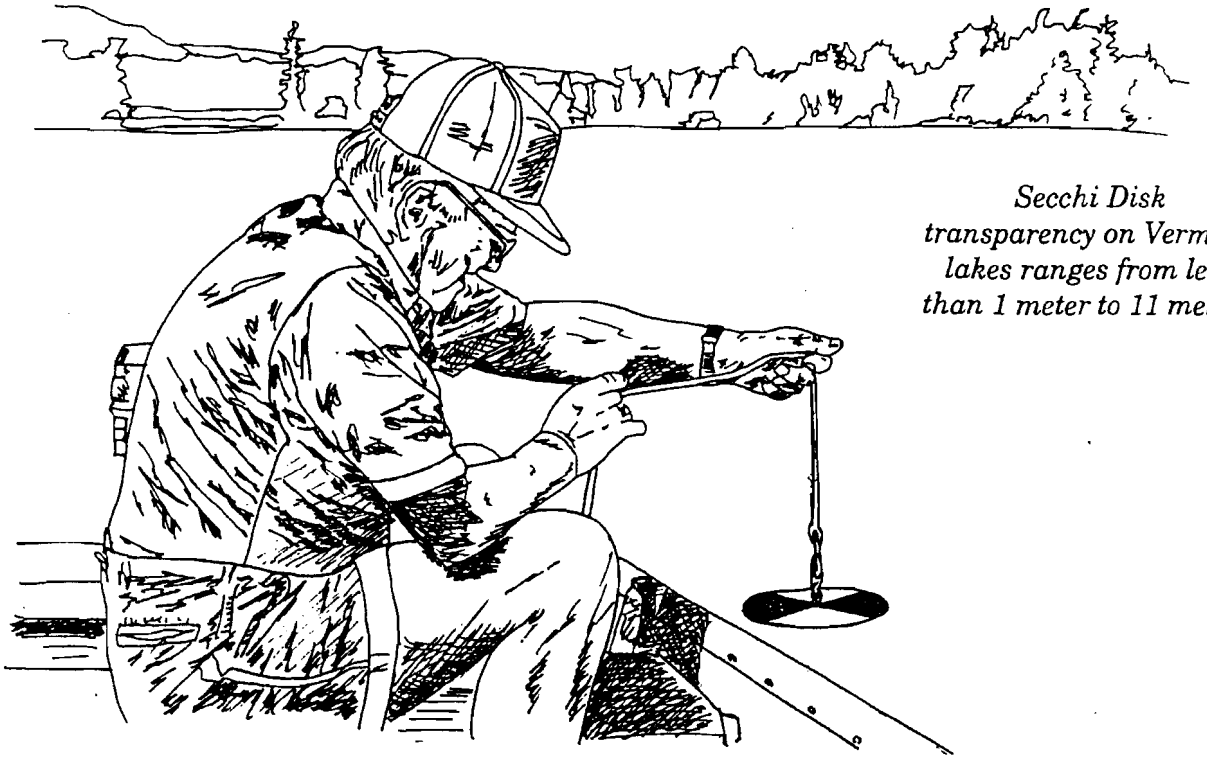
Algae - simple aquatic plants which are usually microscopic in size. Most species of algae are suspended in the water. Algae do not have true roots, flowers, or leaves.

Algal Bloom - a very large population of algae which may cause a green coloration of the water or form large floating mats. A bloom may be stimulated by high nutrient levels, warm water temperatures or long periods of sunlight. Seasonal spring and fall algal blooms are part of the normal cycle of a productive lake.

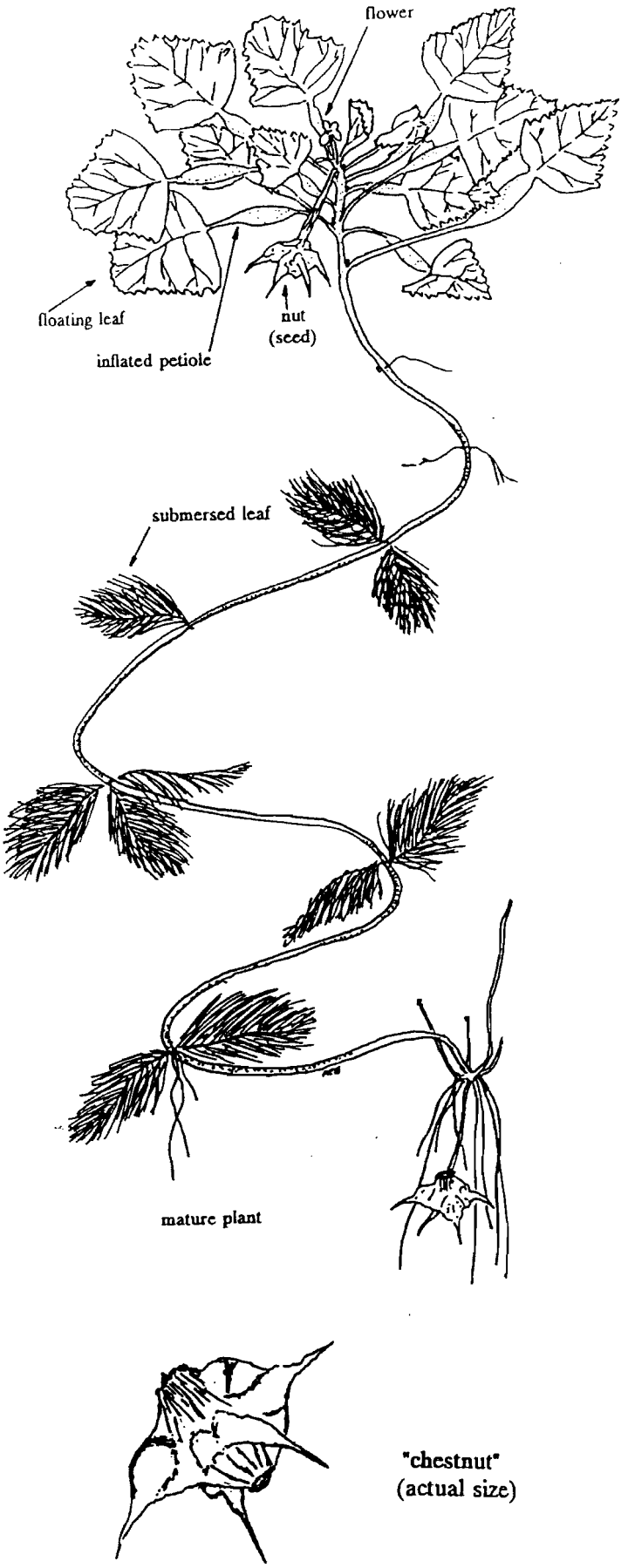
Exotic - non-native or of foreign origin. Exotic species may be introduced intentionally or accidently by humans and other organisms. Many exotic species reproduce rapidly and compete with native species by taking over the natural habitat.

Osprey - a large fish-eating hawk which is dark on the back and white below. There are a few nesting pairs in Vermont.

Runoff - rainfall which is not absorbed by the soil but which instead flows over land and artificial structures (i.e. roads) from higher ground to lower ground and ultimately into rivers and lakes. Fast moving water can scour soil.



Secchi Disk transparency on Vermont lakes ranges from less than 1 meter to 11 meters.



CHESTNUTS (*continued from page 1*)

produce 300 new nuts in a single year!

Water chestnut infestations can severely limit the recreational use of a lake. Further, this plant has the potential to infest wetlands, beaches, sluggish rivers and critical environmental areas in ALL parts of Lake Champlain as well as other waterbodies throughout the state. Currently water chestnut's range in Vermont includes only the southern part of Lake Champlain and one other known inland water, Dead Creek in Vergennes. In the southern part of Lake Champlain, major infestations cover approximately 300 acres; Dead Creek's infestation, discovered in 1990, covers approximately two acres.

The State of Vermont and the U.S. Army Corps of Engineers entered into a cooperative agreement in 1982 to begin a mechanical harvesting program to control the water chestnut infestation in southern Lake Champlain. The goal of the program was to reduce the infestation of water chestnut to south of the Benson Landing area of Lake

Water Chestnut

Trapa natans L.

Description: Annual aquatic plant, with both surfacing and submersed leaves. Surfacing leaves triangular shaped with toothed edges and an inflated petiole, or leaf stalk, forming a rosette on the water surface; submersed leaves feather-like. White flowers form in the axils of the surfacing leaves in July. Fruit are nut-like and "woody" with typically 4, sharp, barbed spines. Long cord-like, rarely branching stems can attain lengths of up to 16 feet.

Habitat: Floating or rooted in the bottom mud of lakes, ponds, slow streams and rivers.

Reproduction: Nut-like woody fruits produced from pollinated flowers float, sink to the lake bottom and germinate in early spring. A single nut may give rise to 10-15 rosettes. Ungerminated nuts may remain viable for up to 12 years.

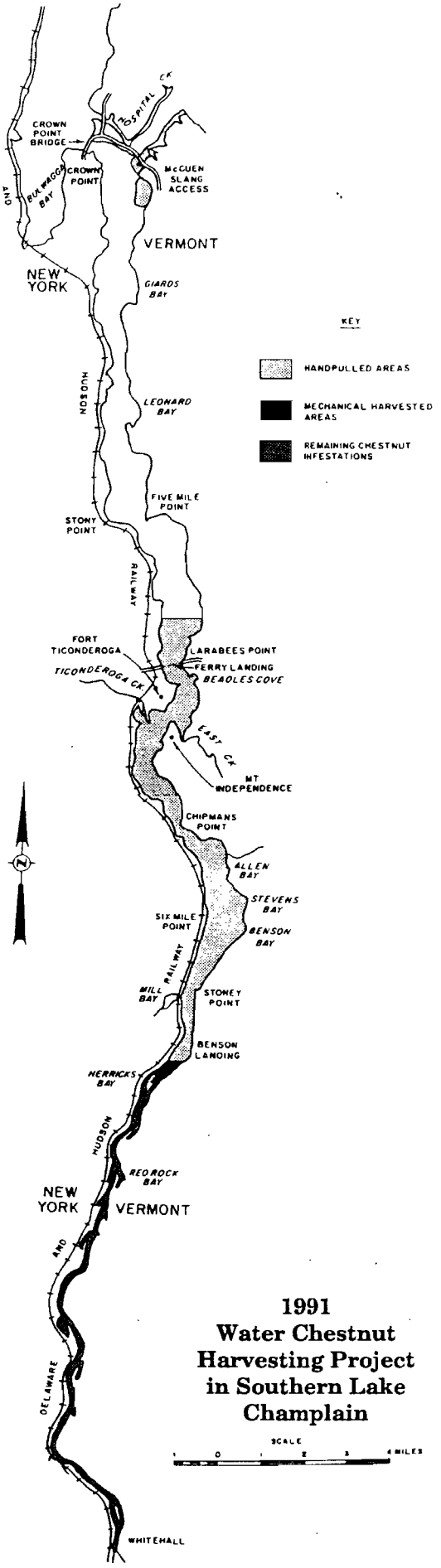
Distribution: Introduced from Europe, Asia and tropical Africa into the northeastern United States.

Champlain and to prohibit its northward spread from this area.

Since 1982, approximately $1.5 million has been spent on this control program. Each year, mechanical harvesters have cut and removed dense water chestnut beds from the deep water areas and work crews have manually hand-pulled plant growth along the shoreline and in shallow bays. The cut vegetation is trucked to disposal sites away from the water's edge. Approximately 50 to 100 acres of water chestnut are harvested each summer. Since water chestnut is an annual plant, beginning from nuts each year, harvesting can effectively control and eradicate an infestation if it takes place before mature nuts are formed. However, since previously dropped nuts may remain alive and able to germinate for up to 12 years, it is necessary to re-check harvested areas each year to remove new plants that have grown from old nuts. After several years of harvesting an area, few viable old nuts remain, and the area can be controlled by handpulling any remaining plants.

Like Eurasian watermilfoil, water chestnuts can be easily transported by boaters. Boaters can inadvertently spread this nuisance aquatic plant and must be careful not to transport water chestnut rosettes (with nuts) or nuts alone to other areas of Lake Champlain or to other waterbodies. Wind and waves also contribute to within-lake spread by breaking plants and nuts loose, thus enabling them to drift to new locations.

The Lake Champlain Water Chestnut Program has been highly successful and the State expects to continue the program in the future, depending on the availability of funding. The infestation in the control area has been significantly reduced in size and yearly harvesting and handpulling has been effective in preventing its spread northward. For the long-term, it is hoped that the control program will reduce the size of the infestation to the point where a maintenance program, consisting of routine surveillance and seasonal hand-pulling, is all that is necessary to keep the infestation in check. Increased citizen awareness and actual participation in a yearly maintenance program will promote the continued success of this program and the prevention of the spread of water chestnut in Vermont.



1991 Water Chestnut Harvesting Project in Southern Lake Champlain

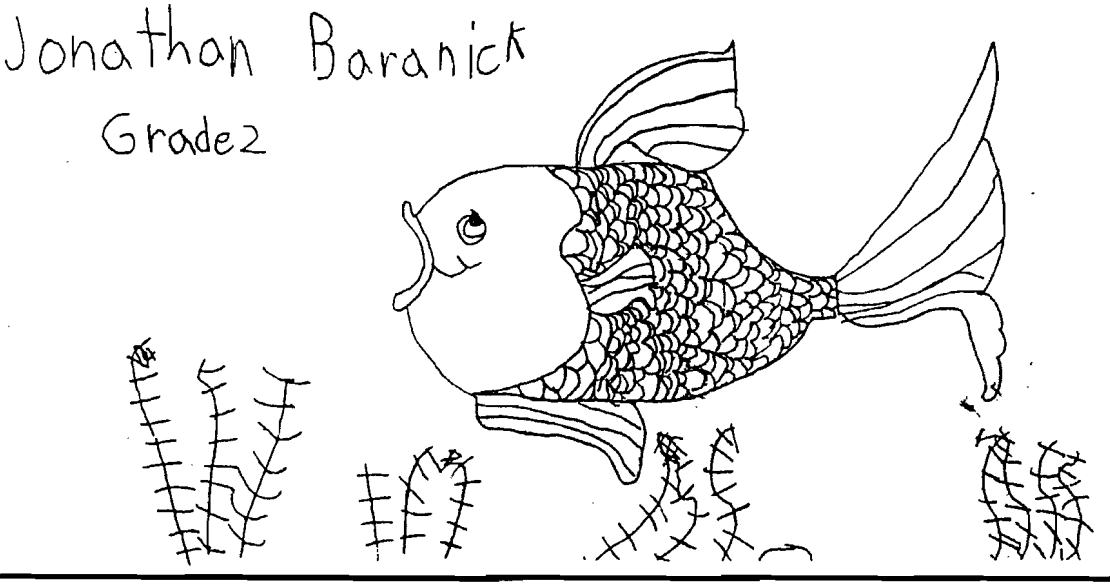
WHAT IS NALMS?

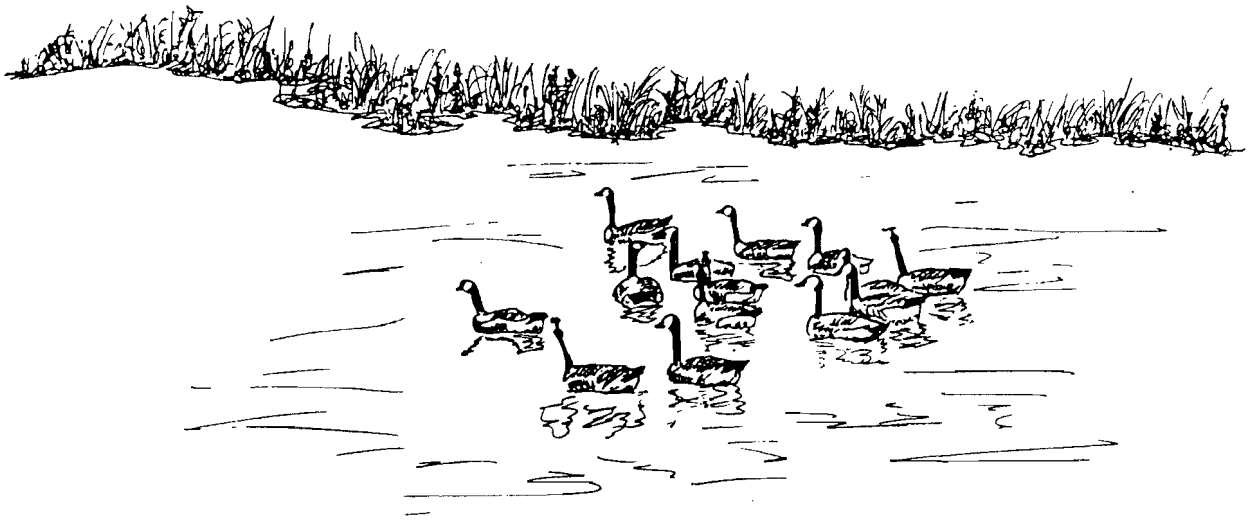
Many readers may not know that an international organization exists which is dedicated solely to lakes. This organization is NALMS - the North American Lake Management Society. Founded in 1980 by a group of people who shared an interest in lakes, NALMS has grown to unite individuals and organizations throughout North America involved in all aspects of lakes. Lakeshore residents; lake associations; state federations of lake associations; government officials at the local, state and federal levels; consultants; corporations; students; educators and researchers are all members of NALMS.

During the first decade of its existence, NALMS established a magazine (**Lake Line**) and a professional journal (**Lake and Reservoir Management**), published numerous educational documents, held annual national conferences and coordinated numerous regional citizen workshops. The organization can also be credited with successfully influencing Congress to fund the U.S. Environmental Protection Agency's Clean Lakes Program for several years when the administration in Washington had requested zero funding. Many states' lakes programs receive funding from the Clean Lakes Program. In Vermont, specific projects have been funded on Lake Morey, Lake Iroquois, Harvey's Lake and Lake Champlain, and significant funding has also been received to support the state's Lake Assessment and Lake Protection Programs.

NALMS is presently drafting a Strategic Plan for the next 5-10 years. An integral part of this plan is the establishment of Chapters in each state and province in the U.S. and Canada. The Society presently has Chapters in 13 states, and Alberta is soon to become the first provincial Chapter. The most visible work of the Society will be the activities of its Chapters, working in each state and province to promote lake management, restoration and protection. A typical Chapter includes the lakes associations in the state, the state lakes program staff, private consultants, corporations, university researchers, students, legislators and individuals with an interest in lakes. With such a collection of talent focused on lakes issues, how can we fail?

If this vision captures your imagination, consider joining NALMS. As a member of NALMS, you will immediately become part of an international network which includes others interested in lakes and lake management, as well as experts in the field. You will also be supporting the only organization in North America devoted solely to lakes. You can also become involved in the initial stages of Chapter development in the northeast. Ultimately, the most valuable benefit of membership will be clean lakes in North America. If you're interested in learning more about the North American Lake Management Society, or would like to become a member, call Ginny Garrison at 802-244-5638.





ZEBRA MUSSEL

Information Card

The Citizens Advisory Committee on Lake Champlain's Future (a committee of New York and Vermont citizens and legislators established under the 1988 VT-NY Agreement on Lake Champlain) is producing a zebra mussel identification card that should be available this summer. The pocket sized cards depict a photograph of the zebra mussel, describe what the mussel looks like, alert readers to the threat these invaders pose and provide a telephone number to report suspected sightings. When available, cards may be obtained from the Lakes and Ponds Unit (802-244-5638).

Educational Workshops

The Lake Champlain Basin Program will be offering a series of zebra mussel educational workshops throughout the basin in May. These workshops will provide information on the zebra mussel, how to identify it, and what to do if a sighting is made. Exact dates and locations for the workshops are still being determined, but if you are interested in being put on a mailing list to receive a brochure, please contact: Elizabeth Soper, LCBP, Planning Division, 103 So. Main Street, Waterbury, VT 05671-0301 or call 802-244-1137 or the Lake Champlain Hotline 1-800-244-9140 (VT callers).

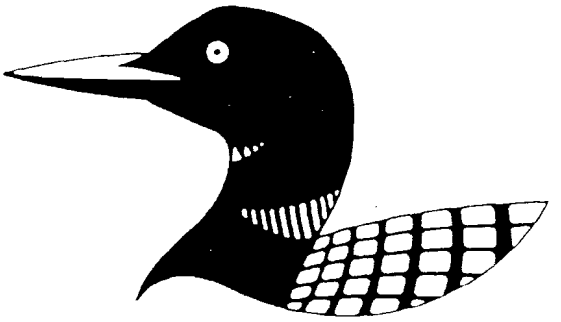
Diet for a Small Lake: A New Yorker's Guide to Lake Management

This 268 page book is the product of NY DEC's Division of Water and the New York Federation of Lake Associations, Inc. (FOLA), a not-for-profit-coalition of lake associations, corporations and private citizens devoted to the preservation and protection of lakes, ponds and streams throughout New York State. Even though this book was developed for New York, it could be valuable to any lake community interested in protecting its lake, as well as individuals who would like to know more about water resources.

Diet for a Small Lake includes detailed instructions for preparing a lake management plan, complete descriptions of lake restoration and watershed management techniques, a comprehensive discussion of lake ecology, and methods for organizing a lake community for action. The guide, which presents highly technical issues, was written for the non-scientist. *Diet for a Small Lake* is available at a cost of $10, plus $2 for shipping and handling, through FOLA at the following address:

Federation of Lake Associations, Inc.
Publications Department
2175 Ten Eyck Avenue
Cazenovia, NY 13035

LOON WATCHERS NEEDED



The Vermont Institute of Natural Science (VINS) is seeking participants in its long-term monitoring of Vermont's endangered Common Loon population. In 1991, only 15 pairs nested statewide, the majority of these in the Northeast Kingdom. In conjunction with the Vermont Fish and Wildlife Department, VINS is attempting to protect and manage Vermont's loons, which are recovering from a population low of only 8 breeding pairs in the mid 1980s. Volunteer observers are needed to document the nesting status of loon pairs, particularly on remote ponds that are infrequently visited by VINS biologists. Especially useful would be information that details the regular usage by loons of specific lakes and any concrete evidence of breeding. Volunteers are also needed to count loons on VINS' annual Loon Watch Day, a statewide census that will be held on Saturday, July 18 from 8-9:00 am. For more information or to become involved, contact Chris Rimmer or Ros Renfrew at Vermont Institute of Natural Science, Woodstock, VT 05091 or call 802-457-2779.

LAKE CHAMPLAIN HOTLINE

Do you have a question
or concern about Lake Champlain?
Call toll-free in Vermont

1-800-244-9140

or write:
Lake Champlain Basin Program
Citizens Advisory Committee
Center Building, 3rd Floor, 103 South Main St.
Waterbury, VT 05671-0301

Note: **The name of The Lake Champlain Conference has officially been changed to The Lake Champlain Basin Program**

◆ ◆ ◆

LCBP NEWSLETTER

The Lake Champlain Basin Program (LCBP) was created because of the growing concern for the health of the Lake Champlain Basin. An important goal of this program is to inform and educate concerned citizens about the Lake and surrounding basin. If you would like to learn more about this program and receive the LCBP quarterly newsletter, please contact:

The Lake Champlain Basin Program
Center Bldg., 3rd Floor, 103 So. Main St.
103 South Main Street
Waterbury, VT 05671-0301
802-244-1137 or 1-800-244-9140 (VT only)

VT Department of Environmental Conservation
Water Quality Division
Lakes and Ponds Unit
103 So. Main Street, 10 North
Waterbury, VT 05671-0408

BULK RATE
U.S. POSTAGE
PAID
WATERBURY, VT
PERMIT No. 17

Address correction requested.