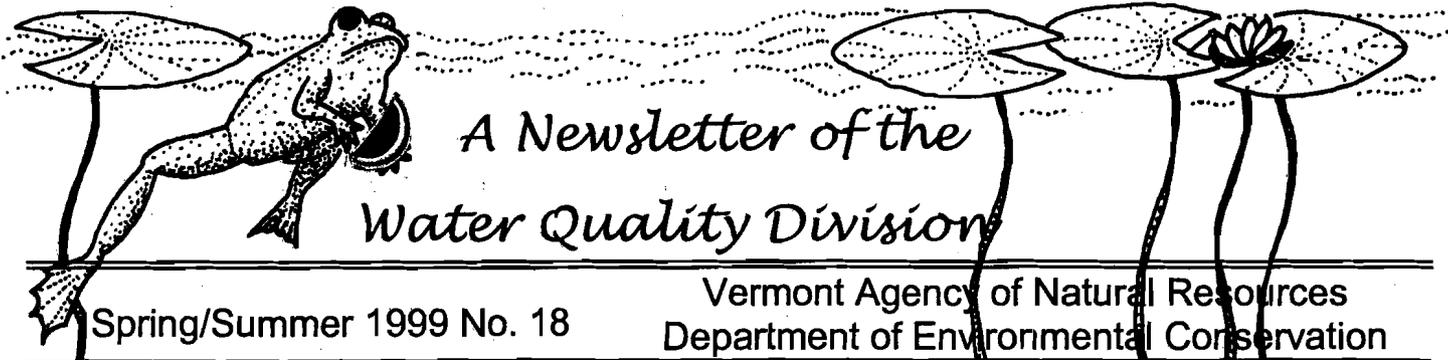


# Out of the Blue



Spring/Summer 1999 No. 18

Vermont Agency of Natural Resources  
Department of Environmental Conservation

## Time to Replace Those 2-Cycle Boat Engines

It's a beautiful summer day in Vermont, clear blue sky, warm temperature and low humidity. A great day to jump in the boat, go fishing, waterskiing or just cruising. You take a deep breath of fresh air and start your outboard, when a cloud of blue smoke billows from the exhaust ports. So much for the fresh air. Your two-stroke outboard, no matter how well tuned, is inefficient and discharges 20-30% of the fuel unburned into the lake water!

Two-stroke carbureted marine engines are used in most outboards and in almost all personal watercraft. Marine engines exhaust directly into the water, introducing petroleum and a host of chemical additives (including some carcinogens) to the lake ecosystem. Two-stroke carbureted marine engines are highly inefficient in their use of gasoline and oil, and are the second largest non-road contributor of hydrocarbons to air pollution.

Consider this: As much as 50 to 60 gallons of fuel per year is discharged into the environment from one average personal watercraft operated for 41 hours per year. It has also been estimated that the operation of a single 100 horsepower personal watercraft for seven hours results in more ozone precursor emissions (hydrocarbons & oxides of nitrogen) than the operation of a 1998 passenger car driven more than 100,000 miles.

Of 38,000 registered boats in Vermont, 29,000 are equipped with outboard engines and approximately 27,550 of these are two-stroke outboards. The Vermont Lake and Pond Recreational Survey (1996) estimated that 92 gallons of fuel per year are used in the average

See "Boat Engines" page 3

## The Governor's First Lake Dip-In!

**Great news!** Vermont's Governor, the **Honorable Howard Dean**, will be dipping into Vermont lakes this summer! The Governor has enthusiastically agreed to join the Lay Monitoring Program and take a Secchi water clarity reading to show support for and recognition of lay monitors and all the work that lake associations and others are doing to protect Vermont waters. The timing of this event also allows the Governor to participate in The Great American Secchi Dip-In, a national volunteer program. Additionally, the Governor's Lake Dip-In will serve as the kick-off to this year's LakeFEST '99!

Lake Bomoseen was chosen as this year's Lake Dip-In site, due to its longevity in the Lay Monitoring Program. The Governor will meet with Jim Leamy, a 21 year veteran of the program and accompany him on the lake to take the week's Secchi disk reading. As part of the Great American Secchi Dip-in, this reading will

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## OUT OF THE BLUE

is produced semi-annually by the Lakes and Ponds Section. Our purpose is to share information on lake and watershed environments, water quality and state activities through articles on lake, stream and wetland ecology and Division 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 Agency of Natural Resources  
Dept. of Environmental Conservation  
Water Quality Division  
Lakes and Ponds Section  
103 S. Main Street, 10 North  
Waterbury, VT 05671-0408  
802-241-3777

<http://www.state.vt.us/anr>

### NEWSLETTER STAFF

Amy Bentley Picotte, Editor  
Ann Bove  
Susan Warren

### CONTRIBUTORS

Amy Bentley Picotte  
Michael Hauser  
Peter Stangel  
Ethan Swift  
Susan Warren

### ARTWORK

Susan Warren

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Governor's Dip-In (continued from page 14)

contribute to the national data base of water clarity readings from more than 2500 lakes across the continent.

The Governor's Lake Dip-In is a great way to bring several varied purposes together, including:

- ◆ Celebrating the Vermont Lay Monitoring Program in which hundreds of volunteers have collected water quality samples from their favorite lakes and ponds with support from the Agency of Natural Resources since 1979.
- ◆ Supporting the involvement of citizens in lake and watershed stewardship.
- ◆ Supporting the on-going and important work of natural resource monitoring and public participation.
- ◆ A great kick-off for the annual Vermont LakeFEST week of July 17<sup>th</sup> - 25<sup>th</sup>, 1999, observed throughout Vermont by lake associations and other groups to promote the wise care of lakes, ponds, and watersheds in their communities. (See "LakeFEST '99!" page 7.)
- ◆ Providing information to the National Great American Secchi Dip-In, an annual effort where thousands of lakes and ponds are sampled nation-wide to capture a snapshot of the nation's water transparency and celebrate the work of citizen volunteers. (See "The Great American Secchi Dip-In" page 10).



You are all invited to the first year of the Governor's Lake Dip-In at 10:00 am on July 8<sup>th</sup>, 1999 at the Lake Bomoseen State Park in Rutland County, Vermont. The Governor will also be presenting the Robert Arnold Lake Protection Award, an award that honors an individual for his or her outstanding lake and watershed protection work. Please call 802-241-3777 for further information.

## Boat Engines (continued from page 1)

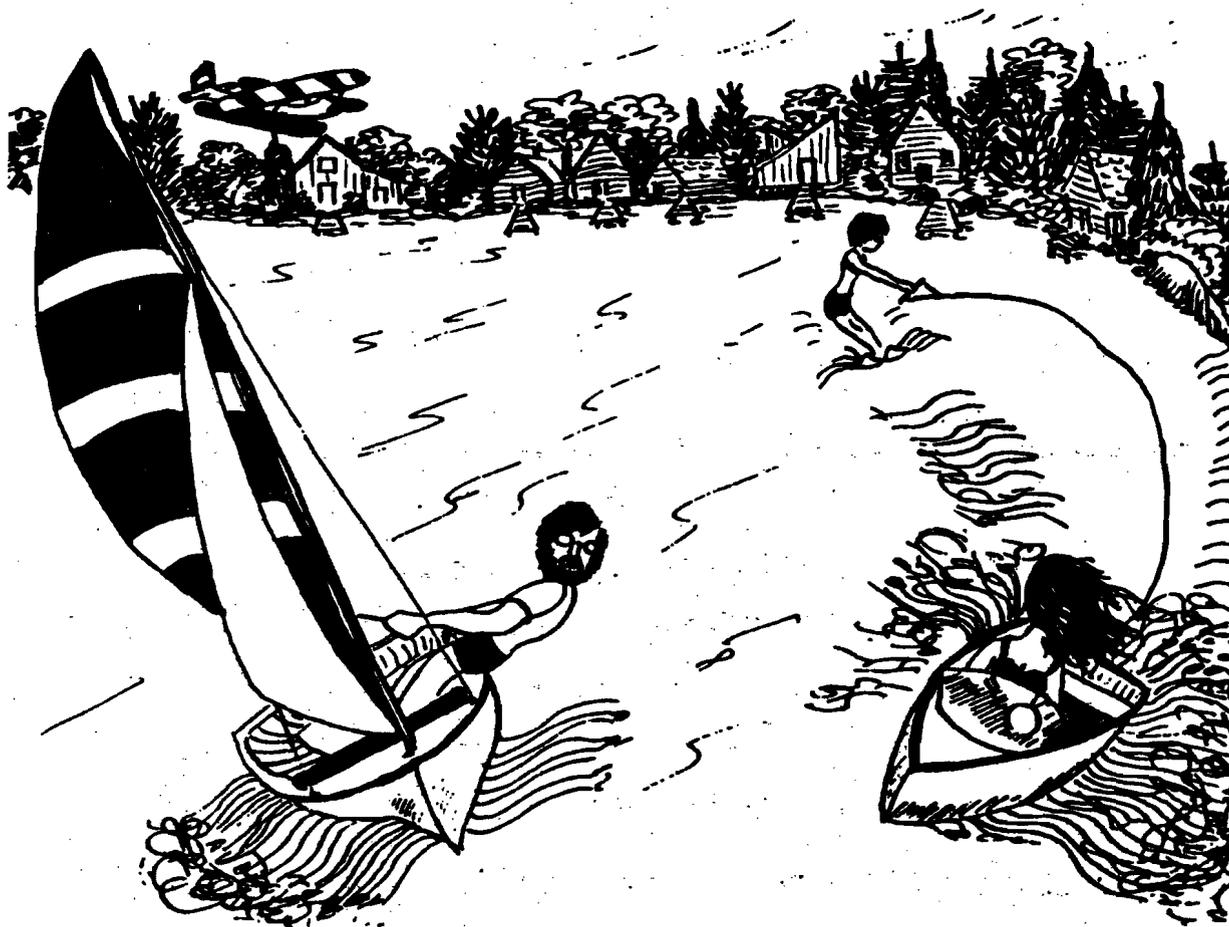
Vermont boat. Based on the 20-30% estimated release of unburned fuel, between 507,000 and 760,000 gallons of fuel/oil mixture is being released into Vermont lakes annually! It is important to note that boats registered out of state which are used on Vermont waters were not included in the above calculation, and therefore this estimate is conservative.

The market is currently dominated by carbureted two-stroke engines that are available between two and 300 horsepower. In a two-stroke engine, the fuel/oil mixture is sparked and the exhaust is expelled in one piston movement, up and down, or two-strokes. Technology in the form of the four-stroke and direct injection two-stroke marine engines has been developed to improve the combustion of fuel. Four-stroke engines are available with ratings between two and 130 horsepower and are a growing segment of the market. While the four-stroke engines typically cost more to purchase, they are quieter, have less vibration, use about 30 percent less fuel compared

to carbureted two-stroke engines, are 75-90% cleaner, and do not produce the objectionable smoke or odor associated with carbureted two-strokes. Direct fuel injection two-stroke engines compared to four-stroke are recent introductions in the higher horsepower range, including 90, 115, 135, 150, 175, 200 and 225 horsepower and may be adapted to lower horsepower motors in the future.

Regulations adopted by U.S. EPA will help reduce emissions from spark-ignition two-stroke engines by 75% by the year 2025. The U.S. EPA regulations encompass new outboard engines and gasoline marine engines produced for personal watercraft, outboards and jet boats. The goals of these regulations will be reached by a flexible eight year phase-in schedule that began in 1998.

You can help reduce emissions to Vermont waters by replacing your outboard with one of the newer four-stroke or direct-injection two-stroke motors. For a copy of the "Report on Possible Water Pollution from the Use of Two-Stroke Carbureted Marine Engines" please contact the Lakes and Ponds Section.



# New England Association of Environmental Biologists' Spring Conference Benefits Lake Champlain Maritime Museum



The 23<sup>rd</sup> annual meeting of the New England Association of Environmental Biologists (NEAEB) was held this past March 10-12 at the Ascutney Mountain Resort in Ascutney, Vermont.

Each year this event is hosted by one of the New England departments of environmental conservation. Although anyone can attend the Conference, typically it attracts University researchers and graduate students, state agency personnel, The U.S. Environmental Protection Agency, and private consultants. The Conference this year concentrated on a number of regional issues, and addressed several topical themes: watersheds, monitoring, macroinvertebrates, and education and outreach. The plenary session focused on restoration efforts on the Connecticut River Watershed.

The Conference was well attended with more than 200 participants. A silent auction raised \$600 for the Lake Champlain Maritime Museum located in Basin Harbor, Vermont. Arthur Cohn, Director of the Lake Champlain Maritime Museum, was the

keynote speaker. Last winter, the Museum staff were busy continuing research on management options for the newly found Revolutionary War gunboat; conserving a remarkable anchor thought to have been shot off the bow of the British frigate *Confiance*, during the Battle of Plattsburgh Bay (1814); and taking more than 100 educational programs to school children in the Champlain Basin. Currently, the source of most pride for the Museum is their Revolutionary War exhibit, now on display at The Navy Museum in Washington, D.C. until next month, at which time it will return to the Champlain valley.

Overall, the NEAEB Conference this year was a great success. This annual conference is a great way to learn about the variety of water issues facing New England states and to see how others are addressing the challenges. For information on NEAEB 2000, please contact the Lakes and Ponds Section. To learn more about The Lake Champlain Maritime Museum, please call 802-475-2022.

## Wanted: Acid Rain Monitor

The Vermont Acid Rain Program is looking for a dedicated individual to monitor precipitation in the Morrisville area. Collection equipment and training are provided by the Department of Environmental Conservation. Monitors are responsible for collecting precipitation samples after storm events and recording the volume and pH of the sample. This position is year round, collecting rain and snow. Collector must be located in an area free of pollution sources. If you are interested in monitoring acid rain in Vermont and can commit to a volunteer, year round position, please contact Heather Pembroke at 802-244-4520.

### pH Scale

14	
13	13.8 lye
12	12 bleach
11	11.3 ammonia
10	
9	
up to 9.0 healthy ecosystem	
8	8.3 seawater
7	7.0 NEUTRAL
6	6.5 milk
5.6 other fish species die off	5.6 pure rain water
5.0 loons face starvation	
4.2 all fish dead	4.3 average VT precipitation
	3
	2
	2.75 lowest pH of rainfall in VT
	1
	0 .03 battery acid

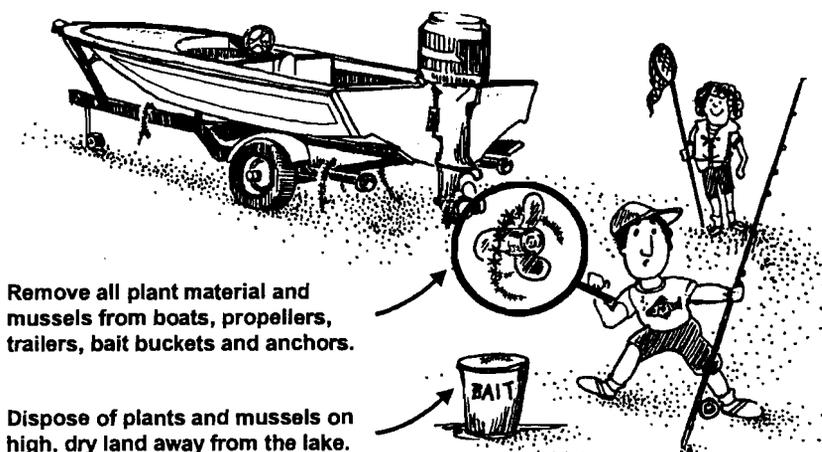
# Aquatic Nuisance Species

## HIGHLIGHTS

- ◆ On February 3, 1999, President Clinton signed an Executive Order on Invasive species. The Order does the following key things:
  1. Directs all appropriate federal agencies to make invasive species issues high priority.
  2. Develops a federal Invasive Species Council.
  3. Directs the Invasive Species Council to prepare a National Invasive Species Management Plan by August 2000.

The president has requested \$13.6 million in new funds to support this initiative.

- ◆ The Vermont legislature has passed a bill to amend the aquatic nuisance species transport law (10 V.S.A. § 1266) to make it illegal to transport water chestnut and quagga



mussels to or from any Vermont surface water. Currently the law pertains only to zebra mussels and Eurasian watermilfoil. The amendment will also make violation of the law a civil offense punishable by a citation of up to \$300 which will facilitate enforcement. Collected fines will be placed in the motorboat registration fund (see next bullet).

drawing from Connecticut Sea Grant

- ◆ The Vermont legislature has passed a bill which extends motorboat registration fees beyond March 2000, the date the fees are currently due to sunset. This is good news for the Grant-in-Aid Program which is funded with a portion of boater registration fees. The Grant-in-Aid Program provides financial assistance for aquatic nuisance control programs in the form of grants to municipalities.
- ◆ This summer \$200,000 of research funds from the U.S. Army Corp of Engineers Aquatic Plant Control Research Program will be used to evaluate controls for water chestnut, ecological considerations of water chestnut management, and to conduct baseline aquatic plant surveys on Lake Hortonia and Burr Pond. Senator Leahy was instrumental in getting this funding which requires no match.
- ◆ The New England Wild Flower publication Vol 2, No. 3 (1998) is devoted entirely to invasive aquatic and terrestrial plants sometimes used for gardening and landscaping. To obtain a copy of this 31 page color publication, send a check for \$4.00 payable to the New England Wild Flower Society at "Invaders", NEWPS, 180 Hemenway Rd., Framingham, MA 01701-2699, or call NEWPS at 508-877-7630.

Visit the VTDEC ANS Website at: [www.anr.state.vt.us/dec/waterq/ans/ans-index.htm](http://www.anr.state.vt.us/dec/waterq/ans/ans-index.htm)

## 1999 Vermont Watershed Grants

In January 1999, nineteen new Watershed Grants were awarded to community organizations around the state. Funded through sales of the Conservation License Plate, a total of \$40,042 was granted out this year.

Grant selections were made by the Citizens Review Committee and approved by Ron Regan, Commissioner of the Department of Fish and Wildlife. As last year, the grants represent a variety of watershed monitoring, restoration, protection, recreation and education projects.

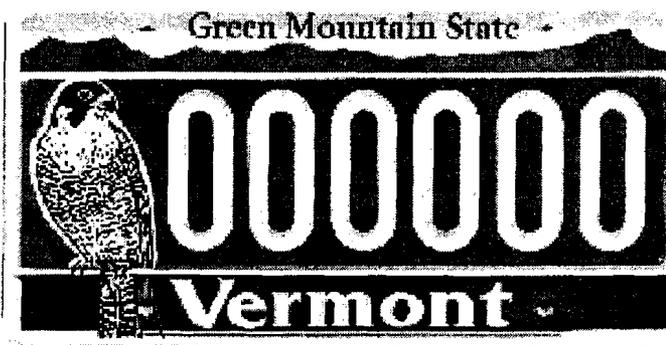
### 1999 Watershed Grants

#### Mini-grants (\$1000 or less)

- ◆ Cabot Watershed Field Studies Project
- ◆ Lake Carmi Watershed Integrated Crop Management
- ◆ Town of Georgia Beach Erosion Control, Lake Champlain
- ◆ Development of Thatcher Brook Canoe Landing, Winooski River, Waterbury
- ◆ Watershed Monitor Training, Bonnyvale Environmental Education Center, Windham County
- ◆ Watershed Quest, Fairlee Schools
- ◆ Aquatic Plant Monitoring and Lake Resident Education, Lake Groton
- ◆ West Rutland Marsh Education Awareness

#### Grants (more than \$1000)

- ◆ Trout River Stream Stability, Montgomery
- ◆ Elizabeth Mine Remediation Project, Thetford
- ◆ Delineation of Dorset Marsh
- ◆ Youth Conservation Corps Streambank Restoration
- ◆ Connecticut Riverfest
- ◆ Lamoille County Westover Riparian Project and Watershed Coordinator
- ◆ Whipple Point Boat Washing Station, Zebra Mussel Spread Prevention, Lake Memphremagog
- ◆ Bird Habitat and Marsh Monitoring, Lake Champlain Basin
- ◆ Passumpsic Valley River Outreach Coordinator
- ◆ Wetland Observation Blind Reconstruction, Green Mountain Audubon Society, Huntington
- ◆ Streambank and Water Quality Protection, Rutland County



### Conservation Plates Support Watershed Projects

Sale proceeds of the Vermont Conservation License Plates are split between the Watershed Grants Fund and the Nongame and Natural Heritage Program of the Department of Fish and Wildlife. For an additional \$20 per year at the time a car is registered, Vermonters can support important watershed and wildlife work. One hundred percent of the funds in the Watershed Fund are granted out to community projects.

Watershed Grants offer a great way for a community organization to get started on water-related conservation, recreation and education projects. The "Mini-grants" category is designed to assist start-up projects for groups that may have little grant writing experience. The application form is simple and the follow-up administration is easy to comply with.

The goals of the Watershed Grant program are to support watershed education efforts and projects that protect, restore, or enhance Vermont's watershed resources. A watershed is a river, stream, lake, pond or wetland and the land and water that drains into it. The watershed approach recognizes the inter-relatedness of these resources.

If you want to discuss an idea for a potential Watershed grant project, please call Susan Warren at 802-241-3777.



## LakeFEST '99 – Mark Your Calendar!

Last summer, the first LakeFEST celebration was observed throughout Vermont by 10 lake associations to promote the wise care of lakes, ponds, and watersheds in their communities. Lake Associations that participated in last summer's LakeFEST celebration hosted a range of diverse and interesting events. Given the great response from the first year, LakeFEST will continue as an annual event. Anyone is welcome to help in planning for this year's LakeFEST '99 celebration, July 17<sup>th</sup> - 25<sup>th</sup>, to foster these objectives:

- ◆ To raise the level of awareness of the lake community (both lake and town residents) about lake issues and to promote increased involvement;
- ◆ To build rapport between lake residents, lake users, and town residents;
- ◆ To have community fun; and
- ◆ To build a foundation on which to begin working on larger issues.

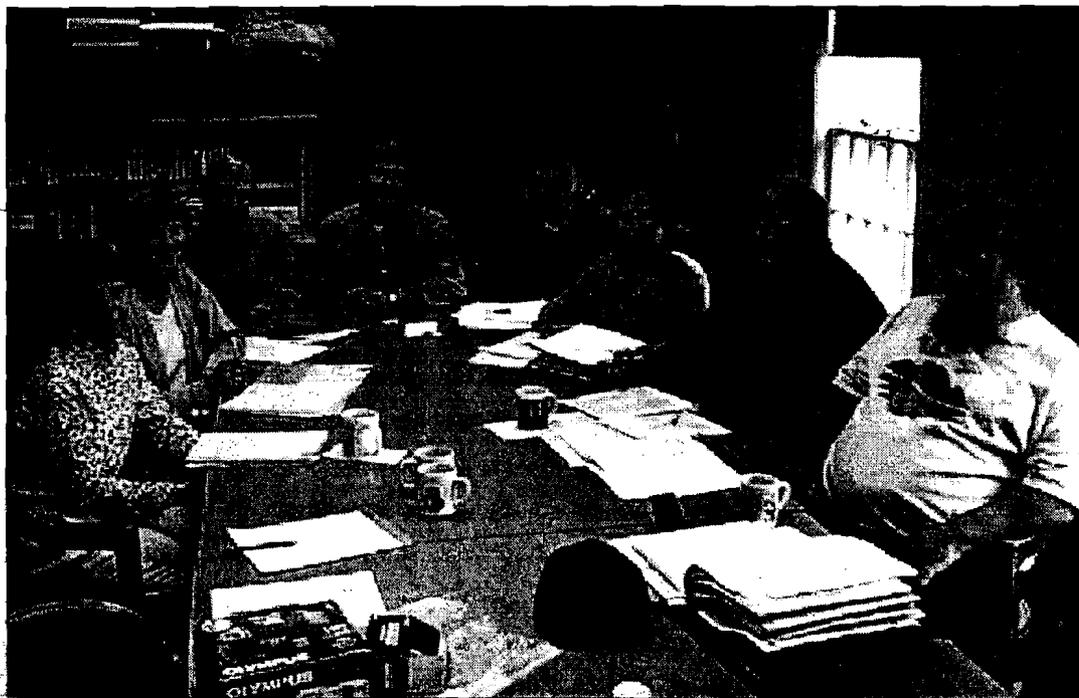
We encourage you to help us meet these goals by scheduling an activity on your lake!

The LakeFEST Planning Committee is very excited about the interest and enthusiasm for this statewide celebration of lakes, ponds, and their watersheds. LakeFEST is the result of discussions from the Lake Protection Advisory Committee on ways to enhance communication between



and among lake associations, the VT Department of Environmental Conservation, and Vermont residents.

If you would like to get involved in planning LakeFEST '99, or join the Lake Protection Advisory Committee, please call Ethan Swift at 802-241-3777.



Members of the Lake Protection Advisory Committee work on planning LakeFEST '99. From left to right: Joanne Wright (Lake Iroquois), Amy Picotte (VTDEC), Bob Campbell (St Albans Bay), Ethan Swift (VTDEC), Jackie Sprague (Harvey's Lake), Susan Warren (VTDEC), Bob Johnson (Lake Parker), Tom Benoure (Fairfield Pond).

## Project WET Students Plant Trees Along Banks

After Vermont mud season comes planting time, which for some can mean more muddy times! Tom Stelter, from the Albany Community School in Albany and John Little from Richford Jr./Sr. High School in Richford took their classes outside this spring to plant trees along their local river banks.

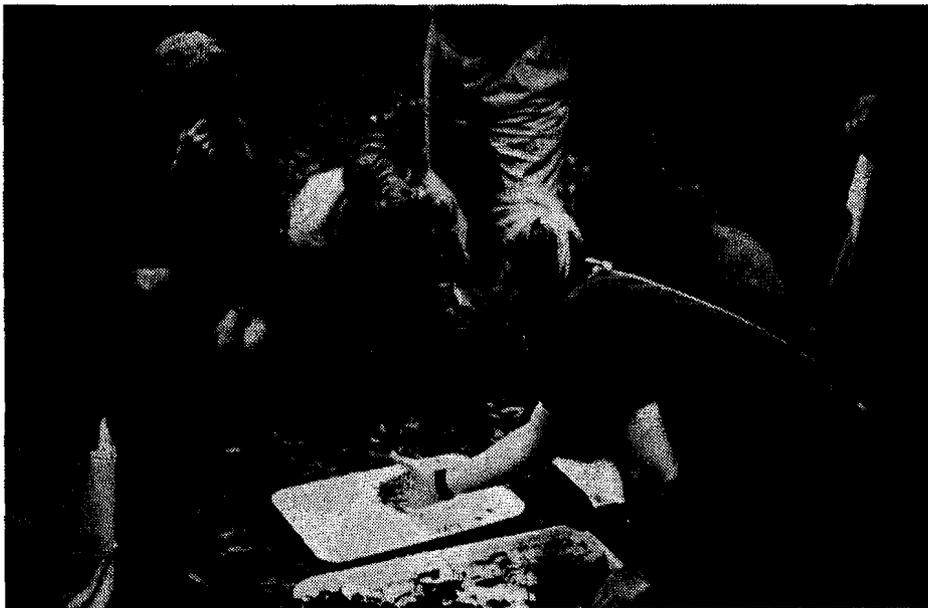
Planting trees along stream banks with appropriate species, such as the bankers willow, northern white cedar, red osier dogwood, and high bush cranberry can help stabilize the bank from erosion. These vegetative buffer strips can also help filter out sediment and other pollutants from reaching the river and they offer important wildlife habitat.



**Albany Community 7th grade students plant trees along the McCleary Brook in Albany, Vermont.**

The trees were provided through Vermont Project WET tree grants, funded by the Environmental Education and Training Partnership.

## 12 New Project WET Facilitators



**Heather Pembrook (in foreground) from the Vermont Department of Environmental Conservation demonstrates macroinvertebrate (river bugs) sampling at the Leadership Training.**

After spending two days at the Farm and Wilderness Camps in Plymouth, twelve educators completed the Vermont Project WET Facilitator Leadership Training. Project WET, Water Education for Teachers, is a k-12th grade, hands-on, integrated educational program that focuses on water.

These newly trained Project WET Facilitators are now certified to offer Project WET workshops to instruct others in using the Activity Guide book and program materials. For information on becoming a Project WET Facilitator, or on how to attend a workshop, please call Amy Picotte at 802-241-3777.

This special Leadership Training was funded by the Environmental Education and Training Partnership.

## Lake Willoughby Sure is Lucky to Have Roy Hill!

Just imagine wrestling with a 25 meter sampling hose from a row boat on the open waters of big, beautiful Lake Willoughby, then ask Lay Monitor, Roy Hill, for stories of his monitoring experiences. Roy Hill has been monitoring Lake Willoughby for ten consecutive years, and for much of the time has relied on his own strength, dedication, and fishing row boat to reach the lake sampling station.

Although Roy plans his sampling for early mornings to take advantage of calmer waters, sometimes he calls his good friend, Jim Caulkins for back up and company on those really rough water days. Fortunately, Jim Caulkins shares the same love and stewardship for Lake Willoughby; he also owns a safer, larger boat which he often uses to take Roy sampling. (Roy Hill is the most senior member of the LMP!) Together Roy and Jim cover the summer weekly monitoring and in doing so each takes a Secchi water clarity reading if only to double check the others eye sight!

Roy has been active with Lake Willoughby protection beyond participating in the Lay Monitoring Program. He is also a member of the Westmore Association, and has organized several public environmental protection workshops. Roy's first attempt at rallying lake users to learn more about protecting Lake Willoughby was to invite them to spend an evening in his living room listening to a slide show presentation on protecting watersheds. After this gathering, Roy followed up by finding out about sponsoring other

Vermont Agency of Natural Resources events.

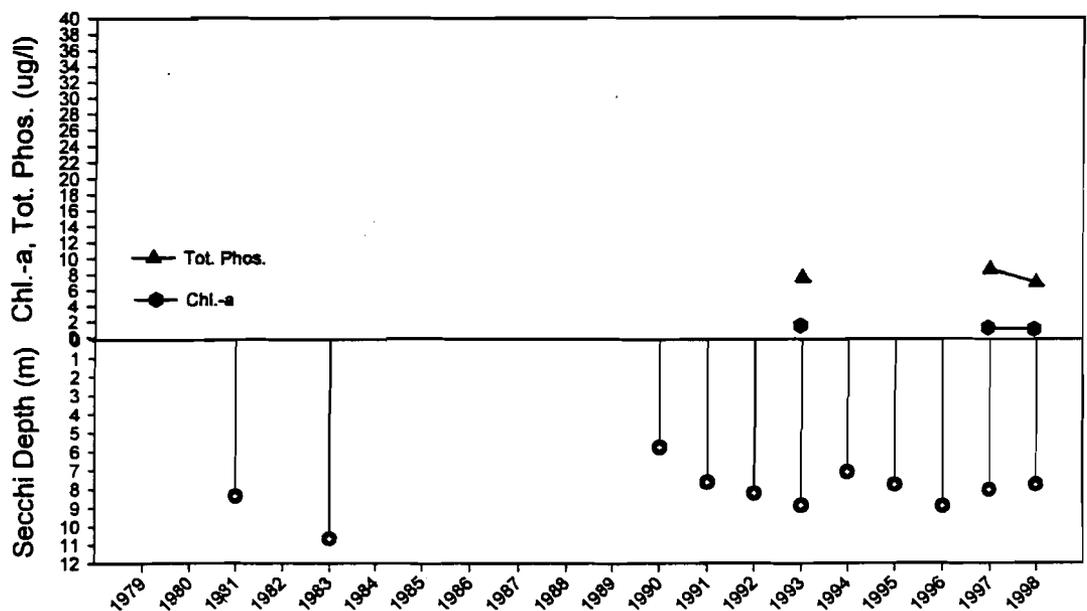
At a Better Backroads workshop, Roy was able to arrange a meeting with professional Vermont road experts, the local town roads foreman, and local residents to walk sections of gravel roads in the watershed and inspect road maintenance practices. Participants learned a lot and gained a better appreciation for how road run-off can affect the quality of Lake Willoughby, and how this issue needs to be properly addressed, including supporting additional resources for the local road crew.

Roy also coordinated lake users to sponsor a Shoreland Property Management workshop. While invited to visit private property along the lakeshore, participants learned to distinguish between natural sites of erosion and sites with accelerated erosion caused by poor property practices. Understanding how to prevent erosion and control shoreline property run-off is important for reducing excessive nutrient and sediment build up in front of camps. When excessive nutrients and sediments enter the lake, the water conditions change, causing increased weed beds which can impair recreational lake use.

Lake Willoughby is lucky to have such a caring and responsible lake enthusiast as Roy Hill. Roy's efforts for protecting Lake Willoughby are greatly appreciated and will not be forgotten, as some of his hard work will always be documented in the Lay Monitoring water quality database on Lake Willoughby (see graph).

### Lake Willoughby Lay Monitoring Program Annual Means

Roy Hill has sampled nine consecutive years of Secchi water clarity readings. Compared to other Vermont lakes, the annual Secchi means indicate high water clarity. Other water quality parameters sampled are total phosphorus (nutrient that feeds algae) and chlorophyll-a (green pigment in algae).



## The Great American Dip-In

The Great American Secchi Dip-In is a demonstration of the potential of volunteer monitors to gather environmentally important information on our nation's lakes, ponds, rivers, and estuaries. The concept of the Dip-In is simple: Individuals in volunteer monitoring programs take a Secchi disk measurement on one day in a period surrounding Canada Day (July 1<sup>st</sup>) and July Fourth. Individuals may be monitoring lakes, ponds, reservoirs, estuaries, rivers, or streams. The Secchi disk readings are used to assess the transparency of waters in the United States and Canada.

The Dip-In uses a Secchi disk to measure water clarity. Used by the Vermont Lay Monitoring Program and professionals world-wide, the Secchi disk is a simple measure of water quality. The black-and-white disk is lowered into the water and the depth at which it disappears from view is recorded. Particulate matter, such as algae or silt, limit light penetration and reduce the water's clarity. Therefore, a Secchi disk water clarity reading is an indication of a lake or pond's water quality in terms of nutrient enrichment and suspended silt.

Historically, Vermont ranks in the top five out of all states each year in terms of water clarity. More than 2500 lake results are included in the Great American Dip-In; below is a summary of results from across North America during the 1998 Great American Secchi Dip-in.

### 1998 Results

Country or State	# of Participants	Ave.
AUSTRALIA	1	0.8
CANADA/BC	8	5.6
CANADA/ON	389	4.3
AL	16	0.7
CA	4	0.4
CO	2	1.7
CT	5	1.2
FL	104	1.6
GA	2	0.9
HI	2	1.8
IA	3	0.2
IL	60	1.0
IN	62	2.0
KS	14	1.0
KY	1	2.4
MA	50	2.0
MD	9	0.8
ME	107	4.9
MI	131	3.5
MN	483	2.6
MO	13	1.2
MT	22	6.5

State	# of Participants	Ave.
NC	13	0.7
ND	1	3.5
NE	4	0.08
NH	29	4.7
NJ	1	2.6
NV	1	6.5
NY	53	3.3
OH	42	0.5
OK	53	0.7
OR	14	2.7
PA	21	1.5
RI	33	1.7
SC	16	3.7
SD	4	0.7
TN	1	1.0
TX	16	0.9
VA	21	0.7
VT	37	4.5
WA	36	3.3
WI	298	3.0
WV	1	0.6

## The Common Horsetail

By HANNAH MARKS (Hannah is a 6th grade student in Brookline Massachusetts and a visitor to Vermont. *Out of the Blue* thanks Hannah for allowing us to use her report on horsetail.)

The common horsetail (Latin name *Equisetum* sp.) lives everywhere in the world except Australia and New Zealand. The common horsetail grows in swamps and marshes. The horsetail has been around for 300 million years during the Coal Age. Fossils are found of it today. Horsetails are one of 35 living species, hybrids and fossils of the genus *Equisetum*.

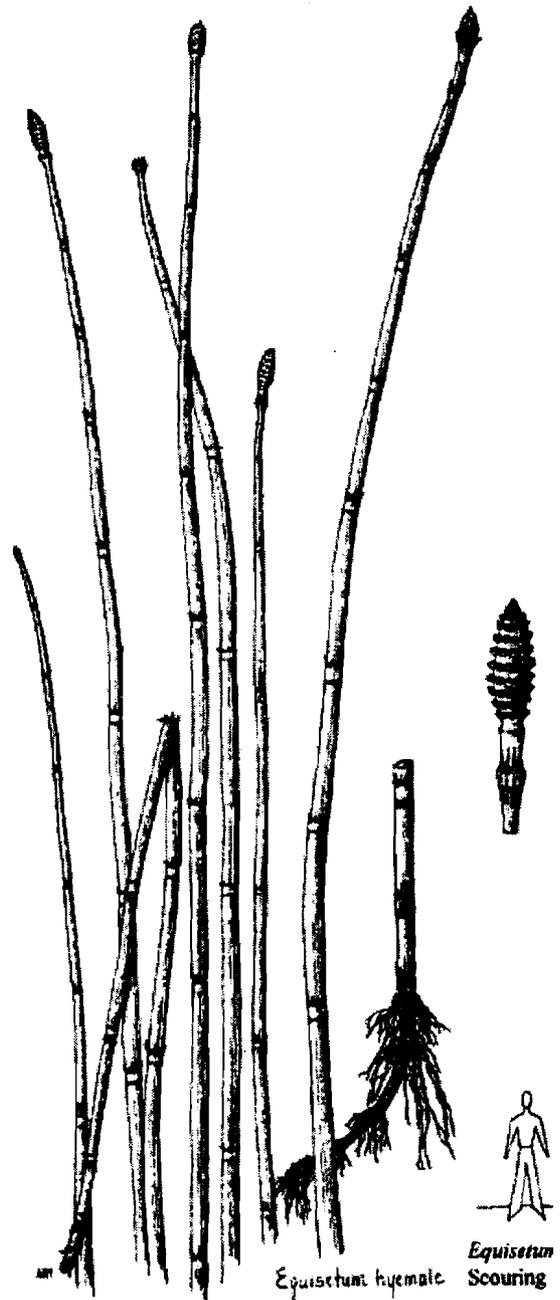
The common horsetail is one to four feet tall. The color ranges from pale to dark green. Its shape is like a fishing rod, which is hollow with tubes connecting to make a stem. Horsetails have a poisonous enzyme inside them which is poisonous to livestock.

Life is easy for the horsetail to live in wetlands because it can provide camouflage for other living things. The reason there are so many horsetails to hide other living things is that horsetail roots connect more easily in the wet soil than in the dry soil. Since roots can connect under ground and water, they spread out and create new plants easily.

The top of the horsetail contains small spores that are released in the spring to make new plants. My hypothesis is that the horsetail sucks up soil and nutrients and drinks water.

Since the horsetail has a rough surface, it is used for scouring, filing, and sanding. It is also called pewterwort. In Central America they use horsetail for kidney problems. They are also used as food.

Editor's note: In Vermont, the common horsetail is found in a wide variety of lakes and ponds, growing in shallow water both in marshy areas as well as along the lake shoreline.



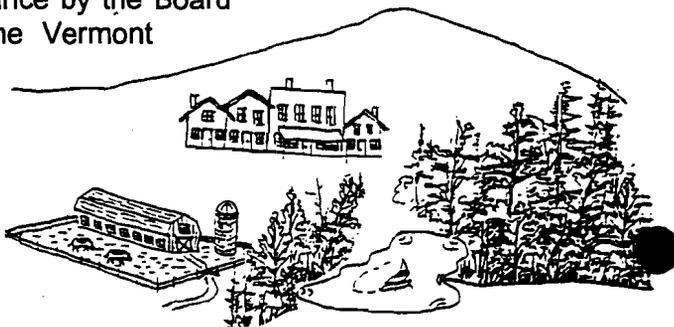
This aquatic plant line drawing is the copyright property of the University of Florida Center for Aquatic Plants (Gainesville). Used by permission.

## Teach Them While They Are Young: Two Newly Proposed Environmental Student Learning Standards

The Vermont Agency of Natural Resources has partnered with the Departments of Agriculture, Education and Public Service, the University of Vermont, SWEEP (StateWide Environmental Education Programs), and AITC (Ag in the Classroom) to provide young Vermonters with a deeper understanding and respect for Vermont's environment. This group, working as the Education for Sustainability Project, has proposed two new educational standards to update and strengthen the Vermont Educational Framework of Standards and Learning Opportunities with concepts of sustainability. (The Vermont educational standards serve as statewide learning targets for what all students are expected to achieve.)

The first of the two newly proposed standards, "Thinking Sustainably," requires students to learn to make decisions that reflect an understanding of ecosystems and the relationships of systems (ecological, economic, political, social) within them and demonstrate an awareness that their personal and collective actions affect the sustainability of these interrelated systems. The second draft standard, "Understanding Place," requires students to demonstrate an understanding of their local environment (e.g., ecosystems, flora, fauna) and community heritage (e.g., agriculture, forestry, history, industry, traditions), how community heritage shapes their lives, and the ways in which community heritage and local environment influence one another.

Although these draft standards were written from input of dozens of public forums, they still need to go through further public hearings and then final acceptance by the Board of Education before they can be incorporated into the Vermont Framework of Standards and Learning Opportunities. If progress continues on schedule by the fall of 1999 these standards will have passed all the hurdles and be adopted into the Framework. Spending time teaching young Vermonters comprehensively about Vermont's natural resources will equip them with the skills to benefit from the environment in a manner that will help to protect it for future generations.



**Vermont Agency of Natural Resources  
Department of Environmental Conservation  
Water Quality Division  
Lakes and Ponds Section  
103 S. Main Street, 10 North  
Waterbury, VT 05671-0408**

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