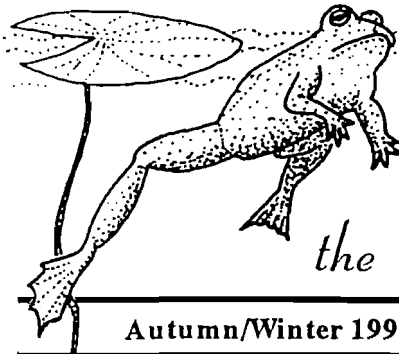
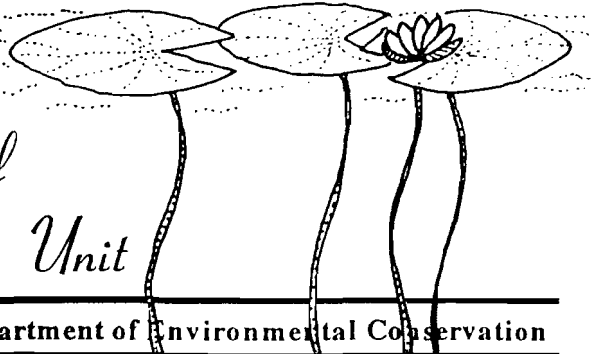


Out of the Blue



A Newsletter of the Lakes and Ponds Unit



Autumn/Winter 1990-91 No. 1 Vermont Department of Environmental Conservation

The Charter Issue

Welcome to the first issue of the Water Quality Division's, Lakes and Ponds Unit Newsletter. In the past, individual unit programs produced separate newsletters. To save time and to reach more people, we have pooled our resources and mailing lists.

Our purpose is to share information on the lake environment, water quality, and state activities through articles on lake ecology and unit programs. We invite your comments, questions, ideas, contributions, and suggestions relating to any aspect of this newsletter. If you know of someone who would like to be placed on the newsletter mailing list, please let us know.

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INSIDE THE LAKES AND PONDS UNIT

Vermont's lakes and ponds are a great natural resource - a fact more and more people discover each year. The state has 284 lakes and ponds twenty acres in size or larger. More than half of these lakes and ponds have public access through municipal, state or federal ownership of shorelands. Increased use of these (and other smaller lakes) has drawn attention to the importance of lake protection and wise lake management.

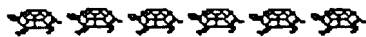
Within Vermont state government, the Lakes and Ponds Unit is the primary entity responsible for lake management and protection programs. The ultimate goal of the Unit is to protect and improve the water quality of Vermont's lakes through public awareness and local commitment to action. Existing lake water quality is monitored through a variety of sampling programs. When a lake experiences water quality problems, Unit staff investigate to determine the causes of and possible solutions to the problems. Lake management or restoration projects are initiated when warranted. Staff are available to answer lake users' questions concerning water quality and lake management issues, and to assist in the development of effective lake and watershed management programs. Numerous brochures are also available on issues important to Vermont's lakes. Long range lake protection is fundamental to the Unit's activities. A major new emphasis of the Unit is technical assistance to local planning groups to help them prevent future water quality degradation by addressing potential sources of pollution. Unit goals are achieved through a

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↔ ↔ LAKES AND PONDS UNIT MAILING LIST ↔ ↔

The Lakes and Ponds Unit has developed an extensive mailing list of lake residents and others interested in Vermont's lakes and ponds. This list has been used to disseminate information on water quality, lake protection, Eurasian watermilfoil, state and national lake conferences, lake associations and other lake related facts.

In an attempt to bring this mailing list up-to-date, we are requesting assistance from those people on the list. Please use the enclosed return card to let the Lakes and Ponds Unit know if you would like to remain on the mailing list or have your name removed. The return card can also be used to correct or make changes to your mailing address. Thank you for your cooperation.



OUT OF THE BLUE

will be 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 call 244-5638, or write:

Vermont DEC
Water Quality Division
Lakes and Ponds Unit
103 So. Main Street, 10N
Waterbury, VT 05676

NEWSLETTER STAFF

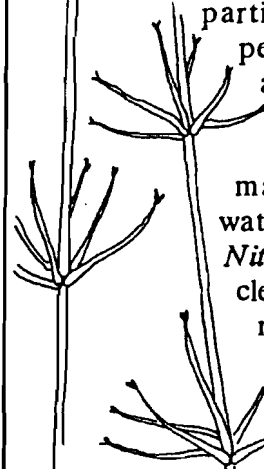
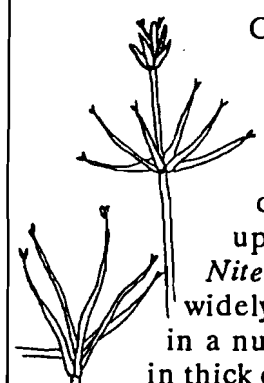
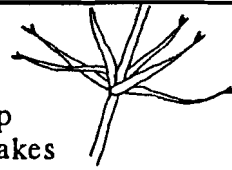
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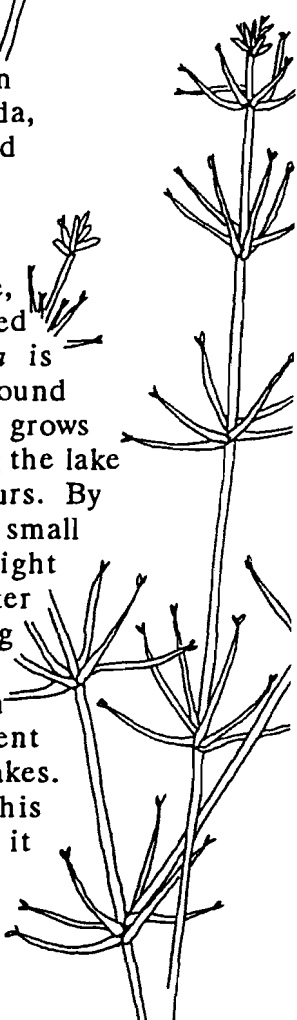
Ann Bove (+ artwork)
Holly Crosson
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Jim Kellogg
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Andy Rouleau
Susan Warren (+ artwork)



NITELLA



Certain deep clear water lakes such as Lake Tahoe in California and Nevada, Crater Lake in Oregon and Lake George in New York, owe their exceptional water clarity in part to a large, upright form of algae called *Nitella*. In Vermont, *Nitella* is widely distributed and can be found in a number of lakes. This plant grows in thick deep water meadows along the lake bottom at specific depth contours. By absorbing nutrients and other small particles that prevent light penetration through the water and by trapping phosphorus beneath its plant beds, *Nitella* aids in maintaining the excellent water clarity seen in some lakes. *Nitella* also benefits from this cleansing action since it requires very clear water for its own survival.



In the next issue:

- * "Lake Champlain Management Conference" - the new committee of federal, state, and local representatives created to guide the management of Lake Champlain
- * Federal Clean Lakes Program and Clean Water Act reauthorization
- * Highlights of Eurasian Watermilfoil research

(continued from page 1)

variety of programs which often involve volunteers. The basic Unit programs are described below.

AQUATIC NUISANCE CONTROL PROGRAM

The Aquatic Nuisance Control Program responds to aquatic plant and algae complaints, administers aquatic plant control permits and develops long range projects to control aquatic nuisances.

AQUATIC PLANT SURVEYS

Aquatic plant growth is surveyed in up to 25 different lakes each summer. Detailed information on the type of plants present and the density of plant growth is recorded for the entire shoreline. The surveys serve several purposes: 1) to document the extent of any nuisance weed growth which may be present, 2) to search for new infestations of Eurasian watermilfoil, 3) to provide baseline information on the extent of plant growth and the species present to assist in documenting future changes, and 4) to locate and identify rare or threatened plants requiring protection under Vermont law. In addition to the routine plant surveys, vegetation on an additional 29 lakes was described by the Lake Assessment Project in 1990.

LAKE ASSESSMENT PROJECT

The goal of the Lake Assessment Project is to develop a priority list of lakes in need of protection. Lakes are being evaluated based on the degree of threat to the lake and the presence of valuable natural resources. This priority list will be used to direct lake protection efforts towards high priority lakes. The list will also be available to any organization, governing body or individual concerned with lake protection.

LAKE CHAMPLAIN PROJECT

The Lake Champlain Phosphorus Study will provide an up-to-date measure of the phosphorus load entering Lake Champlain from its watershed. This information will be combined with the results of extensive lake sampling to develop

LAKES AND PONDS UNIT CONTACTS

802-244-5638

Aquatic Nuisance Control.....	Victoria Barney & Ann Bove
Lakes and Ponds Supervisor.....	Virginia Garrison
Lake Assessment & Spring Phosphorus.....	Kitty Enright
Lake Champlain Project.....	Eric Smeltzer & Jim Kellogg
Lake Protection Program & Aquatic Plant Surveys.....	Susan Warren
Lay Monitoring Program.....	Linda Lohner
Milfoil Control Program.....	Holly Crosson & Ann Bove
Milfoil Watchers Program.....	Ann Bove
Shoreline Permits & Water Levels.....	Andy Rouleau

a lake water quality model linking phosphorus loads to water quality conditions in Lake Champlain. The ultimate goal of the project is to develop a cost-effective watershed-wide phosphorus control program to improve the water quality of Lake Champlain.

LAKE PROTECTION PROGRAM

The Lake Protection Program was developed to provide town planners with information and technical assistance regarding local steps which can be taken to protect lake water quality. Services and information available through the program include:

1. Workshops for planning commissions to discuss lake protection options available at the town level.
2. Information on shoreland zoning, state and federal regulations and programs, and best management practices for lakeshore and drainage basin land uses.
3. Assistance in reviewing existing town ordinances and programs for effectiveness in protecting water quality.
4. An illustrated guide for town planners to assist them in planning for water quality protection.

LAY MONITORING PROGRAM

People from all walks of life interested in being actively involved in lake protection constitute the core of this program. Organized, trained, and equipped by the

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Lakes and Ponds Unit, these volunteers spend 1-2 hours a week (June-August) collecting valuable water quality data on lakes of particular interest to them. Lakes in the program are sampled weekly for water clarity, chlorophyll, and phosphorus. The baseline data collected by lay monitors is used by the State and Federal government to make critical decisions regarding lake management and protection. Lay monitoring data is the only long term water quality information available on a number of lakes.

EURASIAN WATERMILFOIL CONTROL PROGRAM

Vermont's Eurasian Watermilfoil Control Program focuses on managing the growth of milfoil in certain lakes that have established milfoil populations, stopping or slowing the spread of milfoil in lakes where it has been recently introduced, and preventing milfoil from being introduced into new lakes. Program goals are accomplished through research, demonstration projects, monitoring of milfoil populations, milfoil management projects and public education.

MILFOIL WATCHERS PROGRAM

The Milfoil Watchers Program represents a statewide network of concerned citizens. These volunteers are trained in the identification of Eurasian watermilfoil (*Myriophyllum spicatum*), and agree to conduct annual searches in lakes currently thought to be uninfested. Since the early discovery of new populations gives the best hope of eradicating this nuisance aquatic plant and preventing a lakewide problem, such volunteers provide an important service on the many lakes which otherwise might not be monitored for early signs of an infestation.

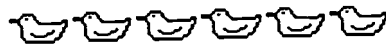
SHORELINE PERMITS

Activities or projects along lake and pond shorelines are regulated in Vermont through "encroachment permits". Each permit application is evaluated for potential impacts to water quality, fish and wildlife habitat, aquatic and shoreline vegetation, and public uses such as navigation and recreation. Projects must be consistent with natural surroundings, municipal shoreland zoning ordinances and

any applicable state plans. Recent public trust issues have resulted in changes in procedures for evaluating applications to include public purpose and public benefits, and other issues such as excessiveness, less intrusive alternatives and reduction of adverse impacts. Examples of projects requiring permits include docks, walls, boat ramps, marinas, sand/gravel beaches, dredging, filling, bridges, utility lines, and water intakes.

SPRING PHOSPHORUS PROGRAM

Each spring the Lakes and Ponds Unit samples up to 70 lakes for phosphorus levels. These samples provide a means of determining the amount of phosphorus that is present in lake waters at the beginning of the open water period, and which will be available for algal growth through the summer. This data gives valuable information on the water quality of Vermont lakes and provides baseline data which can be referred to should changes occur in a lake.

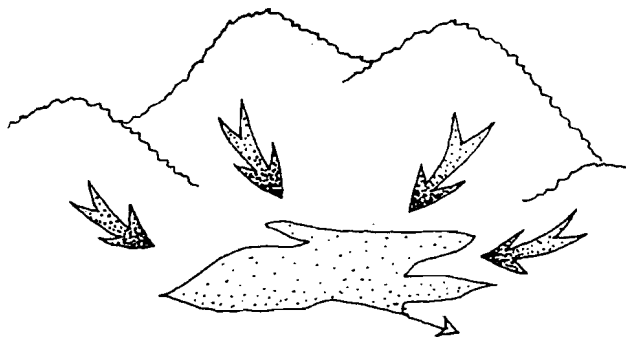


The Lakes and Ponds Unit is primarily concerned with water quality issues which affect public use and recreation. Other topics related to lakes and ponds are addressed by other sections and units of the Water Quality Division or by other Departments. Some of these include:

- Water Quality Division Special Studies Unit** - lake acidification studies, biomonitoring, toxicity testing 244-5638
- Water Quality Division Planning and Engineering Section** - wetlands, hydropower dams 244-6951
- Department of Fish and Wildlife** - fisheries, aquatic birds and mammals 244-7331
- Department of Forests, Parks and Recreation, Recreation Division** - recreation planning for lakes 244-8713
- Department of Health** - public water supply, restrictions on recreational use of waters, well testing, bacteria testing 863-7220 or 1-800-464-4343
- Water Resources Board** - restrictions on the recreational use of lakes, establishment of water level regulations 828-2871
- Department of Public Safety** - motorboat law enforcement 244-8744
- Agency Facilities Division of DEC** - dam safety 244-8757

LAKE PROTECTION - AN OVERVIEW

The most common form of pollution to lakes in Vermont is the introduction of nutrients (particularly phosphorus) and sediments resulting from land runoff in the lake watershed. Nutrient and sediment runoff can result from all types of land uses including construction, septic systems, farming, logging and mining. The erosion of lakeshores, streambanks, dirt roads, roadside ditches and other areas of exposed soil is a major source of sediment being carried into lakes. Over the years, phosphorus and sediments in a lake accumulate, eventually causing algal blooms, nuisance aquatic weed growth, reduced water clarity, alteration of the natural fish and wildlife community, and other problems.



Watershed

Communities have a number of opportunities to protect the water quality of local lakes through their planning and zoning process as well as through educational and volunteer programs. The first step towards lake protection involves gathering information on the lake, its shoreline and its watershed. Important information to collect includes physical characteristics such as soil types and slopes along the shoreline, the location of wetlands and streams in the shoreland zone and the watershed, and the percentage of various land uses within the watershed. Mapping this information is a useful way to summarize it.

Reviewing the current town and state regulations is the next step. It is important to determine what measures governing water quality are already in place and if they adequately address long term lake protection.

The last step in the lake protection process is to identify 1) the water quality desired, 2) the desired character of the lakeshore and watershed, and 3) the actions necessary to meet those goals. These actions could include establishment of shoreland districts and regulations, watershed level protection measures such as erosion control standards for all construction, a municipal sewage disposal ordinance, and educational programs for town residents and lakeshore property owners.

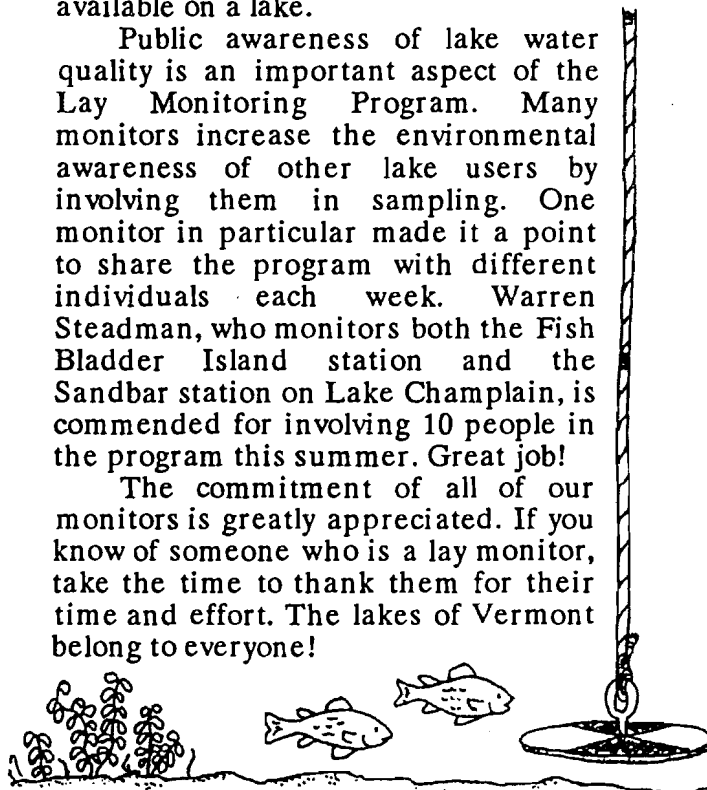
The Lake Protection Program was established to provide information and technical assistance to towns pursuing lake protection. Towns, individuals or associations are encouraged to contact the program for assistance in any of the above steps.

THANKS FOR YOUR HELP!

Vermont is fortunate to have a number of dedicated, volunteer water quality monitors participating in the Lay Monitoring Program every summer. This year 40 lakes and 21 stations on Lake Champlain were sampled between June 1 and September 1. Monitors collect valuable baseline data on many Vermont lakes. In some cases lay monitoring data is the only long term water quality information available on a lake.

Public awareness of lake water quality is an important aspect of the Lay Monitoring Program. Many monitors increase the environmental awareness of other lake users by involving them in sampling. One monitor in particular made it a point to share the program with different individuals each week. Warren Steadman, who monitors both the Fish Bladder Island station and the Sandbar station on Lake Champlain, is commended for involving 10 people in the program this summer. Great job!

The commitment of all of our monitors is greatly appreciated. If you know of someone who is a lay monitor, take the time to thank them for their time and effort. The lakes of Vermont belong to everyone!

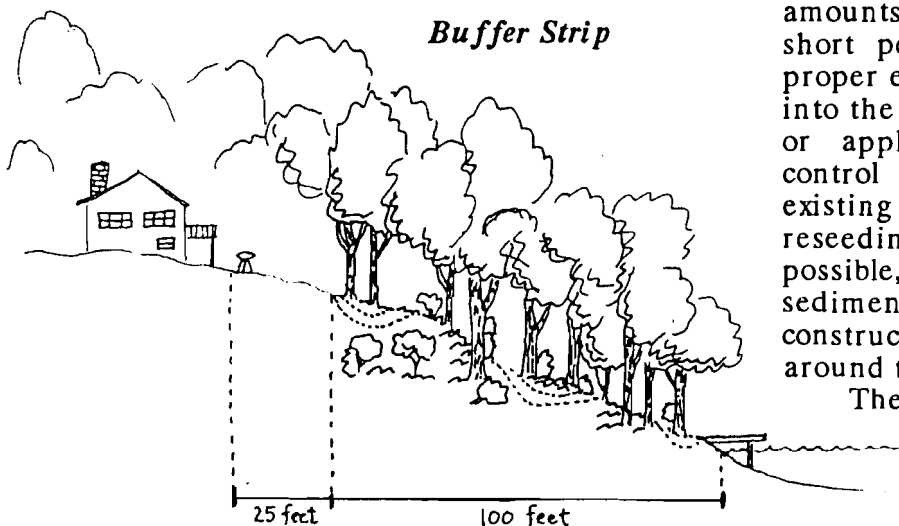


IMPORTANT ELEMENTS OF SHORELAND ZONING

Shoreland zoning varies greatly from town to town in its effectiveness at preventing pollution. In terms of water quality protection, the most important elements of shoreland zoning are buffer strips, setback distances and erosion control during construction.

Buffer Strips - A strip of undisturbed natural vegetation along the lakeshore and streambanks is an extremely important measure for protecting water quality. Buffer strips which separate a development from a lake filter runoff water, settle out polluting sediments and absorb nutrients. The vegetation protects the lake both during construction when large amounts of soil are exposed, and after development when the runoff from lawns, driveways and gardens can also cause pollution. In addition, the vegetation directly on the lakeshore stabilizes the bank and eliminates the need for stabilization structures.

A minimum buffer strip width of 100 feet is suggested. Wider strips are advised when slopes are greater than 15% or highly erodible soils are present. It is important to maintain a good mix of trees, shrubs and ground cover, as all are functioning elements of a buffer strip. Some towns allow clearing of a narrow foot path to the shore or limited branch pruning in order to open up a view, but this should be minimal. Ideally, no removal of the natural vegetation should be permitted.



LAKE LINGO

Chlorophyll - the green pigment found in all green plants (including algae)

Eutrophication - increasing productivity in lakes over time

Phosphorus - a nutrient critical for plant growth

Phosphorus Loading - the amount of phosphorus entering a lake from external or internal sources

Productivity - the amount of plant and algal life a lake can support

Tributary - a stream which flows into a lake or river

Watershed - the land area drained by a body of water, also known as the drainage basin

Setbacks - In conjunction with buffer strips, setbacks assure that developed areas, buildings, and septic systems are located back from the lakeshore. This allows runoff to be adequately treated by the buffer strip before it reaches the lake. To be effective, the setback should be at least 25 feet greater than the buffer strip width, so that construction equipment will have room to maneuver without entering the buffer strip area.

Erosion Control - Soil erosion on construction sites can result in large amounts of sediments entering the lake in a short period of time. Requirements for proper erosion control can be incorporated into the standards of the shoreland district or applied town-wide. Specific erosion control measures include preserving existing vegetation as much as possible, reseeding disturbed areas as soon as possible, use of silt fences to trap moving sediments before they leave the construction site, and diversion of flow around the site.

The Lake Protection Program is available to assist towns in evaluating the effectiveness of their shoreland regulations in terms of water quality protection.

LAKE CHAMPLAIN PHOSPHORUS STUDY

The Lake Champlain Phosphorus Study will provide an up-to-date measure of the phosphorus load entering Lake Champlain from its watershed. This information will be combined with the results of extensive lake sampling to develop a lake water quality model linking phosphorus loads to water quality conditions in Lake Champlain. The lake water quality model will make it possible to predict a measurable water quality response from known phosphorus inputs. The ultimate goal of the project is to develop a cost-effective watershed-wide phosphorus control program to improve the water quality of Lake Champlain.

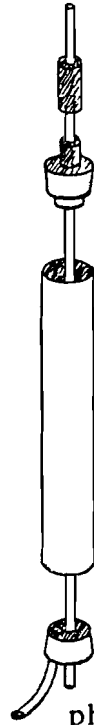
This project is a sizable undertaking and is being accomplished through the cooperative efforts of the New York Department of Environmental Conservation, the Vermont Department of Environmental Conservation (DEC) and the U.S Geological Survey. It began in the Spring of 1990 and will continue for two years.

Phosphorus is being monitored at 33 tributaries in New York, Quebec, and Vermont. These rivers represent the largest Lake Champlain tributaries and are located in drainage areas greater than 10 square miles. They account for 95% of the drainage area of Lake Champlain. The sampling will continue through the open water season with heavier emphasis during spring thaw and other runoff events. Most of the rivers have automatic flow recording stations maintained by the U.S Geological Survey. These stations determine the rivers' height on a continuous basis. Those rivers without automatic recording stations have staff gages (metal yards sticks) that are read daily by volunteers.

The Vermont DEC has established precipitation monitoring sites in Orwell and Underhill, VT. Precipitation is collected on an event basis by volunteers and analyzed by the DEC for phosphorus and chloride. Preliminary findings suggest relatively low levels of phosphorus in the Champlain Valley precipitation, except when contaminated by wind-blown soil or bird droppings. In addition, 17 wastewater treatment plants currently discharging directly into Lake Champlain or below a

tributary sampling station are sampled. These samples are collected once a month and analyzed for phosphorus. By monitoring the major tributaries, daily precipitation events and discharges from wastewater facilities, it is possible to obtain an accurate estimate of phosphorus entering Lake Champlain.

In addition to sampling Lake Champlain's major tributaries to determine phosphorus loading, the lake is also sampled during the open water season at 52 sites. At 47 stations equal volumes of lake water from five discrete depths within the water column are mixed to form a vertical composite. These composite samples are analyzed for phosphorus. The remaining five stations are located in the broad lake, or in central areas of the major arms. These stations all have maximum depths of 163 feet and the deepest is approximately 390 feet. These stations are sampled with a Kemmerer bottle at ten discrete depths (without compositing) to produce vertical profiles.



The Kemmerer bottle is lowered into the water with the top and bottom open. At the desired depth, a metal weight, called a messenger, is sent down the line. When the messenger hits the top of the bottle both ends snap shut, sealing the water inside.

Samples are analyzed for a wide variety of parameters. The additional biological, chemical and physical measurements made at these stations will assist in establishing a reliable data base for future research. All samples are analyzed according to standard procedures at the Vermont Department of Environmental Conservation Laboratory in Waterbury.

In the spring newsletter, highlights and findings of the initial year of the Lake Champlain Phosphorus Study will be available. If you have specific questions concerning the water quality of Lake Champlain, please contact either Jim Kellogg or Eric Smeltzer at 244-5638.



VERMONT'S LAKES AND PONDS NEED YOU!



(NO EXPERIENCE NECESSARY!)

MILFOIL WATCHERS

Concerned citizens are needed to protect Vermont's lakes from Eurasian watermilfoil. This nuisance aquatic plant is quickly spreading through Vermont. Public education and early detection of new populations are the best means of keeping this threat under control. Become a Milfoil Watcher, learn to identify milfoil, and search your favorite Vermont lake for signs of new populations!

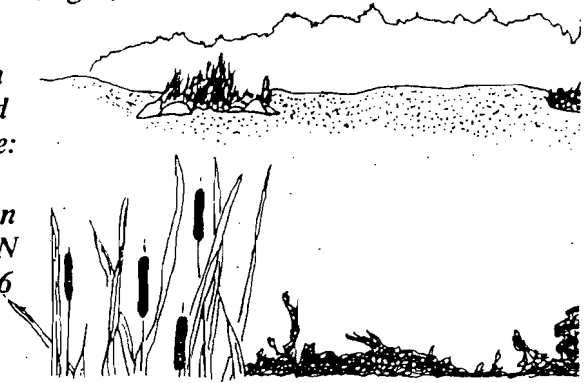
LAY MONITORING PROGRAM

Volunteer water quality monitors are currently needed for 10 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) 1-2 hours a week June through August,
- 3) a boat, gas, and anchor.



*For more information
or to become involved
call 244-5638 or write:
Vermont DEC
Water Quality Division
103 So. Main St., 10N
Waterbury, VT 05676*



VT Department of Environmental Conservation
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