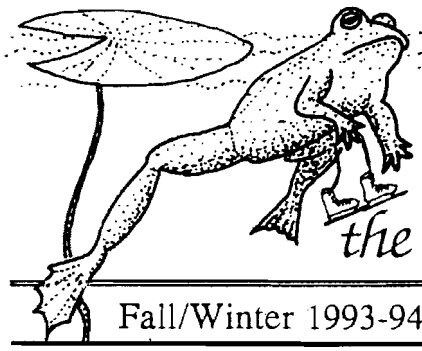
# Out of the Blue



A Newsletter of the Lakes and Ponds Unit

Fall/Winter 1993-94 No. 7 Vermont Department of Environmental Conservation

## From Swimming To Skating: How A Lake Changes In Temperature

As seasons change, some natural responses are more obvious than others, such as in the fall when trees drop their leaves or in the spring when new plant growth starts. Although less noticeable, water in lakes and ponds reacts to seasonal differences in temperatures too, causing changes in the entire aquatic ecosystem.

Plunging deep into a lake on a summer's day confirms that lake water temperatures are warmer on the surface than down at the bottom. During the summer, lake surface water and less so deeper water, are warmed by air temperatures, creating different temperature layers within a lake. Warmer water is less dense, which means it will float on the surface. Cooler water is held in the middle and the densest, coldest water (generally 40-45 degrees Fahrenheit during the summer) sinks to the bottom.

Mixing a lighter, less dense liquid into a heavier, more dense liquid is difficult, like mixing skim milk into molasses. Therefore, this thermal stratification in lakes persists all summer, despite sometimes terrific windstorms, because of the different layer densities. So the top, warmest layer, called the *epilimnion*, may be well stirred during a storm, but it remains separate from the colder, second layer known as the *metalimnion*. Likewise, the metalimnion does not mix with the coldest, bottom layer, or *hypolimnion*. In addition to having different densities, these three layers may be very different in water chemistry.

*See"Winter Ice"page 3*

## Use of Surface Waters Policy Soon To Be In Effect

The Vermont Water Resources Board has had the authority to manage the various uses of Vermont's public waters since 1969. Until now however, the Board has not taken a proactive approach to management. Instead, it has been left to those concerned with a particular body of water to petition the Board when they felt a use (actual or potential) needed to be addressed by regulation. Types of uses that have been regulated by the Water Resources Board on specific lakes include the use of internal combustion (gasoline) engines, houseboats, boating speed, water-skiing and aircraft landing, among others. In some cases, petitions have focused on issues that were unique to the body of water in question. However, the majority of petitions have raised issues which would best be addressed from a regional or statewide perspective. For example: when is a pond too small for high speed boating; when is it

*See "Surface"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 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:

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## *Lake Lingo*

***Anaerobic-*** *environmental conditions where oxygen is absent.*

***Bioengineering-*** *the practice of using vegetative and biodegradable materials to control soil erosion, instead of conventional methods such as concrete and riprap (bundles of stone).*

***Biological Control-*** *the intentional introduction of a natural enemy in order to reduce the abundance of a pest species to where it no longer causes a problem. For example, the use of an insect to control an exotic plant.*

***Class B Waters-*** *waters suitable for bathing and recreating, irrigation and agricultural uses as well as provide good fish habitat, are aesthetical and are acceptable for public water supply with filtration and disinfection.*

***Daphnia-*** *a free swimming microscopic animal.*

***Oxidation-*** *the chemical reaction when certain substances become exposed to oxygen and consequently pick up a positive ionic charge, and occasionally change color; rusting of metal is a result of oxidation.*

***Thermal Stratification-*** *the formation of zones of temperature in deep lakes during the summer. These zones are referred to as the: epilimnion, the warmer, least dense upper layer; metalimnion, the cold, dense middle boundary; and hypolimnion, the coldest, densest layer at the lake bottom.*

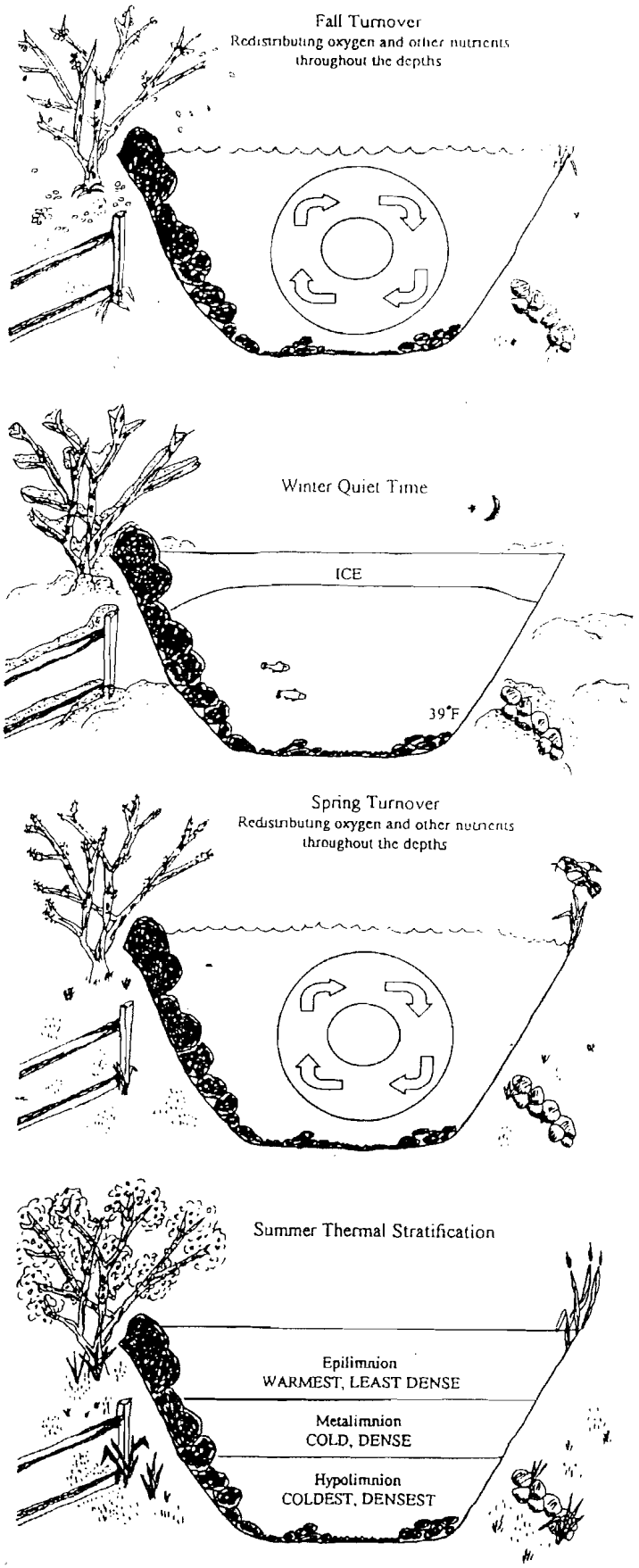
***Veliger-*** *the microscopic juvenile lifestage of a mussel.*

## The Lakes and Ponds Unit WELCOMES two new employees!

**Steve Hanna,** a Civil Engineer, transferred from his position in VTDEC Solid Waste Division to head the Lake Encroachment Program in VTDEC's Water Quality Division. Steve joined the Lakes and Ponds Unit in May, replacing Andre Rouleau who had retired.

**Steve Markason**, an Aquatic Biologist, returned to the Northeast after working as a Wilderness Ranger for the National Forest Service in Wyoming to work on The Vermont Lake Assessment Program.

## Winter Ice *(continued from page 1)*




In September, colder air temperatures and strong winds force the warmer surface water to cool and sink. The water that rises to take its place on the surface will also cool and sink. Lake currents begin to flow from top to bottom, mixing and turning over the lake water until it is all the same temperature. This phenomenon is called *fall turnover.*

After fall turnover is complete, (a few days for smaller lakes, and lasting several weeks on larger lakes), all that is needed for ice to begin forming at the surface is a calm cold night. Unlike other substances, water reaches its greatest density as a liquid at 39 degrees Fahrenheit. When water cools below this temperature, it remains on the surface. As ice forms it floats on the surface, because it is less dense than water! Small lakes freeze faster than large lakes, which is why Lake Champlain is always the last Vermont lake to freeze over. Ocean waters generally do not freeze because of huge stored amounts of heat and constant winds and currents that keep the surface waters in motion, preventing freezing.

Fall turnover redistributes oxygen and other nutrients throughout the lake water, making survival under the ice possible for fish and other organisms. Without this oxygen resupply, plants, fish and the microscopic organisms that make up much of the aquatic food chain, would suffocate soon after the ice seals the lake from the surface air exchange.

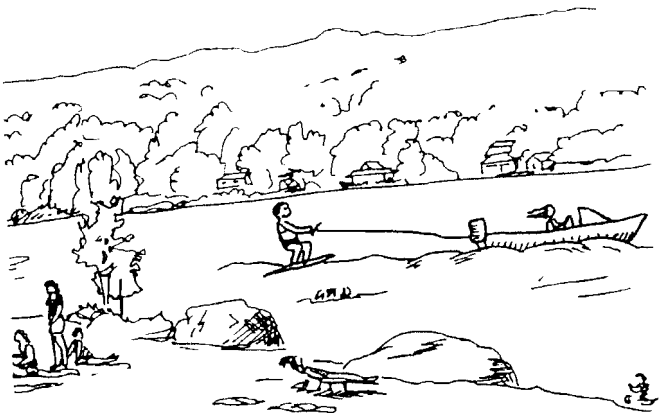
In the spring, lakes will turn-over again, essentially reversing the process of fall turnover.

Once the ice has gone out, the spring winds along with warming air temperatures begin to stir the lake water, warming all the water to the same temperature and allowing *spring turnover* to occur. As air temperatures continue to rise, water temperatures rise. During calm periods, the upper water layer is heated by the sun, and the lake becomes thermally stratified again.

Now that swimming season has long ago ended and fall turnover has been completed, start sharpening those skates for some good times of ice skating ahead!

*Thanks to Kathy Hentcy for contributing to this article.*

appropriate to prohibit the use of internal combustion motors; what maximum speed limits are appropriate on various sized lakes and ponds during the day and at night; and should new uses be allowed even if they may conflict with established uses? Dealing with such broad issues on a lake-by-lake basis, one rule-making at a time, is ineffective and runs the risk of creating contradictory policy decisions.



Over the last two years, the Board has been working on a comprehensive policy to serve as a framework in avoiding and resolving conflicts in the use of public waters. The draft Use of Public Water Policy (UPW Policy) suggests rules that make Vermont's management of lakes, ponds and reservoirs more uniform and predictable, and therefore easier to understand and, when necessary, to enforce. In general, the Board's draft policy rules would not restrict currently established water uses. People seeking to introduce new uses prohibited by the proposed rules, or those seeking to restrict established uses, would be able to petition the Board to change the rules for a specific body of water. Thus, the burden of petition would be on those seeking to change the status quo, not preserve it, as current practice has been.

Last summer, the Board received extensive comment at a number of public hearings and more than 200 written comments in response to its UPW Policy draft. Currently the Board is reviewing this information, incorporating changes in the draft where appropriate. The Board hopes to have the revised UPW Policy available for public comment in early 1994. At that time, the Board will notify the roughly 1000 individuals and organizations on its UPW Policy mailing list. This list includes all lake associations, all municipalities with affected lakes or ponds and all persons or organizations that either attended public hearings, submitted written comments or otherwise indicated an interest in this matter. Following an opportunity for the public to further comment, the Board plans to formally adopt the UPW Policy.

*Any questions regarding the UPW Policy should be directed to William Bartlett, Executive Officer, Water Resources Board, 58 East State Street, Drawer 20, Montpelier, VT 05620-3201, telephone 802-828-2871.*

## "It's True"

***How does winter road salt affect Vermont lakes and ponds?***

Salt applied to roads to melt winter ice is not known to have ever caused toxic conditions in Vermont's surface waters. Different studies with *Daphnia*, a free swimming microscopic animal, have shown that salt or sodium chloride levels become toxic at 4-5 grams/liter (g/l) of water. In Vermont, sodium chloride levels are considered unusually high when they reach 0.03 - 0.04 g/l. Natural sodium chloride levels in Vermont lakes and ponds are approximately 0.001 g/l.

However, although not causing toxic conditions, increased lake levels of sodium chloride can occur from road salt runoff. For example, ten years of monitoring a small pond in southern Vermont has shown a 30 fold (from 0.001 g/l to 0.03 g/l) increase in sodium chloride concentrations, coincidental with the paving of a dirt road in the pond watershed. Salt is not normally used on dirt roads, and it is believed that after the road in the watershed was paved, the pond began to receive road salt run-off from the paved road.

## Who Named That Pond ?

Many Vermont lakes and ponds were named after the original settlers in the region, for example Harvey's Lake, and others for obvious characteristics, such as Long Pond, Mud Pond and Round Pond. An early 1900's plan to attract more visitors to Vermont included renaming some lakes with more colorful names. In the Woodbury area, Dog Pond was renamed to Valley Lake and Number Ten Pond was changed to Mirror Lake. Other lakes were named after local historical events, such as Runaway Pond or by Indians, who choose names that reflected the lake's physical and spiritual features.

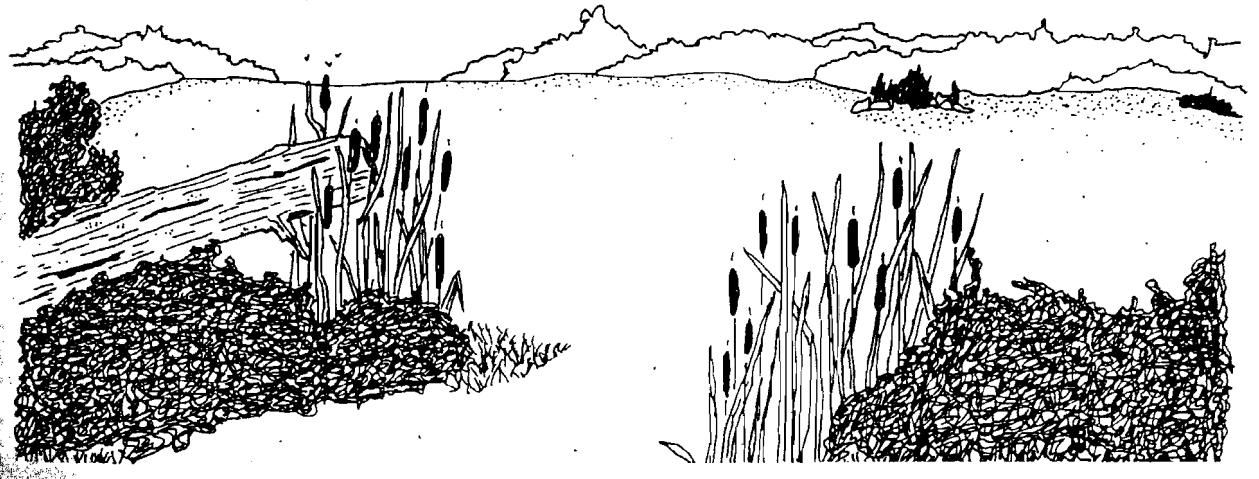
The Indian name, Lake Bomoseen, translates *"Keeper of the Ceremonial Fire"* and means that the lake is endowed with magical or spiritual properties. Joe's Pond in Danville and Molly's Pond in Cabot were named after two friendly Indians who frequented the areas after the Revolutionary War.

Lake Morey was originally called Fairlee Pond after the town of Fairlee, but since it was easily confused with Lake Fairlee, it's name was changed to honor a famous resident, Samuel Morey. In the 1790's Samuel Morey invented a small steam powered boat. He patented the invention and sold the plans to Robert Fulton for $100,000 in stock, which later proved to be worthless. Allegedly in disgust, Samuel sank his steamboat in the lake. Twelve years later, Robert Fulton built the *Cleremont* and historically has been credited as the steamboat inventor.

Lake Carmi was originally named Huntsburg Pond, then switched to Franklin Pond when the town was renamed. By the end of the 19th century its name was changed again to Silver Lake due to its extreme clarity. In 1910, however, the name was changed to Lake Carmi, presumably after Carmi Marsh who owned the southern and eastern lakeshore.

Runaway Pond in Glover earned its name from a historical incident. During the spring of 1810, a miller was in short supply of water to power his grist mill located three and half miles north of what was then called Long Pond. A number of people joined together to cut a deeper channel at the outlet on the pond's north end to increase the water flow to the mill. The project was not too difficult because the north shore was only a few feet above the water level and narrowly built with its steep bank dropping off into the valley. After the channel was cut, a party commenced on site. Suddenly an unusual sound was heard and the channel ran dry. Moments later, the whole north bank was undermined, and the entire contents of the lake gushed northward, reportedly in a wall of water 50 feet high. The miller was rescued just before the water wiped away all traces of his mill. Today, Runaway Pond is a wetland with a plaque along the roadside to commemorate the eventful day of 1810.

To learn more about lake history, look in the Vermont Historical Section of town libraries or visit the Vermont Historical Library in Montpelier. A good book for local Vermont history is *Vermont Place Names-Footprints of History* by Esther Munroe Swift.




**Watershed Surveys Underway!**

The Lake Parker Association in Glover became the first lake association in Vermont to begin work on a Watershed Survey to identify possible pollution sources and inventory land uses. The survey is divided into three sections, In-lake, Shoreland, and Watershed areas for easier organizing; the Lake Parker Association decided to begin with the Shoreland section. The association sent a letter to each lakeshore owner notifying them that volunteers probably would be visiting each lakeshore property. After an in-field "training session" with the VTDEC Lake Protection Program, a group of volunteers met to divide the lakeshore into segments for smaller groups of volunteers to survey. The Association is now in the process of evaluating the results and hopes to survey more areas next summer.

This fall, Harvey's Lake in Barnet also began the Watershed Survey process by conducting an In-lake survey. They plan to continue their efforts next year.

*For more information on the Watershed Surveys, contact Susan Warren (802-241-3777) at the Lakes and Ponds Unit.*

**Bacteria Sampling at Lake St. Catherine**

The Lake St. Catherine Association, in Poultney and Wells, conducted bacteria sampling along the lake's shoreline for the third summer in a row. With the cooperation of the Poultney Town Manager and the Town Health officer, sampling kits are ordered free of charge from the VT Department of Health. The lake's Lay Monitor, Phil Alden, pre-selects the sampling sites, has them approved by the town officials, and then conducts the sampling from his boat. Stream mouths, areas of dense development and areas of past problems are often targeted as bacteria collection sites, and when possible sampling is conducted following holiday weekends. The same 20 sites are sampled two or three times in one summer, and about 30% of the sites change each summer. In the three years of sampling, Phil reports that only one failing septic system has been identified. The owners were very cooperative about correcting the system when informed of the test results. Generally, sampling results indicate bacteria levels in Lake St. Catherine are well within the acceptable amount for Class B waters.

**Maidstone Proposes Upgrading Shoreland Zoning**

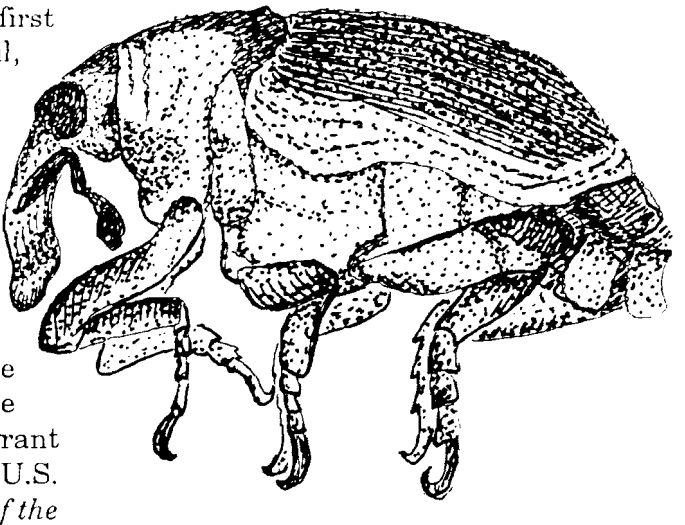
The Town of Maidstone is in the process of revising its zoning regulations, and since one of the goals of their Town Plan is to protect the water quality of the lakes in town, attention was given to the Shoreland district. The Maidstone Lake Association, which is also interested in protecting Maidstone Lake, participated in the review of the proposed regulations and offered comments. Among other provisions, the proposed zoning includes protection of shoreland vegetation for the other less developed lakes in town and "encourages" shoreland residents on Maidstone Lake to refrain from further cutting along the shore. Lee Stewart, Maidstone Lay Monitor, feels that the process has opened up discussion between the town and the Lake Association and looks forward to "improved" communication between the two groups.

**New Lake Association Formed!**

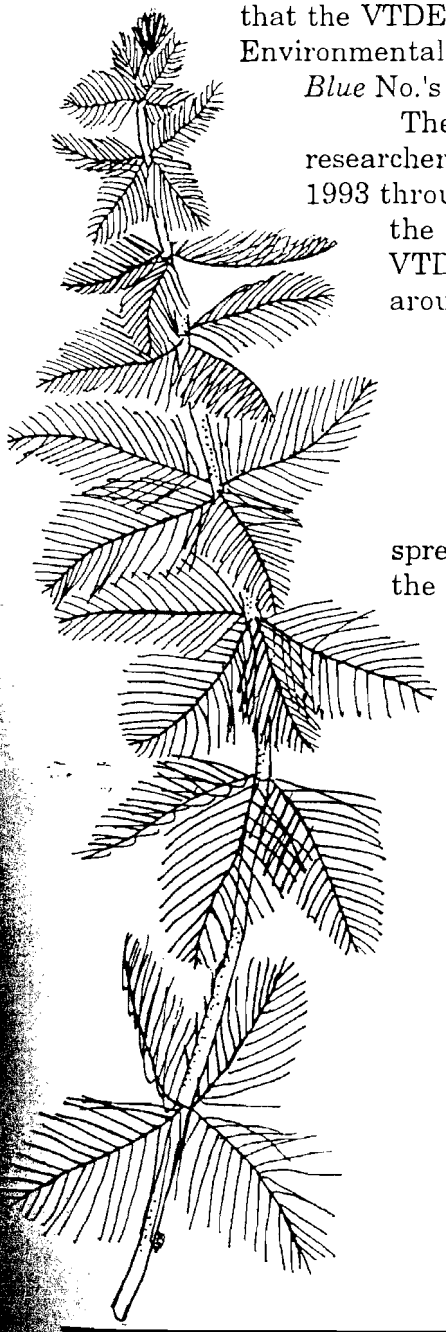
Arrowhead Mountain Lake, located in the towns of Milton and Georgia, is a 732 acre reservoir on the Lamoille River. Arrowhead Mountain Lake Association became the 78th lake association in Vermont this fall when a group of concerned lakeshore and town residents gathered to discuss and vote on association bylaws. The group identified pollution, wildlife-Eurasian watermilfoil, and use of large boats and personal watercraft as their top priorities. Town residents who do not own property on the shoreline will be represented on the Association board by a "Non-resident Representative".

*The Lakes and Ponds Unit can provide information on starting an association.*

## Vermont Weevil Introductions First In The Nation



This summer, two Vermont lakes received the first intentional introduction of the aquatic weevil, *Euhrychiopsis lecontei*, ever to occur in the United States. Approximately 5,000 weevils were released at three sites in Lake Bomoseen in Castleton and 5,000 at two sites in Norton Brook Reservoir in Bristol, in order to evaluate their potential as a biological control for the nuisance aquatic plant, Eurasian watermilfoil (*Myriophyllum spicatum*). For the weevils to be considered a successful biological control, they will have to significantly reduce the amount of milfoil at the introduction sites. The 1993 weevil introductions are part of a larger, five-year biological control research grant that the VTDEC received in 1990 from the U.S. Environmental Protection Agency (see *Out of the Blue* No.'s 2, 3, 5 and 6).



The weevil introductions were made by VTDEC staff and Middlebury College researchers on sixteen separate occasions (eight times on each lake), from June 30, 1993 through September 2, 1993. The weevils used for the releases were reared at the Waterbury VTDEC laboratory, Middlebury College and collected by VTDEC staff and Middlebury College researchers from various field sites around Vermont where they occur naturally. All weevil life-stages, egg, larvae, pupae and adult, were released at each introduction site. Over the next two years, milfoil sampling at the weevil introduction sites by divers and aerial photography, will help document the effect weevils have on milfoil. Additional weevil introductions will continue at both lakes in 1994.

Excitement about Vermont's weevil biological control project has spread to other states across the country, in part due to recent articles about the project in publications such as The Boston Globe, Chicago Tribune, *Discover* Magazine and others. The VTDEC continues to receive inquiries from other states regarding the availability and effectiveness of the weevils. It is still too early to tell whether the weevils can successfully control Eurasian watermilfoil through intentional introductions. However, there is some evidence to suggest that naturally occurring weevil populations may have played a role in the spontaneous milfoil declines that have been observed in eight milfoil lakes in Vermont.

## Excellent Turn Out At The Weevil Tour

The tour of the VTDEC weevil-rearing facility held for state employees and the general public on July 23, 1993 was a big success! Approximately 100 people attended the "open-lab" throughout the day. Participants were able to see a video of the weevils feeding, mating and laying eggs, examine each weevil life-stage under the microscope, and view the weevil-rearing tanks. For those who missed the tour, and as a result of the tour's positive reception, a similar event will be held during the summer of 1994.

# — 29 Erosion Control Projects Completed In Lake Iroquois Watershed —

The Lake Iroquois Watershed Project concluded this fall with the completion of 29 erosion control projects in the watershed! The primary goal of the Watershed Project has been to reduce phosphorus loading to Lake Iroquois through erosion control, as soil erosion was determined to be a major contributor of phosphorus to the lake. A watershed survey conducted during the summer of 1992 identified a variety of soil erosion sites including eroding driveways, roads and ditches, unstable shorelines, and collapsing lakeshore retaining walls. During the past summer, erosion control projects were implemented on many of these sites.

The erosion control projects included thirteen vegetative buffer strip projects, eleven road or ditch improvement projects, two shoreline restoration projects using soil bioengineering methods, one shoreline protection project using stone riprap, and two town road ditch projects, for a total cost to the Project of $15,600.

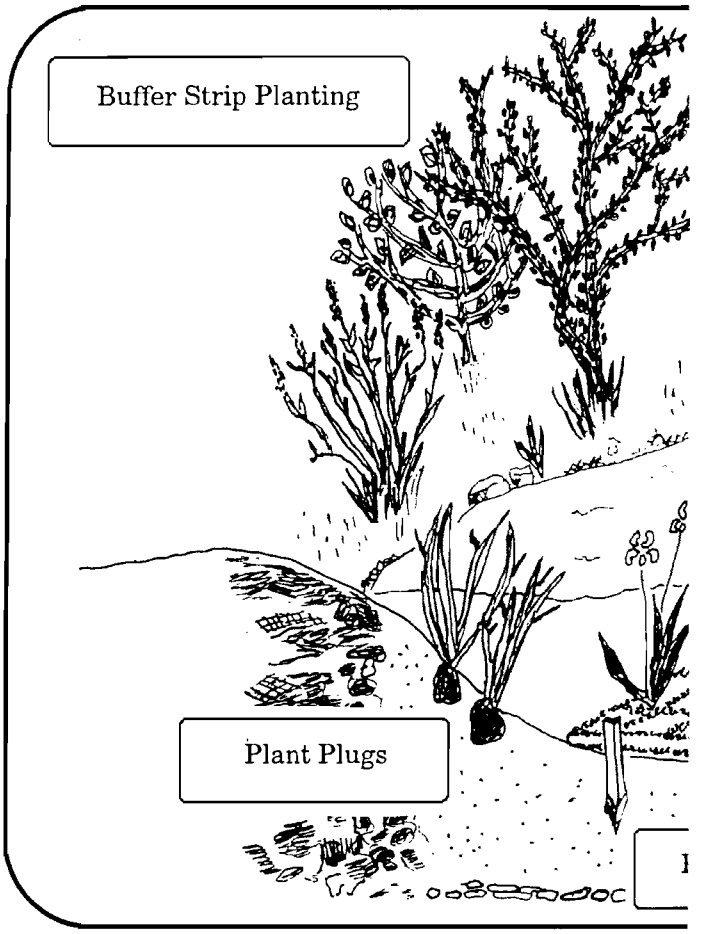
### Buffer Strip Reestablishment

Lakeshore erosion typically occurs where native vegetation has been removed or on lakes experiencing substantial fluctuations in water level. Reestablishing a buffer strip of native vegetation helps to stabilize the shoreland and eliminate the need for artificial stabilizing structures. In most cases of lakeshore erosion, planting a mix of trees, shrubs and herbaceous plants will hold shoreline soil in place and prevent erosion.

Thirteen shoreline sites with mild erosion were selected for reestablishment of native vegetation. The buffer strip projects were planted following a buffer strip workshop. The Watershed Project supplied the landowners with native plants that were purchased from six different Vermont nurseries, and the landowners planted them according to a planting design.

### Roads and Driveways

Because a gravel road is by definition exposed soil, roads and driveways and their associated ditches and culverts are often the locations of erosion problems. Good maintenance is essential to maintain the proper crown, ensure even flow of water off the road, and keep the roadside ditches stabilized. In the Lake Iroquois watershed, road erosion site corrections included ditch reconfiguration and stabilization, culvert replacement, regrading, and water bar construction. It is important for towns and private road associations to follow good maintenance practices in order to prevent roads from becoming significant erosion sites.

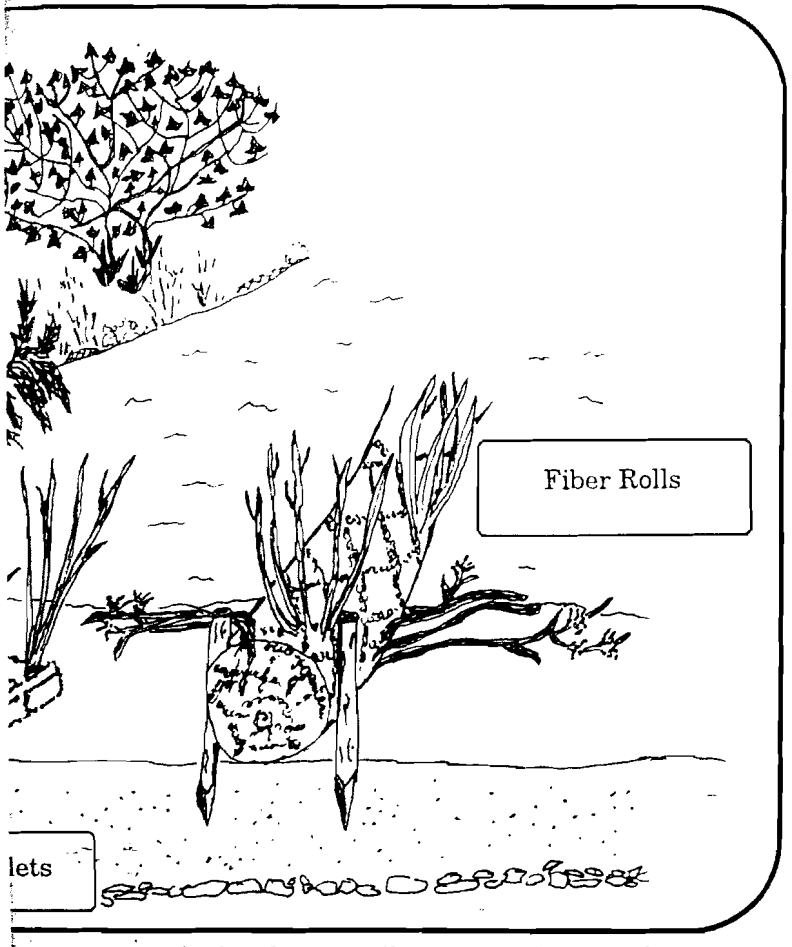



**Feature Erosion Control Project - Soil Bioengineering Comes To Vermont!**

Two of the erosion control projects used specialized soil bioengineering methods to restore eroded shoreline areas. Bioengineering methods involve using biodegradable and vegetated materials to stabilize eroded shorelines, instead of traditional "structural" methods using concrete and stone, thereby reestablishing a vegetated shoreline with aesthetic and natural values, and greater long-term stability. These methods have been used in

Europe for the past 30 years with great success. The Project believes that the two bioengineered sites on Lake Iroquois are the first time these methods have been used on a Vermont lake!

Along one section of the shore bioengineering materials were used to create a wetland buffer strip to reduce shoreline erosion. Fiber rolls and "live" plant pallets were anchored with wooden stakes to aid in the stabilization and re-vegetation of sites where steepness or high exposure to waves cause instability. The plant pallets, fiber rolls, and wooden stakes will remain in place until they bio-degrade in an estimated eight to ten years. In the meantime, native vegetation will have had time to become established.




Fiber rolls are made of a biodegradable coconut fiber matting rolled into the shape of a log. They are flexible and support plant growth on lake shorelines. The fiber rolls were placed in the water nine feet from the shoreline so that two inches remained above the lake surface at the mean (average) water level to create a wave break. The rolls were laced together end to end to create a continuous length, then anchored in place with wooden stakes.

Small two inch diameter "plant plugs" growing in a coconut fiber mesh were inserted into the fiber rolls. The Project used native and naturalized plant species such as Soft-stem bulrush, Giant burreed, Three-way sedge, Wild calla, and Blue-flag iris. These species should grow quickly and create an attractive wetland buffer strip.

"Live" plant pallets, coconut fiber reinforced sod pieces 3.5 inches thick, 50 inches long and 30 inches wide, were placed in a checker-board fashion in the area between the fiber rolls and the shoreline. The plant pallets arrived pre-grown with native species of Soft-stem bulrush, Sweet flag, and Blue-flag iris. Both the fiber roll and the plant pallets were placed around any existing stumps and boulders following the natural contour of the shoreline. The pallets, like the fiber roll, were anchored with wooden stakes.

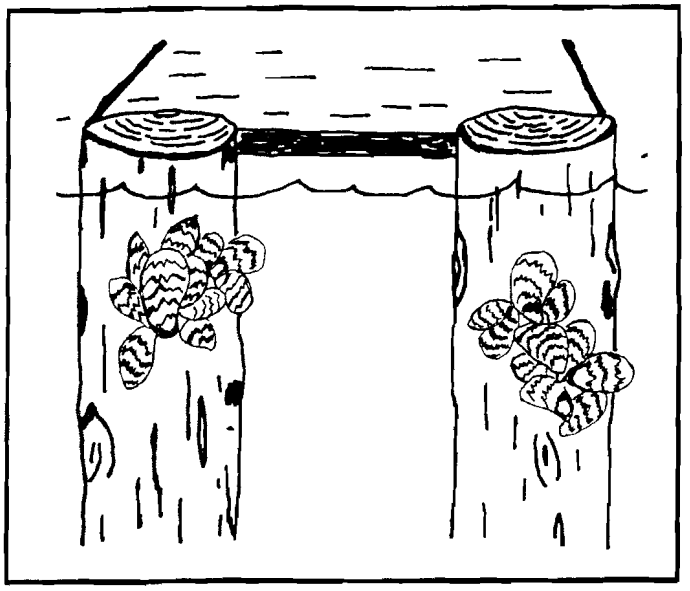
Bioengineering methods are simple and do not need a technical expert to design. One of the appeals of using these methods is that heavy, noisy equipment is not needed to install the materials.

*For further information on the Lake Iroquois Watershed Project and the erosion control methods used, contact the Lakes and Ponds Unit.*

LAKE IROQUOIS WATERSHED PROJECT

# Zebra Mussels Spread To Lake Champlain

The zebra mussel is a small freshwater mollusk, native to the Caspian and Black seas of Eurasia. In 1988 this prolific mussel was first identified in the United States in Lake St. Clair in the Great Lakes region. It is believed that the emptying of ballast water from commercial trans-Atlantic ships introduced the mussels into the Great Lakes. Since then, the mussels have spread throughout eastern U.S. interconnected waterways. Last July, the first zebra mussel was found in Lake Champlain in Orwell. Subsequent VTDEC surveys in Lake Champlain revealed that zebra mussels are commonly found from Whitehall north to Chipman Point in southern Lake Champlain. Later in the summer, a single zebra mussel was identified in Northern Lake Champlain near Windmill Point in Alburg.



**What problems do zebra mussels cause?**

As part of the zebra mussel life cycle, tremendous numbers of microscopic juveniles (called veligers) can travel great distances following water currents or transported by boats and trailers, causing rapid spread and infestation to new water bodies. Once settled on a hard surface, the veligers grow rapidly into one inch size adult mussels. Colonies of adults can attain densities well over 40,000 individuals per square meter. Some Great Lakes' infestations have reached 700,000 mussels per square meter. Only one year after zebra mussels invaded the Great Lakes, the municipal water treatment facility of Monroe, Michigan shut down temporarily as a result of the intake pipes becoming clogged by zebra mussels. Similar effects have occurred in small water systems that supply lakeside residences and agricultural irrigation systems.

Zebra mussels can affect water quality in a variety of ways. Most significantly, the mussels filter-feed on microscopic organisms that form the base of the food chain, occasionally causing an apparent increase in water clarity. Over time, this feeding behavior can affect a lake's entire ecological balance.

Zebra mussels impact recreational activities as well. The mussels will attach themselves to the hulls and propellers of moored boats. Popular swimming areas become abandoned when storm driven waves wash dead and dying mussels onto a beach, causing horrendous odor and sharp shell litter problems.

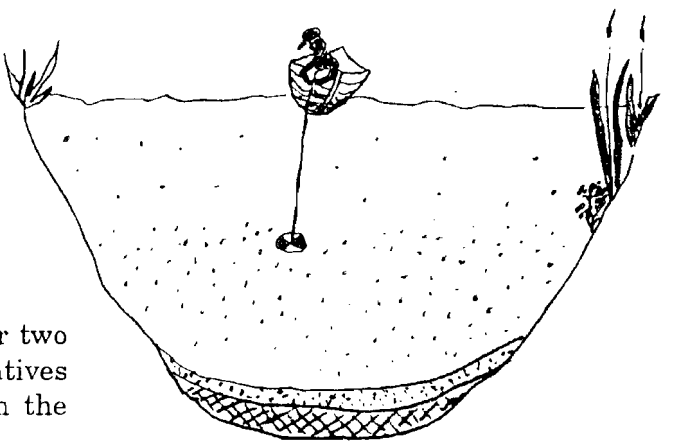
**What is being done about zebra mussels?**

This past summer, the Agency of Natural Resources was directed by the Vermont Legislature to conduct a study to address the threat to Vermont waters by zebra mussels and to develop strategies to minimize potential problems. A multi-disciplinary study committee is currently reviewing funding options for zebra mussel controls in state and municipal water supply facilities, and on streams and other state water bodies. The committee will present its findings and recommendations in a report to the legislature in January 1994.

The Lake Champlain Basin Program began an aggressive zebra mussel education and outreach effort last August by posting zebra mussel informational signs at all Lake Champlain boat accesses, preparing public service announcements, distributing mussel identification cards and fact sheets, and featuring the zebra mussel in their newsletter, *CASIN' the BASIN*. The Agency of Natural Resources is proposing to monitor zebra mussel spread within Lake Champlain (expanding on the volunteer mussel monitoring efforts of 1992 and 1993) as well as to monitor for new infestations statewide.

*See "Zebra Mussels" page 16*

## The Stewart Family Monitors Maidstone Lake's Water Quality

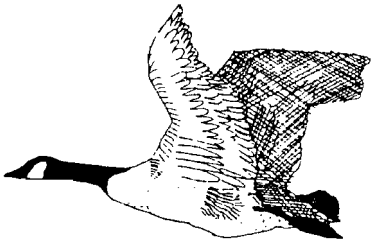


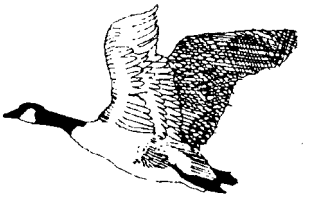
One of the more impressive claims of the Lay Monitoring Program is its statewide participation. Maidstone Lake, located way, *way* east, over in the Northeast Kingdom's town of Maidstone is fortunate enough to have the Stewart family as one of its 198 lake shore residents. Mary Stewart delightfully states that since she was two weeks old, she would visit her grandparents' camp on Maidstone Lake. Today, Mary, her husband Lee and their two grown children, Todd and Tracy, and other relatives continue to spend family summer weekends on the lake at Mary's mother's camp.

Living on a lake in the summer seems to melt generational barriers. Entire families can be united on the same issues, such as the fun of canoeing and the protection of nesting loons and lake water quality, not to mention camp maintenance tasks, such as painting. In 1989 the Stewart team contacted the VTDEC, asking how they could test Maidstone's water quality, having remembered that some years previously a neighbor used to take the Secchi disk water clarity readings. Since then, they have built a solid water quality data base, which shows low algal population densities and high water clarity readings, and can be used as a reference point from which to measure any future changes in Maidstone Lake's water quality. Lee and Mary joke that their most memorable day out sampling was a frustrating experience using the 25 meter collection hose from a canoe. While sampling, the hose went astray all over the boat, and the water sample actually came out the wrong hose end! After that incident, samples were collected from their sturdy motorboat.

Mary, a Classroom Assistant, and Lee, the Associate Director of Personnel at the University of Vermont, have both spent a lot of time in and around educational centers. As the Maidstone Lay Monitors, they extend their involvement in education to include lake ecology issues. They regularly discuss lake protection issues with other concerned lake residents and visitors, and every July at the Maidstone Lake Camp Owner Association's annual meeting, they present their water quality sampling results. Lee and Mary say they plan to continue monitoring, but suggest that once during the summer the Lay Monitoring Program should collect fecal coliform bacteria samples, a water quality parameter currently not part of the Lay Monitoring Program. Through the participation and recommendations of volunteers like the Stewarts, the Lay Monitoring Program strengthens its statewide lake monitoring success.

*The VTDEC Lay Monitoring Program is a volunteered based program. People from all walks of life who are concerned about lake ecology and lake protection issues can collect lake or pond water quality samples through participating in the Lay Monitoring Program.*





# Dedicated Lake Groups Battle Pioneer Milfoil Invasions

Of the 37 Vermont lakes currently known to support some amount of the nuisance aquatic plant Eurasian watermilfoil (*Myriophyllum spicatum*), eleven support milfoil growth in a pioneer stage. What constitutes a pioneer infestation? This term is used when Eurasian watermilfoil has been recently introduced into the water body and the amount of growth, although it may vary from within the lake or when compared to another lake, is typically scattered in limited areas around the shoreline.

Instituting immediate management programs at this level of infestation is critical. The sooner management programs are instituted, the greater the chance of preventing further spread of the pioneer infestation. Furthermore, the cost of implementing control programs for pioneer infestations will be lower than the cost of targeting larger infestations where denser milfoil growth can be found in many areas of a lake.

Public education is a critical element of a pioneer milfoil infestation management program. Lake users can unknowingly contribute to milfoil spread within an infested lake by recreating in milfoil beds and breaking the plants into pieces. These fragments can then drift, sink and become established in new areas. Fragments of milfoil caught on boating and other recreational equipment if not removed can lead to a new introduction. Lake users aware of the problems associated with milfoil, how to identify it and the importance of spread prevention measures, will only aid the success of a milfoil management program.

cross section

Several lake groups are involved in pioneer milfoil management efforts; their dedicated efforts are summarized below.

## Beebe Pond

The Beebe Lake Association initiated a control program on 100 acre Beebe Pond in Hubbardton after milfoil was discovered there in late summer 1991. Handpulling and bottom barrier installations were conducted by VTDEC. The Beebe Lake Association rallied immediately to inform and educate their members as well as others. A core group of Association members has annually handpulled in shallow infested areas by wading and snorkeling. The Association raised funds in 1992 and 1993 to hire a SCUBA diving crew to target deep water infestations.

Although milfoil has spread to new areas in Beebe Pond, the densest milfoil areas have been reduced. Continued success at combating the milfoil in Beebe Pond will be determined by ongoing Association efforts and handpulling activities.

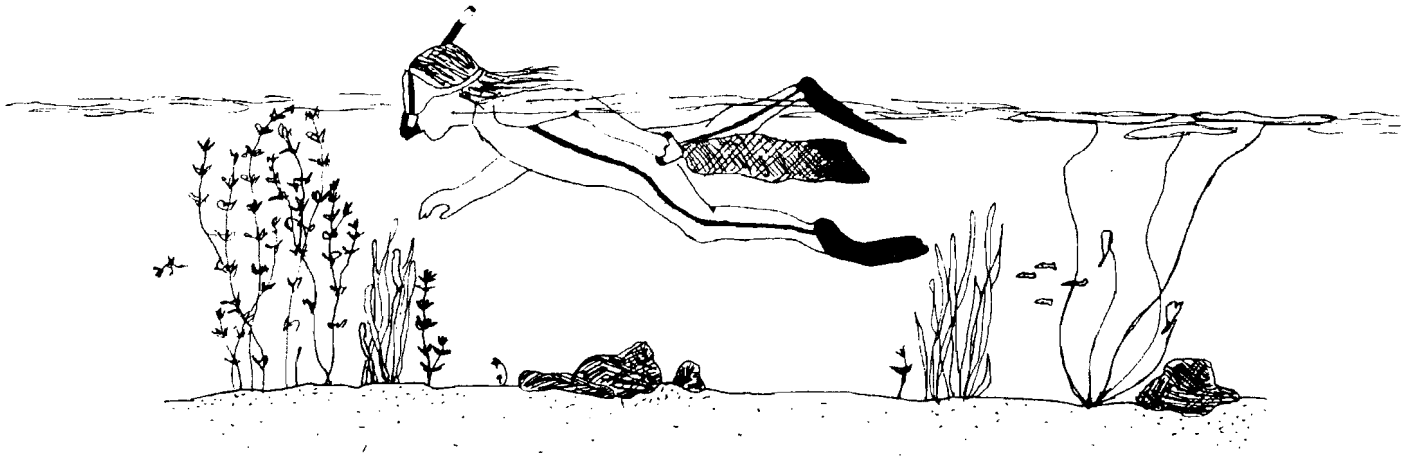
## Cedar Lake

Cedar Lake, a 114 acre lake in Monkton with a maximum depth of only 13 feet, was discovered to have limited milfoil growth in early summer 1990. The Cedar Lake Association organized education and control efforts to battle what was thought to be a very small milfoil population at the public access. When a much larger and very dense patch of milfoil surfaced in the lake two years later, a dedicated Association began handpulling out of canoes. Shortly after, they investigated control and funding options, and using primarily volunteers, constructed a powered platform barge to more easily handpull plants from the surface.

Eurasian watermilfoil

The Cedar Lake Association has been extremely creative in funding milfoil control in Cedar Lake; designing and marketing milfoil t-shirts and "selling" tables at a local flea market are just a few of their profitable fund raisers.

By the end of the summer in 1993, this group had successfully reduced the largest milfoil bed in the lake and had also targeted other milfoil hot spots. Milfoil is far from



eliminated in Cedar Lake, but because of the efforts of the Cedar Lake Association, it has been prevented from becoming established lakewide.

**Lake Dunmore**

An early summer 1989 infestation in primarily one area of Lake Dunmore, a 985 acre lake located in the towns of Salisbury and Leicester, was successfully controlled by VTDEC bottom barrier and handpulling efforts aided by a strong educational campaign by the Lake Dunmore - Fern Lake Association. When a much larger infestation surfaced at the northern end of the lake in 1991, an incredible volunteer lake association handpulling program substantially reduced this population in one season. Although the new infestation was fairly widespread, the area's maximum depth of five feet and fine sediment bottom, made it an easy target for handpulling by snorkelers.

The Lake Dunmore - Fern Lake Association creatively expanded the VTDEC Milfoil Watchers Program into a lake wide "adopt a shoreline" program to: involve lake residents in milfoil management; discover new milfoil growth as early as possible; and establish a permanent network of "watchers" on Lake Dunmore for years to come.

Control efforts on Lake Dunmore have been highly productive in both preventing further spread of milfoil in the lake and in reducing the size of the infestation. A successful program will be dependent on continued lake resident involvement and dedication.

**Halls Lake**

The milfoil population in Halls Lake, an 84 acre lake located in Newbury, was discovered late in the summer season of 1991. A large, very dense bed of milfoil was found in one area of the lake and scattered plants or small groups of plants were found around approximately half of the shoreline. Handpulling efforts occurred in 1992 by volunteer lake residents, SCUBA divers hired by the Halls Lake Association, and the VTDEC. Unfortunately, the large bed was beyond control by handpulling. The Association spent 1992 brainstorming via monthly meetings and fundraising to initiate an effective management program for the entire lake in 1993.

After much deliberation and many hurtles, a core group of Halls Lake Association members with input and assistance from a group of committed SCUBA divers and the Town of Newbury initiated what appears to have been a highly successful pioneer milfoil management program on the lake. A diver operated suction harvester was modified from a New York suction harvester machine design, constructed and employed on the lake. Fifteen days of diver operated suction harvesting in August of 1993 were spent tackling the largest bed and numerous other days were spent throughout the summer handpulling scattered milfoil growth. The Association also initiated an educational effort to spread the word about milfoil and the recommended controls.

End of 1993 season surveys showed successful removal of most of the dense milfoil

*Continued on the next page*

bed via suction harvesting and handpulling. The Association expects to suction harvest again next summer and conduct rigorous lakewide survey and handpulling efforts. Future milfoil control success in Halls Lake will result if the Halls Lake Association and others that have volunteered their time continue their efforts in battling milfoil.

### Lake Morey

A pioneer milfoil infestation was discovered in Lake Morey, a 538 acre lake in Fairlee, in late summer 1991. Committed Town of Fairlee officials, Lake Morey Protective Association members and others worked with a private consultant to develop an integrated management plan to combat the milfoil infestation. In 1992, an integrated management plan was initiated on the lake using bottom barrier materials, diver operated suction harvesting and handpulling techniques. However, that same summer a significantly greater amount of milfoil was discovered in the lake than had been identified at the time the initiated management plan was developed. The control methods that were employed in 1992 were not sufficient nor designed to control the amount of milfoil actually growing in the lake.

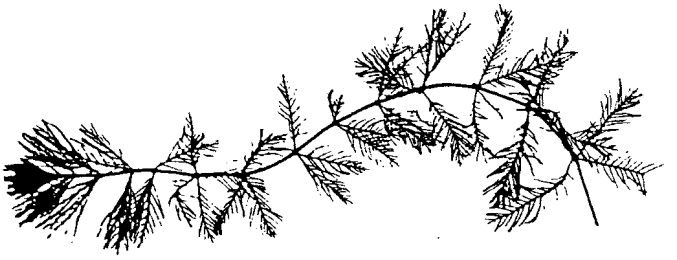
Not defeated, the same committed Lake Morey group, worked again with a private consultant to design another integrated management plan for 1993. This plan proposed chemical treatment, bottom barrier installations, diver operated suction harvesting and handpulling techniques. The methods that were actually implemented in the lake in 1993 were only bottom barrier materials and handpulling. Successful milfoil control was achieved in some areas of the lake; however, the densest area was left untargeted.

Despite continued milfoil growth and spread, the Town of Fairlee, the Lake Morey Protective Association and others are determined to control milfoil in Lake Morey. A large educational effort was initiated to inform the surrounding community of the milfoil problem, to educate all lake users about the problem in order to prevent further spread of the milfoil, and to institute an "adopt a shoreline" program similar to the effort initiated on Lake Dunmore. Plans are underway to implement an integrated management plan in 1994 and beyond. The milfoil in Lake Morey has not yet seen the last of this dedicated group!

### Number of Milfoil Lakes Rises to 37

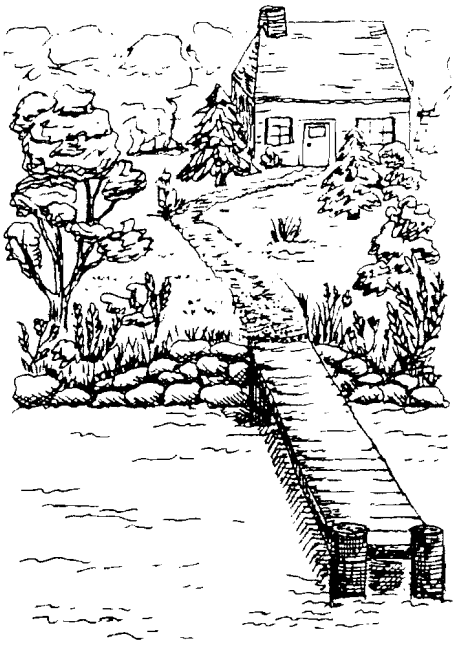
With the discovery of a pioneer Eurasian watermilfoil infestation in Fairfield Pond, the number of infested lakes in Vermont has climbed to 37. Fairfield Pond located in the town of Fairfield, is a 464 acre lake with a maximum depth of 42 feet. Twelve year old Fairfield Pond resident, Sean Bocash, recently trained in milfoil identification, discovered the milfoil growing in the pond in late August and brought it to the attention of the Fairfield Pond Association. Fairfield Pond Association president Tom Benoure notified the VTDEC and immediately rallied Association members to buoy off the densest infestation with warning signs and to conduct a lakewide search. Many members took to the water to handpull plants in the shallow depths. The VTDEC conducted an assessment of the lakeshore and the densest bed. An urgent meeting of the Fairfield Pond Association was conducted to inform members and to develop a control strategy.

The Fairfield Pond Association, working in cooperation with the town of Fairfield, hopes to initiate a management plan in 1994 in an attempt to reduce the size of the infestation and prevent further milfoil spread.



**Lake Champlain Numerical Phosphorus Standards Signed Into Policy**

On May 14th, 1993 the governments of Vermont, New York and Quebec signed an agreement posing numerical phosphorus standards for Lake Champlain. According to the agreement, all three governments are responsible for reducing the amount of phosphorus entering Lake Champlain and abiding by the established phosphorus standards. This international pact recognizes Lake Champlain as an ecosystem and seeks to manage the lake consistently across political boundaries.



**Fourth National Volunteer Monitoring Conference**

DATE: April 10-14, 1994
PLACE: Portland State University, Portland, Oregon
CONTACT: Volunteer Monitoring Conference/Pacific Agenda
P.O Box 10142
Portland, OR 97210
503-225-9916

## Recently Made Available

1) **Lake and River Shoreland Conservation Conference Summary**. A summary of events and an action plan outline from the *Lake and River Shoreland Conservation Conference* held on June 25, 1993 at the Camels Hump Middle School in Richmond, Vermont has been mailed to all the conference participants and lake association contacts. It is available to others by contacting VTDEC. This eight page summary also includes the names and addresses of the conference participants.

2) **Planning a Project on Your LAKESHORE?** A brochure describing the Shoreland Encroachment Program is now available. The pamphlet describes lakeshore projects which would require a permit from VTDEC, such as docks, dredging, filling, or any other work beyond the mean water level.

3) **Zebra Mussel Fact Sheet.** The Lake Champlain Basin Program has updated their Zebra Mussel Fact Sheet. The four page fact sheet summarizes the potential zebra mussel impacts to Lake Champlain, zebra mussel biology and emphasizes what everyone can do to help prevent zebra mussel spread.

4) **Nonpoint Source Pollution Fact Sheet.** The Lake Champlain Basin Program's six page pamphlet on nonpoint source pollution is now available. The fact sheet defines nonpoint source pollution, explains why it is a problem and discusses ways for people to reduce nonpoint source pollution. The fact sheet includes drawings and an easy to follow list of nonpoint source pollution Do's and Dont's.

5) **Living With The River.** This pamphlet is a landowner's guide to erosion control on the Connecticut River. Grafton County Conservation District, along with assistance from the New Hampshire and Vermont Soil Conservation Services, and a 1993 Partnership grant from the Connecticut River Joint Commissions made available this graphically designed brochure. This pamphlet also includes a listing of the Conservation Districts located along the Connecticut River as sources of technical help.

***Contact the Lakes and Ponds Unit at 802-241-3777 to obtain any of these publications.***

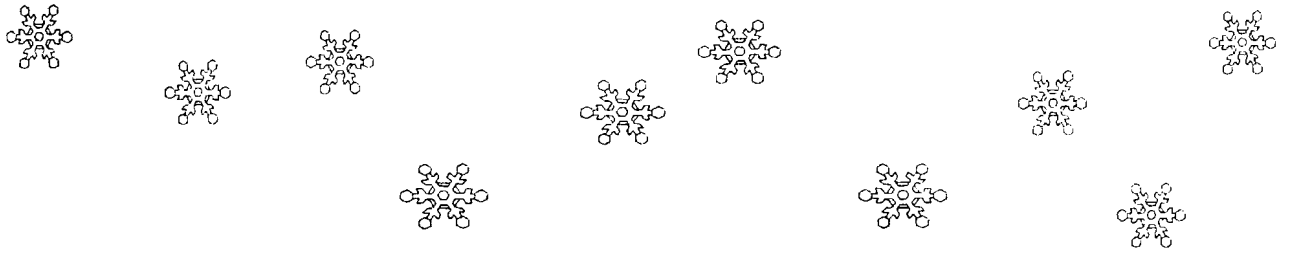
## Zebra Mussels *(continued from page 10)*

**What can you do?**

Learn about the mussel, how it spreads, how to identify it, the threat it poses, and share this information with others. Current recommended controls are installing filters on in-take pipes that physically exclude entry of the mussel and mechanical scraping with proper disposal of the removed mussels. In addition, in order to prevent further mussel spread, it is very important that people observe the following points:

- Inspect boat and trailer carefully for mussels and aquatic vegetation. Remove and discard in the trash.
- Drain all water from boat, including bilge, live well and engine cooling system.
- Dry boat and trailer in sun for at least two days or if using boat sooner, rinse off boat, trailer, anchor, anchor rope and chain, bumpers, engine, etc... with tap water or at a car wash.
- Leave live aquatic bait behind- either give to someone using the same waterbody, or discard in the trash.

*Further information is available from the VTDEC (Neil Kamman at 802-241-3777) and the Lake Champlain Basin Program (1-800-468-5227).*



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**Lakes and Ponds Unit**
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