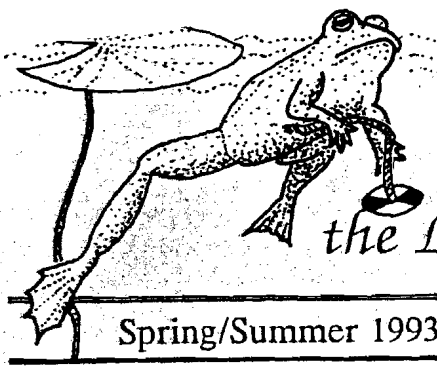
Out of the Blue



A Newsletter of the Lakes and Ponds Unit

Spring/Summer 1993 No. 6 Vermont Department of Environmental Conservation

The Common Loon: The Spirit of Northern Waters

The common loon's haunting calls echoing off a still lake have inspired the imaginations of generations of people. This beautiful bird is known by American Indians as "The Spirit of Northern Waters". The French called it "The Diver with the Necklace". Today the common loon, still enchanting as ever, unfortunately exists in Vermont as an endangered species.

Although four species of loon are found in North America, the common loon, *Gavia immer*, is the only one that breeds in Vermont. In the early spring as the ice begins to break up, loons return from their winter migration along the Atlantic coast and retreat to the quiet deep waters in the spruce-fir forests of northern Vermont to begin courtship. The males first stake out territorial claims with violent diving and bowing behaviors. The males "yodel" when defending their territory and their "laughing" or "tremolo" sounds can either indicate threat or excitement.

Once mated, a loon pair builds a nest close to the shoreline or on a small island. In the nest, made from little more than a pile of vegetation or a shallow scoop in the soil, a single female will lay two or three olive-brown eggs splashed with dark chestnut spots. Both parents share responsibility for the nest and must maintain the eggs at a temperature of approximately 100 degrees F throughout the 28-day incubation period. If during nesting time a loon becomes disturbed, the nest will be readily abandoned. A canoeist, fisherman, boater or other "intruder" such as an otter or raccoon who ventures too close or stays too long, will cause the nest to fail. Repeated water

See "Loon" page 3

The Waterbury Lab Is Crawling With Excitement

This June, the Lakes and Ponds Unit plans to begin rearing the herbivorous (plant-eating) aquatic weevil, *Euhrychiopsis lecontei*, at the Department of Environmental Conservation laboratory in Waterbury. This weevil, native to Vermont, has been proven to do significant damage to the nuisance aquatic plant Eurasian watermilfoil without harming beneficial native aquatic plants. In cooperation with the VT Department of Agriculture and the VT Department of Forests, Parks and Recreation, weevil and Eurasian watermilfoil cultures will be kept in greenhouse aquaria, outdoor stock tanks and in an environmental chamber at the lab. Air temperature, water temperature, light conditions and water quality will be carefully controlled to try to keep watermilfoil plants and weevil eggs, larvae, pupae and adults growing vigorously. The goal of the project is to raise as many weevils as possible and then introduce them into lakes with dense watermilfoil growth to try to cause the plant to decline. Two lakes have been targeted to

See "Weevil" page 4

In This Issue...

OUT OF THE BLUE

is produced semi-annually by the Lakes and Ponds Unit. Our purpose is to share information on lake environmental 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 S. Main Street, 10 North
Waterbury, VT 05671-0408
(802) 244-5638
(241-3777 after June 30, 1993)
TDD 1-800-253-0191

NEWSLETTER STAFF
Amy Bentley Picotte
Ann Bove
Susan Warren

CONTRIBUTORS
Amy Bentley Picotte
Ann Bove
Holly Crosson
Linda Henzel
Karen Hyde
Rachel Marble
Michaela Stickney
Susan Warren

ARTWORK
Susan Warren
Amy Bentley Picotte

LAKE CHAMPLAIN NEEDS YOU!

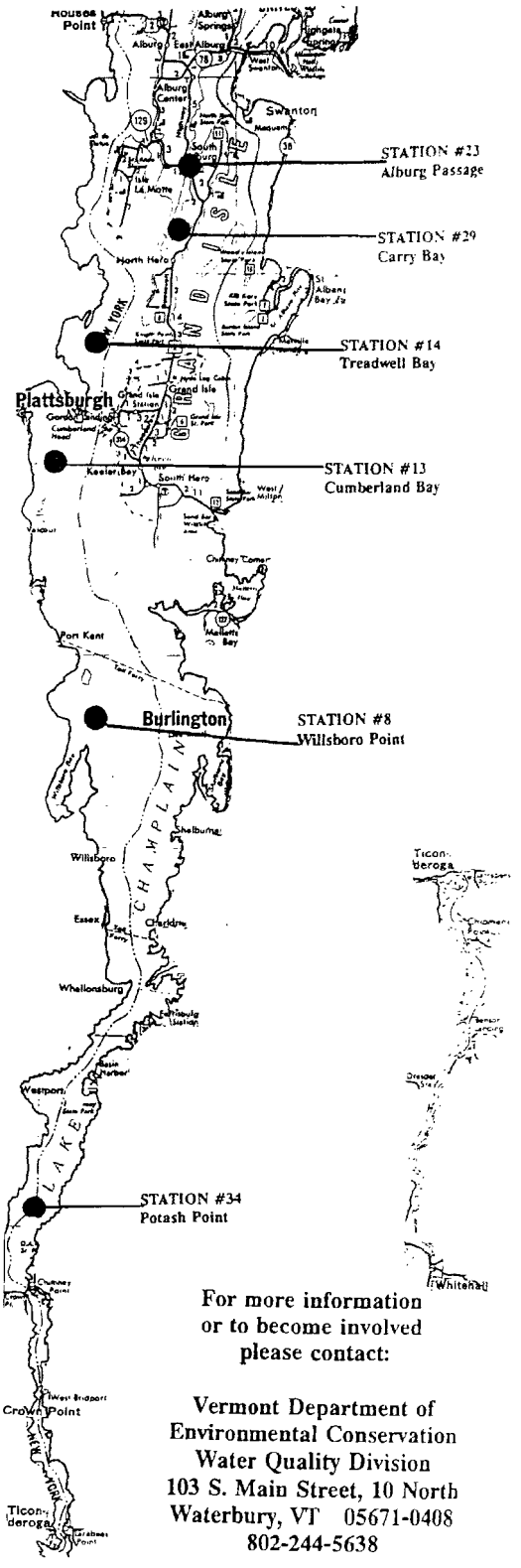
(No experience necessary!)

Volunteer water quality monitors are currently needed for six Lake Champlain stations during the summer of 1993. Anyone can be equipped and trained to collect water quality samples as long as they have:

- an interest in contributing to the protection of this great resource,
- one to two hours a week, June-August, and
- a boat, gas and an anchor.

The stations in need of monitors are shown at right.

The Vermont Lay Monitoring Program coordinates volunteer monitors at 35 Lake Champlain stations every summer. This summer is the start of the 15th sampling season! Join the effort to improve Lake Champlain's water quality.

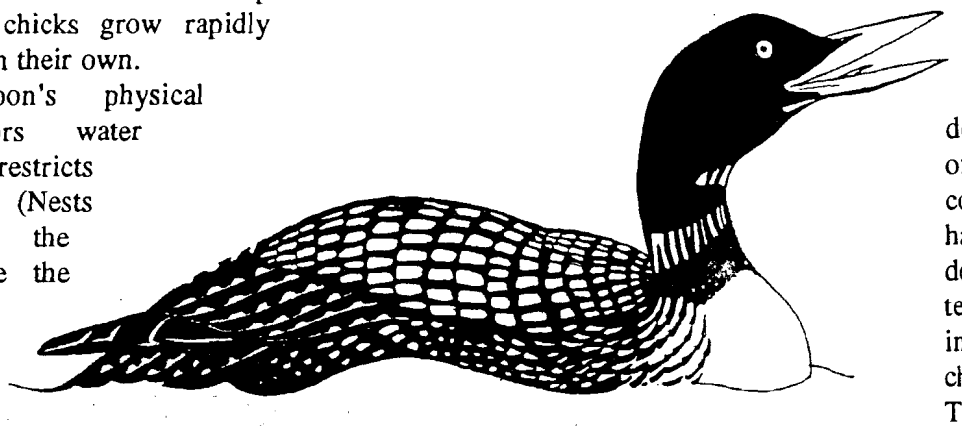


For more information or to become involved please contact:

Vermont Department of Environmental Conservation
Water Quality Division
103 S. Main Street, 10 North
Waterbury, VT 05671-0408
802-244-5638

skiing close to nesting areas guarantees abandonment of the nest. Nest abandonment can affect the survival of the entire species.

Within a day of hatching, the fledglings forsake the nest for open water. Mortality is high for young loons; predatory birds and mammals, snapping turtles, large fish, bad weather, disease and other factors take their toll on newborn loons even though they are already able to swim and dive. Boats inadvertently steered towards a family of loons often lead to separation of the chicks. If the chicks are left alone, they succumb to predation and exposure. The loon's three-note "wailing" call is used to reestablish contact between themselves and their chicks. When summer passes peacefully, the chicks grow rapidly and by fall are on their own.



The loon's physical structure favors water mobility and restricts walking on land. (Nests built right on the shoreline reduce the need for much walking). The common loon's powerful legs, webbed feet and heavy weight make it a strong swimmer and diver. Loons must dive for their meals of fish, insects, crayfish and selected aquatic plants. They can feed underwater for minutes at a time, swallowing most fish whole. When loons dive for fish they often pick up pebbles to aid in food digestion. Some birds may become entangled in fishing lines or ingest lead sinkers, which will cause lead poisoning. Anglers are encouraged to use sinkers made from alternative materials, to recover their sinkers before releasing fish and to pick up any stray lines on or near the water.

Annual records of nesting loon pairs in Vermont since 1978 are now available from the Vermont Institute of Natural Science (VINS) (funding for the annual records is provided by the Nongame Wildlife Fund, distributed by Vermont's Nongame Natural Heritage Program). Records show that numbers of nesting pairs peaked at 19 in 1982. Since a sudden drop to 8 nesting pairs in 1983 (no cause for this decline has been identified), Vermont's breeding population has been recovering at the rate of about one additional nesting pair per year.

In 1992, VINS staff made weekly visits to all known lakes used for breeding. These visits identified 20 territorial pairs statewide. Sixteen pairs nested, and four of these built a second nest, making a total of 20 nests for the season. Ten of the 16 nesting pairs in 1992 hatched a total of 15 chicks, 13 of which survived. This represents an increase of one nesting pair from 1991. The estimated mid-summer statewide population increased to 124 loons (86 adults, 15 juveniles, and 23 immature) from 108 (75 adults, 15 juveniles, and 18 immature) in 1991.

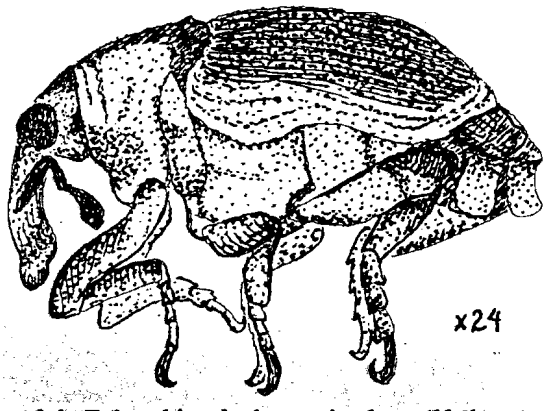
In addition to counting individuals, VINS field observations have noted degree and cause of disturbance, courtship behaviors, territorial defense, maintenance behaviors, incubation, and chick rearing. Ten of the 20 total nests in 1992 failed. Causes of nest failure were directly related to: human disturbance, predation and failure of eggs to hatch.

The presence of the common loon contributes to the diversity of wildlife on Vermont lakes. Increased public awareness concerning the causes that threaten the loon's survival, helps to secure the loon's future on Vermont lakes, something everybody enjoys and benefits from.

This summer will be the 11th annual Vermont Loon Watch Day. VINS seeks volunteers to count loons on Vermont lakes and ponds on Saturday, July 17th, 1993 from 8-9 a.m. To get involved, contact Chris Rimmer or Roz Renfew at VINS, (802) 457-2779.

receive weevils this summer: Lake Bomoseen in Castleton and Norton Brook Reservoir in Vergennes.

Rearing *Euhrychiopsis lecontei* in the lab presents a challenge. An established protocol to rear the weevils does not exist and some of the work will be trial and error. Middlebury College has been keeping very small cultures of the insects in their lab to conduct various experiments and to determine more about the weevil's life history. They were successful at keeping all life-stages of the weevil in culture; however, no attempt was made to raise the weevil in larger numbers for introductions into lakes. In fact, to our knowledge the project at the Waterbury lab will be the first attempt in the country to raise such a large number of this weevil species as a biological control for Eurasian watermilfoil. As with any monoculture, especially one kept under artificial conditions, there is a danger of introducing a pathogen (disease-causing organism) which could wipe out the whole culture. The staff at the Waterbury lab, armed with experience and determination, hopes to prevent this from happening.



Adult Euhrychiopsis lecontei, *the milfoil-eating aquatic weevil being reared at the DEC lab in Waterbury. Actual size is approximately 2-4 milimeters (—).*

The number of weevils that will be introduced into Lake Bomoseen and Norton Brook Reservoir is dependent on how successful the laboratory rearing is, and whether or not weevils can also be collected from their natural sites in the field and then relocated. Lakes and Ponds Unit staff and Middlebury College researchers will attempt to introduce weevils of each life-stage (egg, larvae, pupae, adult) to both bodies of water during the summer. Norton Brook Reservoir is only twenty acres in size and although it supports a dense population of watermilfoil, there is no current watermilfoil control program, so weevils will probably be able to distribute themselves throughout the pond fairly easily. Because Lake Bomoseen is so large (2,360 acres) and has an extensive mechanical harvesting program to combat the watermilfoil population, weevils will be placed in only two or three unharvested areas during 1993: Neshobe Island, Eckley Point and possibly along Cedar Mountain. Researchers at Middlebury College will periodically monitor the weevil population and milfoil growth after the introductions to determine survival of the weevils and whether or not watermilfoil has declined. Any decline in the watermilfoil may not be apparent until at least the next season. Depending on how the weevils survive during this first summer, additional introductions may take place in 1994.

Milfoil Watcher's Needed For Vermont's Lakes

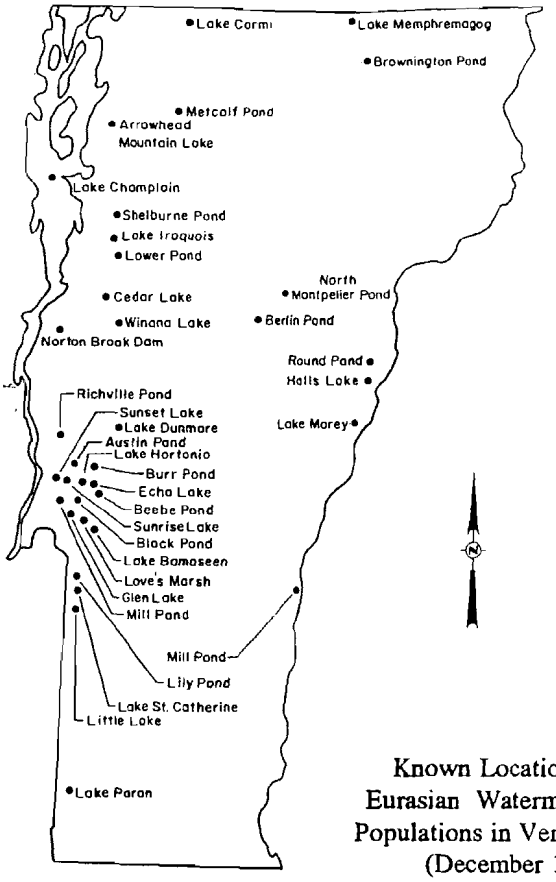
Since 1987, the Lakes and Ponds Unit staff have been training interested volunteers to identify and search for Eurasian watermilfoil, a fast growing nuisance exotic plant. Searches are conducted on lakes not yet known to support this nuisance species as well as on lakes supporting only small isolated patches of the plant. Early detection of Eurasian watermilfoil growth is crucial to implementing rapid and successful control programs aimed at preventing milfoil from spreading lakewide.

With only 18% of all the lakes in the state with a surface area larger than twenty acres under the watchful eye of a Milfoil Watcher, additional lakes are desperately in need of protection. If you can assist in searching for Eurasian watermilfoil in a lake you care about and would like to be trained as a Milfoil Watcher, contact the Lakes and Ponds Unit. Vermont's lakes need your help!

Reminder!

In 1988, the Vermont legislature passed a law making it illegal to transport Eurasian watermilfoil from lake to lake. The milfoil transport law carries heavy fines, imprisonment, or both. A Pittsford man was recently convicted of transporting Eurasian watermilfoil into Lake Dunmore after pleading No Contest to the charge this spring, and was given a deferred sentence. In his precedent-setting ruling, Addison County Judge Cashman ruled that state did not have to prove that the defendant knew he had milfoil on his trailer when he backed it into the lake, only that there was milfoil on the trailer.

The lakes identified on the map below are currently known to support either scattered patches or dense beds of Eurasian watermilfoil. Know Vermont's milfoil infested lakes and stop its spread! Remove all plant material from your boating equipment before leaving a lake's access area. By removing all plant material, you are assured of removing Eurasian watermilfoil, even if you are uncertain about how to distinquish it from other types of aquatic plants.



Known Locations of Eurasian Watermilfoil Populations in Vermont (December 1992)

"It's True"

What is the difference between a lake, a pond and a reservoir in Vermont?

There is no clear distinction between lakes, ponds and reservoirs in Vermont. Generally speaking, bodies of water which are large and deep enough to thermally stratify in the summer, with a warm upper layer of water overlaying a cool bottom layer, are considered lakes. Ponds are smaller and shallower, often have aquatic plants growing throughout their bottom area and have a uniform water temperature throughout during the summer months. A reservoir, used to collect and store water, can be either a naturally occurring lake or pond, or a manmade lake. In Vermont, the terms lake, pond and reservoir are used interchangeably and do not necessarily represent any specific standard as described above.

What causes the foam often seen on the water's surface or along the shoreline of lakes?

Foaming is usually a result of decreased surface tension on the water caused by the presence of suspended or dissolved organic matter. The decreased surface tension, along with churning of the water by wind and wave action, results in foam development. Foams are common on tannic (tea-colored) streams or ponds due to their high amounts of natural, organic acids, or on nutrient-rich lakes. In Vermont, detergents are not usually found at high enough levels in lakes to cause foaming.

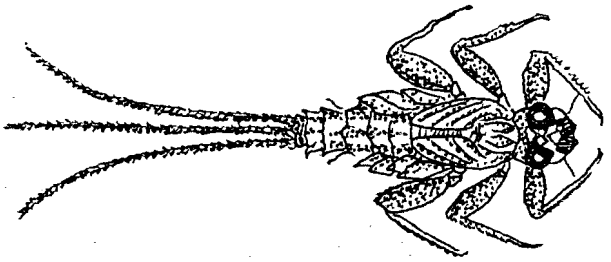
Do I need a permit to build a dock or put in sand along the lake shore in front of my camp?

Small (less than 50 feet in length or smaller than 500 square feet) temporary docks made of wood or metal, mounted on piles or floats, do not require permits as long as navigation is not hindered. Otherwise, any construction or alteration below the normal (mean) water level of a lake or pond comes under state regulation and requires a permit. A few examples where permits are required include: retaining walls along the lakeshore, permanent structures in the lake bed, dredging, or the placement of sand. Before beginning *any* construction contact the Vermont Department of Environmental Conservation at (802) 244-5638 (241-3777 after June 30, 1993).

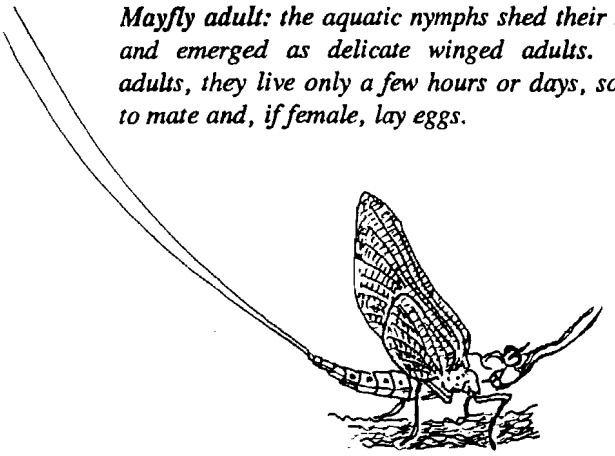
Water Quality and Mayflies!

Lakes, ponds and streams of good water quality support a variety of macroinvertebrate species. Macroinvertebrates are animals lacking a backbone that are large enough to see without using a microscope. Examples of macroinvertebrates found in Vermont lakes and ponds include crayfish, snails, mussels, leaches, insects, worms and mites. Some macroinvertebrate species are intolerant of pollution and occupy only habitats of good water quality; these species can be used as indicators of water quality conditions. Mayflies are one of the most sensitive groups of macroinvertebrates and will only survive in clean water. Mayflies hatch from eggs into their nymph stage where they can be found on vegetation, mud, debris, gravel or rocks in shallows of lakes, ponds and streams. This spring look for mayflies as an indication of clean, oxygen-rich water.

Mayfly nymph: after hatching from eggs, the nymphs spend one to four years feeding and growing in the water. There are many different species of mayfly in Vermont; they are most commonly found in swift, clear streams.



Mayfly adult: the aquatic nymphs shed their skin and emerged as delicate winged adults. As adults, they live only a few hours or days, solely to mate and, if female, lay eggs.



Profile of Lake Champlain Monitor, Warren Steadman

Warren Steadman, Jr. likes to get involved. Three years ago he asked the Lake Champlain Committee what studies were being done on Lake Champlain and quickly volunteered as a water quality monitor after hearing about the Department of Environmental Conservation's Lay Monitoring Program. Living in South Hero, Warren collects weekly water samples from two of the thirty-five Lake Champlain monitoring stations. One station lies north of Sandbar Bridge and the other is located east of Fish Bladder Island.

Warren has participated in a variety of recreational lake activities during his forty years as a lake resident. Operating a small private camp business and teaching the Vermont State Police "Motorboat Safety Course" have increased his concern for the health of the lake. During the summer, Warren enjoys talking to lake visitors about his work as a monitor and says people respond positively to his contributions to water quality protection. Often he encourages the people he meets to accompany him on one of his weekly water quality sampling trips.

Children are another target audience for Warren. He feels it's important to teach young people about lake ecology so they can develop an understanding of how water quality affects everyone, regardless of whether or not people live on the lakeshore. Warren has helped educate junior high school students at the Fulsom Educational Center in South Hero about lake ecology by demonstrating how he samples the lake for three water quality parameters: water clarity, total phosphorus concentration and chlorophyll-a concentration. Warren has extended his monitoring duties to include an educational outreach responsibility, as he has shown his willingness to answer questions from people of all ages on the water quality work being done on Lake Champlain.

The success of the Lay Monitoring Program comes from volunteer participation. Each monitor has different reasons for helping out, and as Warren states, he most likes just being out on the lake and helping in a small way as part of a much larger effort. With help from dedicated monitors like Warren, the Lay Monitoring Program will continue to be the greatest source of long term baseline data on Vermont lakes.

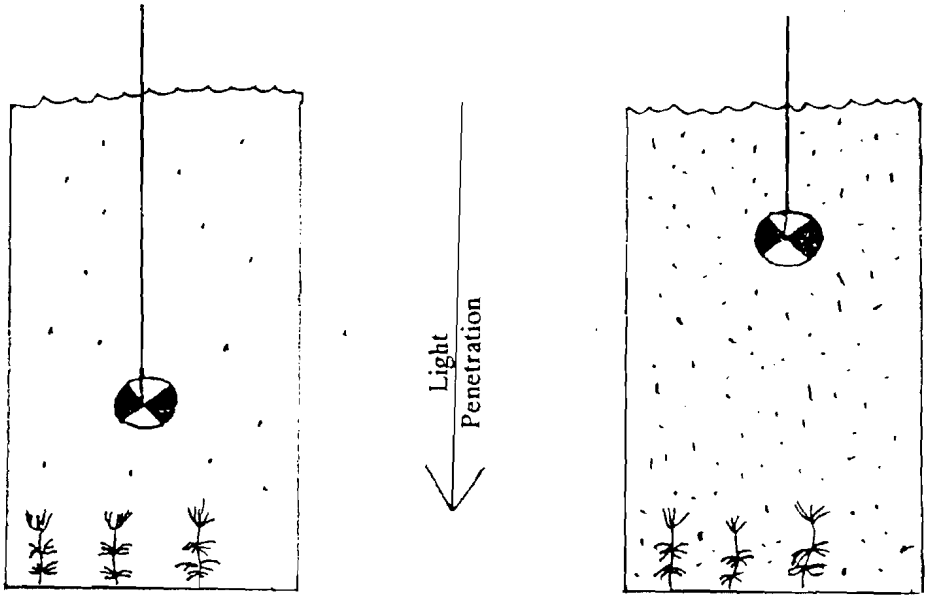
Why Sample Water Quality With A Secchi Disk?

Volunteer participants in the Department of Environmental Conservation's Lay Monitoring Program (LMP) sample for three water quality parameters: water clarity, total phosphorus concentration and chlorophyll-a concentration. Each of these parameters provides a description of a lake's water quality with respect to nutrient enrichment. Water clarity, measured by a Secchi disk (rhymes with "Becky"), is an indication of the amount of phosphorus and algae present in the water and is the parameter recommended by the LMP to use for long term water quality monitoring.

A Secchi disk, named after its Italian inventor, Pietro Secchi, is an eight inch diameter metal disk, painted with black and white quadrants and attached in the center by a rope. Water clarity is measured as the disk is lowered from the shady side of a boat (to reduce the glare) into the lake. When the Secchi disk reaches the depth at which it is barely visible, the line, marked in meters, is read at the water's surface to the nearest tenth of a meter.

Secchi disk readings, although simple in technique, provide a valuable description of water quality. The clarity or transparency of a lake's water is directly related to the amount of materials suspended in the water. Algae, microscopic animals, water color, eroded soil, silt and re-suspended bottom sediments are factors which interfere with light penetration and reduce water clarity. The amount of algae in the water is directly related to the nutrient enrichment in a lake. When phosphorus, the nutrient of most concern in lakes (see *Phosphorus and Its Many Forms* on page 12), becomes excessively available, algae feed on it and their population explodes, resulting in a lower Secchi disk transparency.

Secchi disk transparency readings statistically show the least variability of the three LMP parameters from year to year. Because they create the most stable water quality data base, any unusual water clarity readings are more easily detected. Lake residents can then be alerted to investigate the potential cause of change in their lake's water clarity. Secchi disks are the preferred sampling parameter for long term lake water quality monitoring, because they build the most consistent water quality data base and offer the most cost-effective means of maintaining it.



Clear lakes having a small algal population result in deep Secchi disk readings.

Turbid lakes having a large algal population result in shallow Secchi disk readings.

How the Secchi Disk Measures Water Clarity

The Facts About Septic Systems And Lakes

When people talk about lake pollution, septic systems often come to mind first. How big a problem for lakes are failing septic systems? Research in Vermont has shown that failing systems are not usually a major source of phosphorus to the lakes, but failing systems can cause localized weed and algae problems, and are a potential threat to human health.

A Typical Household Septic System Design

The septic system is a two part wastewater treatment and disposal system composed of a septic tank and a leachfield. The tank is designed to remove solids from the household sewage, and the leachfield treats the remaining liquid.

Household sewage is composed of waste from the toilet, washing machine, showers and sinks. This waste, called "influent", collects in a single pipe used to transport the sewage outside to the septic tank. In the septic tank, solids settle to the bottom, and grease and scum float to the surface. Solids and scum are decomposed by bacteria living in the tank, thus reducing the volume of waste.

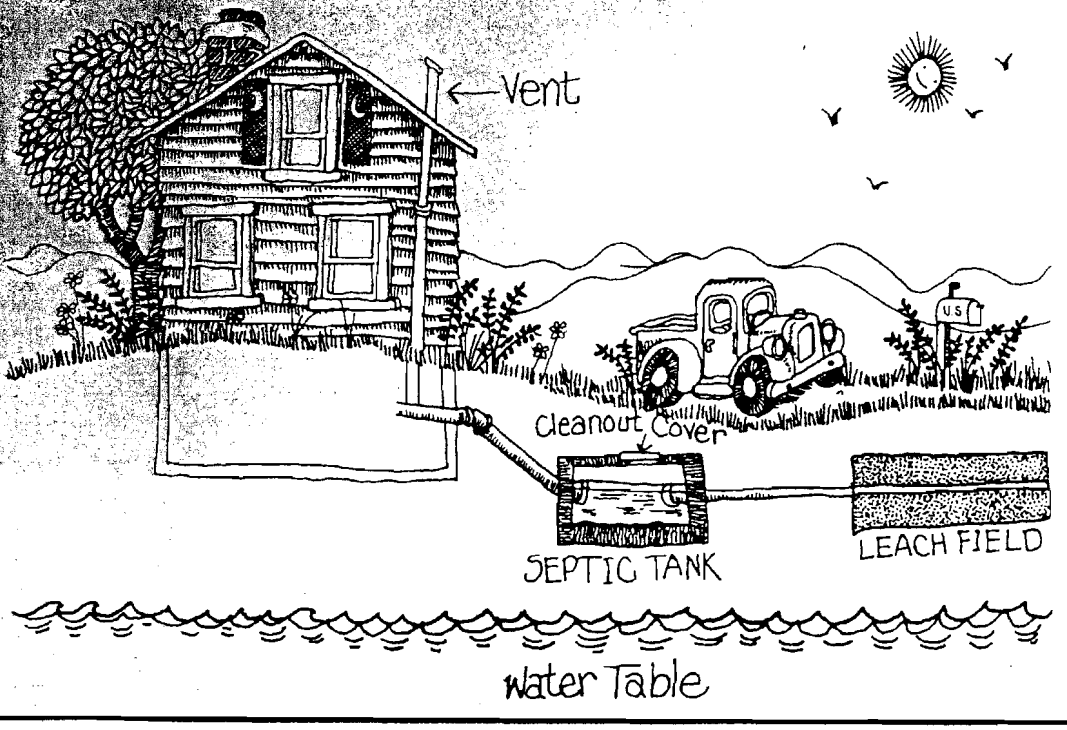
The remaining liquid waste, now called "effluent", leaves the tank and enters a series of parallel perforated pipes in the leachfield. These pipes distribute the effluent over trenches of crushed stone. Bacteria living on the stone purify the effluent by removing dissolved pollutants. The effluent filters down through the crushed stone and is further filtered and treated by the native soil and its organisms.

How Big a Problem Are Failing Septic Systems for a Lake?

Diagnostic studies completed in Vermont on Lake Morey, Lake Iroquois and Fairfield Pond measured or estimated the phosphorus entering the lakes from septic systems as well as from other sources. In all three studies, only 1 to 4% of the total phosphorus loading from the shorelands came from septic systems.

Generally, erosion problems and varied land uses in the watershed have the potential to contribute much greater amounts of phosphorus to lakes than failing septic systems. Phosphorus is naturally found attached to soil particles and as part of organic matter, often in great quantities. Any erosion from dirt roads, ditches, streambanks, construction sites and from land uses, such as lawn care and fertilizer use, result in phosphorus-rich runoff. Phosphorus enrichment of lakes results in excessive plant growth, algae blooms, decreased water clarity and dissolved oxygen depletions.

If septic systems are not generally a major component of phosphorus pollution to lakes, should we worry about whether or not they are working properly? Yes! Poor septic systems can be a health hazard to those using the water near a failing system. In addition, systems that are not properly treating wastewater can leach nutrient-rich water via groundwater into nearby surface water, resulting in *localized* excessive plant and algae growth.



Laws and Regulations

Laws that regulate septic systems vary from town to town. Some towns regulate waste disposal through a Municipal Sewage Disposal Ordinance or through provisions in their zoning ordinance. Such regulations establish standards for the design, location and construction of septic systems. If a town has no sewage disposal standards, it is possible for a system to be installed without meeting any site or design requirements. The State only reviews systems on lots requiring an Act 250 or State subdivision permit. New systems built in lots subdivided before 1970, or old systems installed before 1970, predating the State subdivision regulations and Act 250, receive no state review.

Many lakeshore residents express concern over the proximity of "older systems" close to the lake. Many of these systems were installed before any design standards existed. These systems are not in violation of the law unless it is shown they are creating a discharge to surface or ground water, or that they are creating a public health hazard. Observed failing septic systems should be reported to the Town Health Officer, who has the authority to investigate such complaints. Failing systems discharging into surface water can also be reported to a state Environmental Enforcement Officer. Call the Chief Environmental Enforcement Officer in Waterbury (802-244-1634, or 241-3820 after June 30, 1993) to find out who your District Enforcement Officer is.

Septic System Projects for Lake Associations:

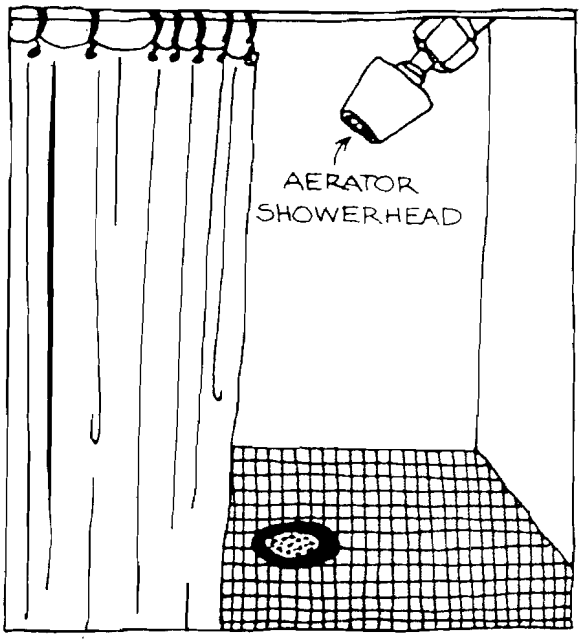
- Distribute information to lake shore residents about proper septic system maintenance.
- Encourage owners of rental properties to post use instructions for their guests.
- Send reminder cards every three years to shoreland owners about septic tank pumping.
- Organize tank pumping days; many pumping businesses will offer discounts on large orders from the same area.

Good Maintenance Practices for Campowners

It is important for people to take responsibility for ensuring that their waste water is being properly treated. Good septic system maintenance is essential in preventing failure. Observe the following septic system practices:

Day to day activities:

- Practice water conservation, and avoid short periods of heavy water usage.
- Dispose of only waste water and toilet waste in the system; avoid putting strong cleaners, paper towels etc. into the system.
- Compost garbage; garbage disposals can overburden septic tanks.



Long-term practices:

- Pump septic tanks regularly (every three years for year-round homes, every five years for seasonal residences).
- Don't use tank cleaners that claim to eliminate the need for pumping; they can cause leachfield failure.
- Don't add water-using appliances unless you're sure your system is designed properly.
- Don't enlarge a residence or convert to year-round use without upgrading the septic system if necessary.

Happenings

Trout Daily Limits Reduced:

A new fishing regulation passed by the Vermont Fish and Wildlife Board reduces the daily limit of trout on lakes and ponds to "six fish or not more than five pounds". The regulation also sets the daily limit on rivers and streams at "twelve trout, of which not more than six may be brown and/or rainbow". Other two-fish daily limits still apply as indicated in the *1993 Digest of Fish and Wildlife Laws*. Copies of the *Digest* are available at many local general stores and at the Department of Fish and Wildlife, (802) 241-7331 (241-3700 after June 30, 1993).

Vermont Lake and River Shoreland Conservation Conference

DATE: Friday, June 25, 1993
PLACE: Camels Hump Middle School in Richmond, VT.
CONTACT: Michael Kline
Water Quality Division, 10 N. Bldg.
103 S. Main St., Waterbury, VT 05671-0408
(802) 244-6951 (241-3770 after June 30, 1993)

Lake Champlain Celebration Days

DATE: Sunday, Monday and Tuesday, July 23-25, 1993
PLACE: several locations throughout the basin
CONTACT: Lake Champlain Basin Program
54 West Shore Road, Grand Isle, VT 05458
1-800-468-5227

Annual Lay Monitoring Conference

DATE: Saturday, July 31, 1993
PLACE: Grand Isle Ed Weed Fish Culture Station
CONTACT: Amy Bentley Picotte
Water Quality Division, 10 N. Bldg.
103 S. Main St., Waterbury, VT 05671-0408
(802) 244-5638 (241-3777 after June 30, 1993)
(Further information will be sent to lay monitors in late June.)

Recently Made Available

1) **Lay Monitoring Slide Show.** This 20 minute slide show, with script, features the Lay Monitoring Program and the lake sampling responsibilities of Program monitors, including the equipment and methods monitors use to take water samples. Appropriate for ages 13 through adults. Available on loan.

2) **"For Your Lakes Sake".** Lakeshore property maintenance pamphlet available. "For Your Lake's Sake" describes ways in which shoreland owners can help protect a lake through good property management. An easy to read chart lists simple "do's" and "don'ts" on subjects such as yardwork, septic systems and the shoreline. Also discussed are watersheds, their role in lake water quality, and sources of phosphorus from land runoff. Please help us achieve wide distribution of the pamphlet! The Lakes and Ponds Unit suggests a donation of 5¢ each if 50 or more are requested, but is glad to provide them at no charge if an association can't afford the cost.

3) **Milfoil Study Committee Report: A Report on the Use of Aquatic Herbicides to Control Eurasian Watermilfoil in Vermont.** The Milfoil Study Committee, established by the Commissioner of the Department of Environmental Conservation in November, 1992, was charged with evaluating the potential use of chemical pesticides to control Eurasian watermilfoil in Vermont. The findings and recommendations of this committee are explained in this report.

4) **Guide to Nurseries that Supply Native Plants for Wetlands and Ponds.** A booklet that features Vermont nurseries that grow and sell native trees, shrubs and herbaceous plants suitable for wet or moist soils. Produced by the Vermont Wetlands Program. Use in conjunction with **Re-Establishing A Lakeshore Buffer Strip** to stabilize your shoreline and filter runoff with attractive, native vegetation.

Contact the Lakes and Ponds Unit at (802) 244-5638 (241-3777 after June 30, 1993) to obtain any of these items.

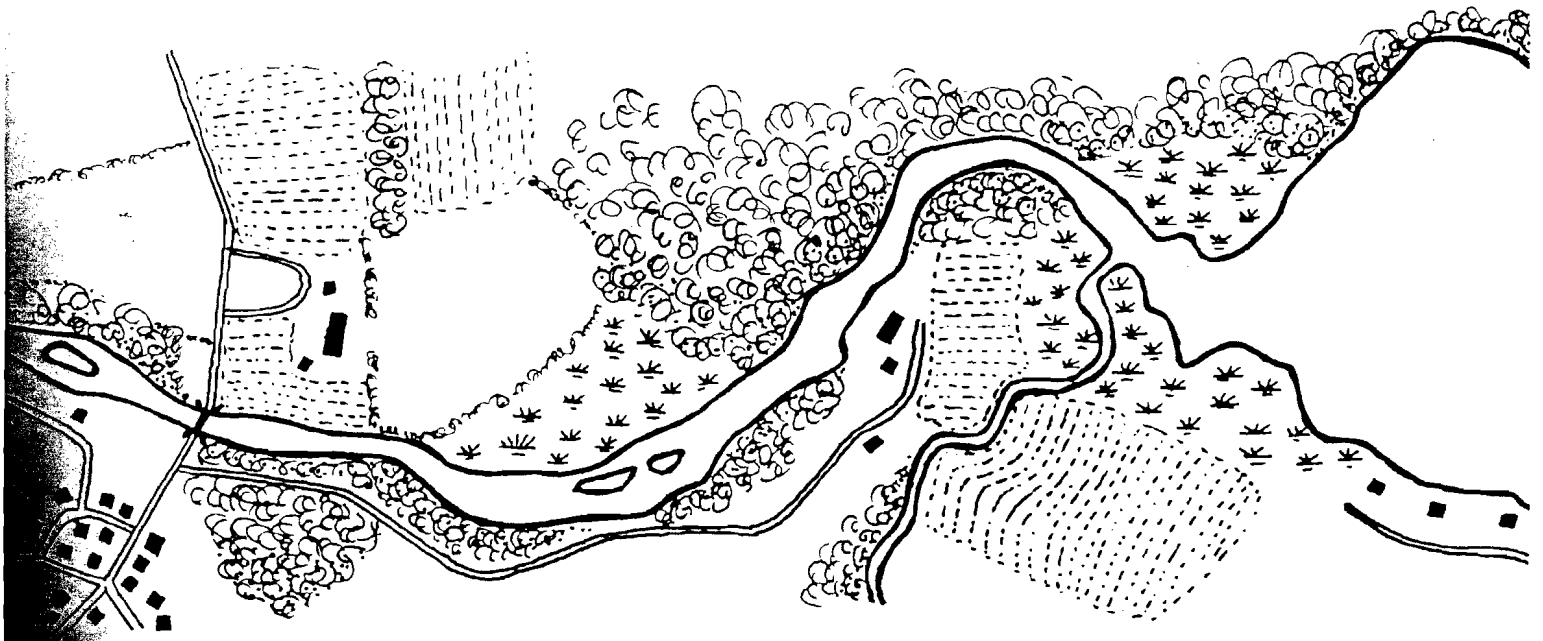
Lake Iroquois Watershed Study
A Progress Update!

The primary goal of the Lake Iroquois Watershed Project is to reduce phosphorus loading to Lake Iroquois through erosion control (see *Out of the Blue*, Fall\Winter 1992-93, No. 5). Soil erosion has been recognized as a major contributor of phosphorus to the lake. Last summer and fall, Michaela Stickney, Project Coordinator, conducted site surveys on over 250 properties to identify existing erosion problems. Michaela encountered a variety of erosion situations: eroded driveways and ditches along driveways; cleared vegetation along streams and lakeshores, which accelerates erosion; collapsed lakeshore retaining walls; and erosion of roadbeds, roadside ditches, and culverts. Preliminary estimates indicate that nearly 18 tons of soil are being transported into Lake Iroquois annually! This estimate only includes properties where Michaela was granted access (of the 244 landowners originally contacted, 19 declined to participate in the Project).

The next phase of the project is to design erosion control measures for each identified problem site. These measures will range from planting vegetative buffer strips along eroding lakeshores and streambanks, regrading roads, and digging out ditches and lining them with stone, to replacing culverts and installing sediment basins to catch water-borne sediments. Small grants for landowners to pay for the erosion control practices are available at 75% of the cost. The remaining 25% is the responsibility of the landowner, but can be matched with "in-kind services" such as volunteer labor or donated materials. A total of $29,719 from the Clean Water Act (through a U.S. EPA grant) is available for small grants, and Michaela anticipates that most of the problem site corrections will be funded.

Participation of landowners in the correction phase of the Lake Iroquois Watershed Project, as in all other phases, will be voluntary. Implementation of actual erosion control measures will take place this summer. Erosion control projects will be divided into three groups, so one group will be started and completed each month. (Look for profiles of actual erosion control projects in the next issue of *Out of the Blue*).

An Overview and Progress Report was sent to all landowners in the Lake Iroquois watershed in February. The report featured initial findings of the study, a project schedule extending through next fall, and an update on development of the Watershed Education Plan. Copies of the Overview and Progress Report are available for other interested people as well. Please contact Michaela Stickney at (802) 244-5638 (241-3777 after June 30, 1993) to receive a copy.



Phosphorus and Its Many Forms

The nutrient phosphorus is the most common cause of water quality problems in Vermont. Phosphorus levels are naturally lower than levels of all the other major aquatic nutrients, occurring in amounts able to sustain the food chain while limiting the amount of algae production. However, when phosphorus concentration in a lake increases and becomes excessive, problems such as algae blooms and poor water clarity result. Because phosphorus is the nutrient of greatest concern in aquatic systems, lakes are frequently sampled for this nutrient.

Sources of Phosphorus

Phosphorus is supplied by any activity or process that results in the introduction of sediments or human and animal waste into water. Phosphorus sources include: weathering of rocks, decayed plant and animal material, atmospheric deposition, agricultural runoff, residential or road runoff, municipal and industrial discharges, and failing septic systems. The diagram of the phosphorus cycle on the following page identifies some of these sources and shows the changes that occur in the water column from one phosphorus form to the next and back again.

Forms of Phosphorus

In nature almost all of the phosphorus is bound with four oxygen atoms and is known as phosphate. Depending on how the phosphate molecule binds with other elements, phosphorus will occur in a variety of forms. Phosphorus concentrations are analyzed according to one of the four groups of phosphorus forms: *orthophosphorus, dissolved phosphorus, particulate phosphorus* and *total phosphorus*.

What do each of the forms tell us about a lake?

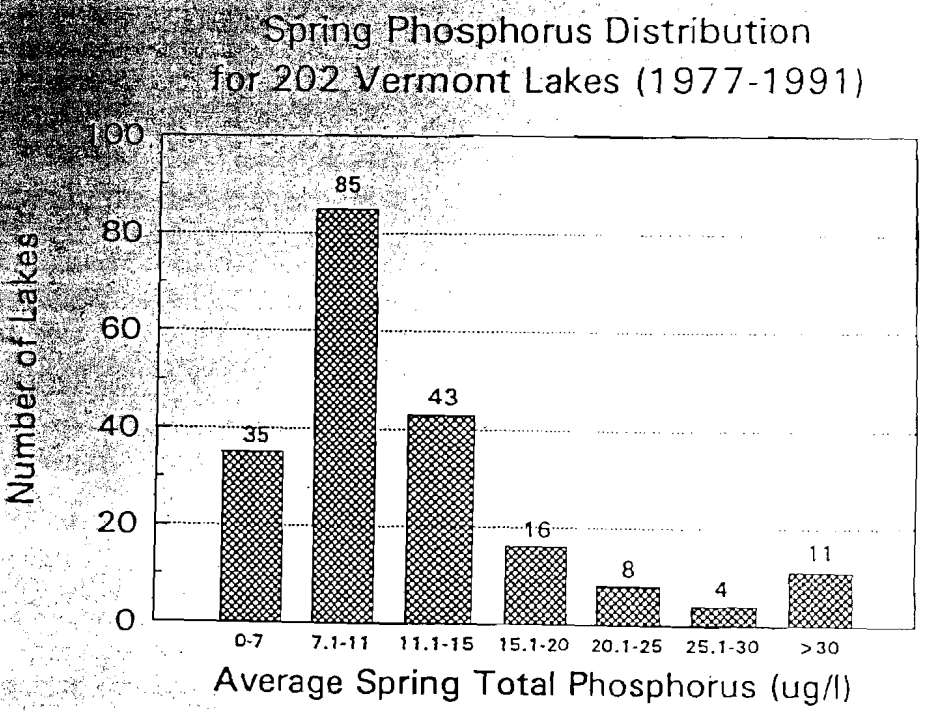
1) *Orthophosphorus* is a water soluble inorganic form of phosphorus, which is most readily absorbed for use by algae and plants.

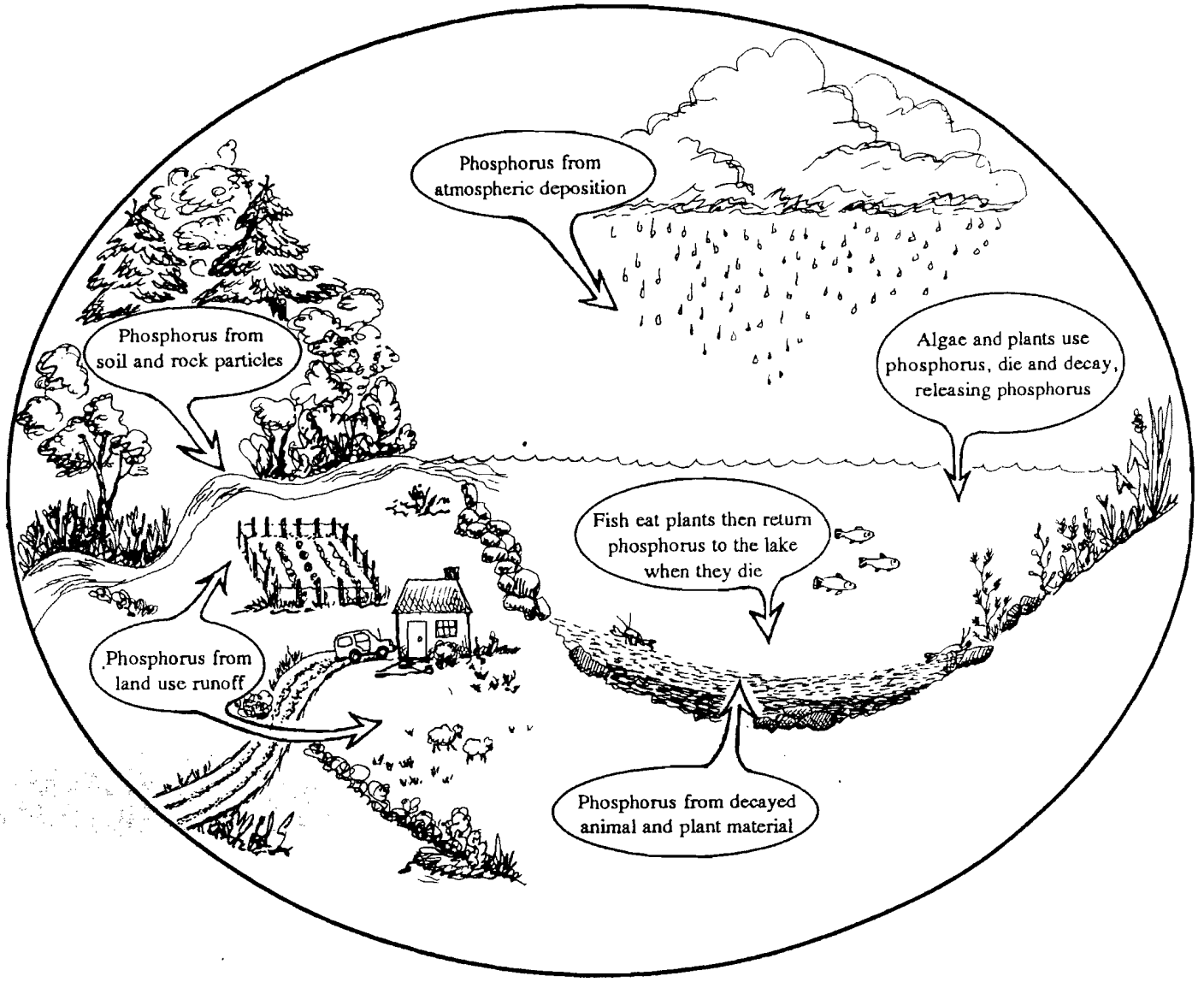
2) *Dissolved phosphorus* is a measure of the organic and inorganic (primarily ortho-phosphorus) water soluble phosphorus and indicates how much phosphorus could be readily used by algae.

3) *Particulate phosphorus* is inorganic and organic particles suspended in the water such as silt and living matter (algae and zooplankton); concentration of particulate phosphorus is used to determine the potential availability of phosphorus.

4) *Total phosphorus* includes all chemical forms of phosphorus and most accurately describes a lake's supply of phosphorus.

Phosphorus easily transforms from one form to another in the environment and are in constant flux. Accordingly, sampling for total phosphorus provides the best description of the complete phosphorus supply in a lake's water column. Two annual Department of Environmental Conservation (DEC) water sampling programs, the Spring Phosphorus Program and the Lay Monitoring Program, collect data on total phosphorus concentrations which helps DEC staff evaluate a lake's level of productivity and make informed water quality management decisions. A table of the range of total phosphorus concentrations found in Vermont lakes is presented below.





The Phosphorus Cycle

Once phosphorus enters the water column it is easily and continually recycled (see diagram). Plants and algae readily transport orthophosphorus across their membranes within microseconds of having come into contact with it. Once taken in by plants and algae, orthophosphorus is immediately transformed into particulate phosphorus and used for growth. When the algae eventually die, the decomposing organic matter will settle to the lake bottom. Here it undergoes further decomposition, releasing phosphorus which can attach to bottom sediments. The phosphorus can either remain in the sediments or be reintroduced into the water column by a variety of ways: 1) bottom organisms burrow and stir up the bottom sediment; 2) a total depletion of dissolved oxygen at the bottom of some deep lakes causes a release of dissolved inorganic phosphorus to the water column; or 3) water currents or wind stir up the bottom. This cycle varies according to the depth and temperature of a lake and many other factors.

Transformations between the forms of phosphorus occur constantly and some of the forms are barely detectable in lakes. Measuring the total phosphorus concentration is important to the overall understanding of a lake's water quality. However, if more detailed knowledge about a lake's phosphorus cycle is needed, then measuring the different forms is important. In either case, phosphorus is often the subject of any lake water quality study, and will continue to be an essential element of the Unit's lake monitoring programs.

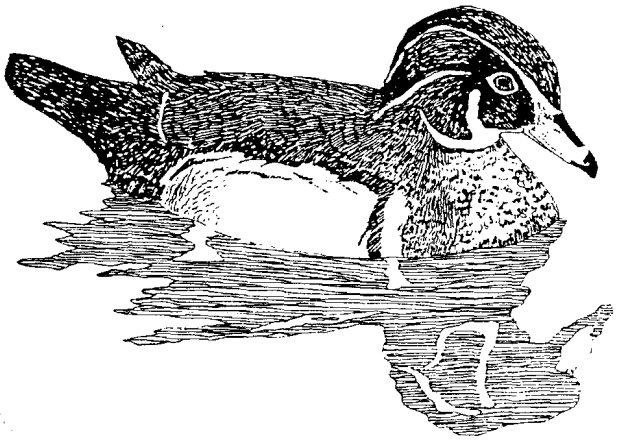
retain their vision through
the Plan. The Town is now
the third step.

this endeavor, the planning
place the town's interim zoning
with permanent bylaws. Zoning is a
in the town, with local residents naturally
some of its "powers". Town officials
the need for much public participation,
and education before the Interim Zoning
successfully re-worked and adopted by the
They see this process as critical for
the normally close-knit town together rather
fragmenting them over such a sensitive issue.

Cow Mountain Pond

Plan implementation will also involve the
of the major natural feature of the Town,
Mountain Pond forest area, which scored
of any land parcel in the FLESA study. Cow
Pond is one of 31 undeveloped wilderness
left in the Northeast Kingdom. The Natural
Program has found the area to have statewide
significance. Supporting some uncommon aquatic
plant life, the pond is a potential nesting site for
loons. A nearby bog is a frequent feeding area for
moose.

Granby has joined forces with the Nature Conservancy, the Northeastern Vermont Development Association, the Vermont Department of Forests, Parks and Recreation, the U.S. Forest Service, and the Vermont Housing and Conservation Board (VHCB) to preserve this area through the Forest



in 1989 with the formation of a planning commission. Recent development pressures on their forest land, the major source of employment and recreation for the townspeople, made them realize that this valuable resource was vulnerable and needed protection.

Course of Action

The townspeople have carefully mapped out a course of action that has required several years of hard work and is now beginning to pay off. The planning process established from the beginning has become famous throughout the region because of its unusual citizen participation program, involving the entire town's population. Town officials have used the potluck dinner, a traditional New England ritual, as a forum to encourage community input and commitment to the process. This public commitment, along with perseverance on the part of planning commission and selectboard, has brought results.

The first step of this process was to conduct the Forest Land Evaluation and Site Assessment (FLESA) in order to identify the town's resources. The second step was to identify the town's vision of itself by developing a town plan, incorporating the FLESA as part of the plan. Concomitantly, they adopted Interim Zoning and established a Conservation Commission. The third and culminating

Legacy Program. The current owner of this tract of land is Champion International Corporation, a timber company, who could conceivably sell off the lake for vacation homes. *(Editor's note: since the original publication of this article the land has been purchased as described in the next paragraph.)*

Forest Legacy

If Granby is successful, they will have protected 1,640 acres of environmentally significant forest land from conversion to non-forest uses. The land, which costs in excess of $500,000, will be purchased in conjunction with the U.S. Forest Service using Forest Legacy monies, a grant from the VHCB, and over $72,500 of local money. The town will purchase the pond, a 200 foot buffer strip, the timber rights on the entire parcel, and a right-of-way to ensure public access for recreational purposes, including hunting, fishing, cross-country skiing, and hiking. The U.S. Forest Service will own the remaining rights. VHCB and the Nature Conservancy will hold a conservation easement on the pond, the buffer strip, and the timber rights owned by the town.

Public Participation

The Granby Planning Commission will be developing over the next few months a municipal forest management plan for the Cow Mountain Pond area. In their usual fashion, they will begin this process by first surveying the residents and landowners on forest management issues and holding a public meeting - which includes another potluck meal - on these issues.

Public support for the entire project is overwhelming among the residents of Granby, who voted unanimously to raise their own taxes to pay for the project. Through their FLESA and Town Plan they were able to identify their vision for their town, and specifically, the steps they would need to take to realize that vision. After several years of persistence and working cooperatively among themselves and with other organizations, they are beginning to see their plans come to fruition. They are not quite there yet, but they are a lot closer than they were in 1989.

"State of the Lakes" is a section available for Lake Associations or other groups to inform "Out of the Blue" readers about their group's activities or report on lake projects of statewide interest. Articles must be submitted to the "Out of the Blue" staff in early fall for the Fall/Winter issue and in early spring for the Spring/Summer issue.

LAKE LINGO

Effluent- the liquid that leaves a septic tank after sewage has been treated.

Influent- the untreated mixture of liquid and solid sewage.

***Inorganic compound-** a molecule derived from mineral sources which does not contain the element carbon.*

***Macroinvertebrate-** animals lacking in internal skeletons, that are large enough to see with out using a microscope, such as insects, clams and mussels, and crayfish.*

***Mollusk-** animals often having a hard shell that wholly or partly encloses a soft, unsegmented body and a muscular foot used for guiding (includes clams, mussels, and snails).*

***Organic compound-** molecules made by plants or animals containing carbon molecules linked with other elements such as oxygen, nitrogen, and phosphorus.*

***Zooplankton-** microscopic animals that float freely in the water.*

☎ Please Note! ☎

The Lakes and Ponds Unit will have a **new telephone number** as of June 30, 1993. It will be:

(802) 241-3777.

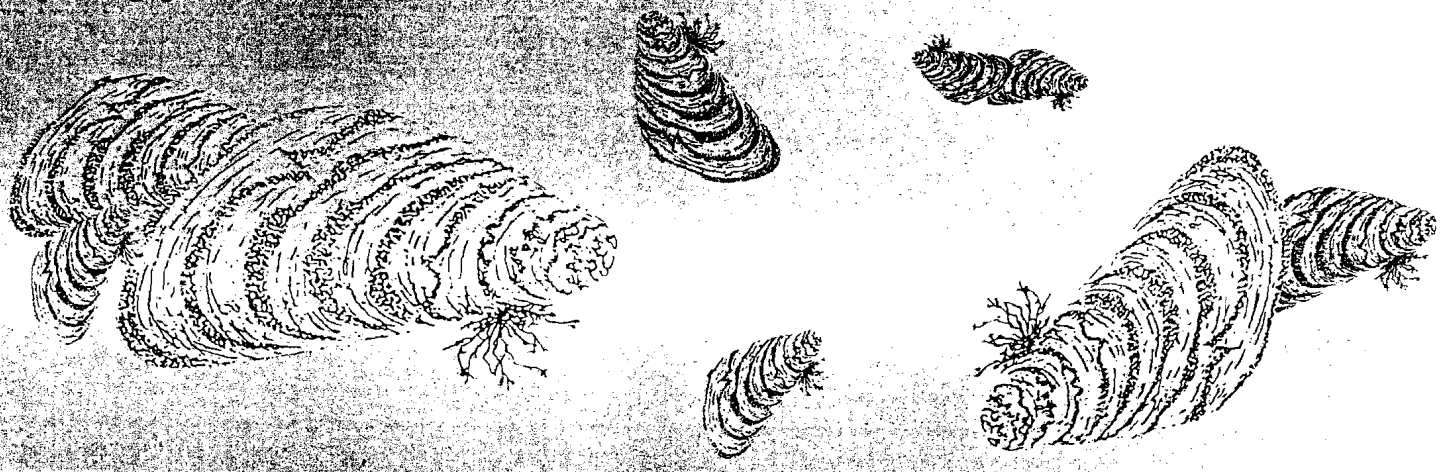
Most Agency of Natural Resources Waterbury telephone numbers also will be changing at this time. If you use an old phone number after June 30, you should get a recording informing you of the new number. We hope you will have patience as we adjust to a new telephone system!

Monitoring for Zebra Mussels

The zebra mussel (*Dreissena polymorpha*), is an exotic mollusk, which clusters together in colonies of thousands and covers or blocks any hard underwater surface. Zebra mussels were first discovered in and around the Great Lakes in 1988, and are predicted to enter Lake Champlain in the near future. Department of Environmental Conservation monitoring for the zebra mussel in Lake Champlain was initiated in 1992 and will continue this summer.

Zebra mussel arrival in Lake Champlain threatens the natural aquatic ecosystem, as well as industrial and recreational activities on the lake. Staff from the Department of Environmental Conservation will monitor for zebra mussels at various high use marina sites using artificial substrates and conducting visual examinations of boats, docks and moorings. In addition, different sites with healthy native clam populations will be studied so that any future population changes caused by a zebra mussel infestation can be monitored.

Lake Champlain monitors involved in the Lay Monitoring Program and other concerned Lake Champlain or Lake Memphremagog users are asked to help monitor for zebra mussels this summer. The monitoring procedures require simple weekly checks for zebra mussels on artificial substrates provided by the Department of Environmental Conservation. Please call Amy Bentley Picotte at (802) 244-5638 (241-3777 after June 30, 1993) for more information if you are interested in how you can monitor for zebra mussels in Lake Champlain or Lake Memphremagog.



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

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

Address correction requested.