Out of the Blue

A Newsletter of the Water Quality Division

Winter 2003 No. 24

Vermont Agency of Natural Resources
Department of Environmental Conservation

Bacteria Monitoring: What Is It?

We would like to thank the Calais Conservation Commission for their interest and persistence in this type of monitoring. This article was written largely because of their questions and concerns.

Bacteria monitoring involves measuring the amount of a certain bacteria to use as an indicator of waters contaminated with dangerous pathogens. The primary bacteria measured in most freshwater bacteria monitoring is *Escherichia coli*. While some strains of *E. coli* can make humans ill, not all strains of *E. coli* bacteria are pathogenic (disease causing). When *E. coli* is found in waters, its presence is not the problem of concern itself, but is used rather as an indicator of fecal contamination.

Since *E. coli* is a constituent found in the intestines of humans and other warm-blooded animals, when found in water, it means that somehow fecal material has made its way into the water. Fecally contaminated water may contain live viruses, bacteria, protozoans, or worms that are pathogenic to humans and can make them ill. While fecal contaminated water may have pathogens present, most of these pathogens cannot survive outside the intestinal environment for long periods of time, and therefore are not necessarily a serious human health threat. On the other hand, if *E. coli* is found, indicating fecal contamination, live viruses or pathogens may be present in the fecal material and it is safest to assume they are now in the water.

See page 6, "Bacteria"

The Stories Ice Fishermen Tell… About Algae!

"It could have been a murder," but as it turned out, it was just a red algae bloom. Ice fishermen often observe blooms of algae growing densely under the ice as they drill through to fish. Algae blooms occur under lake ice for the same reasons they occur in open lake waters during spring or summer. There are four factors responsible for algae blooms.

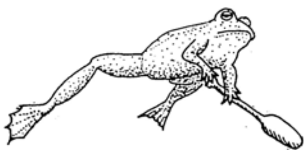
In all waters, salt or fresh, algae blooms are controlled by light, temperature, nutrient availability, and the presence of algal-eating predators. The interplay of these factors control algal cycles and blooms, including blooms ice fishermen observe during the winter.

Typically, algae cycles follow seasonal changes and conditions. During spring, when daylight increases and lake waters are cool and well mixed, algal blooms occur often, especially in nutrient enriched lakes. In well mixed waters nutrients are evenly distributed throughout the water column,

See page 5, "Algae"

In This Issue…

"Out of the Blue" Available on the Web



Check out the latest and future newsletter issues on the Water Quality Division Web Page at

www.vtwaterquality.org

OUT OF THE BLUE

is produced semi-annually by the Lakes and Ponds Section. Our purpose is to share information on lake, river, and wetland environments, water quality and state activities through articles on aquatic 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.vtwaterquality.org

NEWSLETTER STAFF
Amy Picotte, Editor
Ann Bove
Susan Warren

CONTRIBUTORS
Amy Picotte
Kellie Merrell
Margie Torizzo
Michael Hauser
Neil Kamman
Susan Warren

Missisquoi Bay Makes Waves

In northern Lake Champlain in the Missisquoi Bay area there has been an on-going dispute about how to replace the causeway which Route 74 uses to cross Lake Champlain, connecting Swanton and Alburg. Throughout the process to build a new bridge for Route 74, there have been many citizens, including the Missisquoi Bay Lay Monitors of 16 years, Barbara and Bill Duval, who have advocated for the project to include the removal of the old causeway. The local citizens believe that the stone causeway acts like a dam and impedes the natural flow and flushing of the bay, trapping all pollutants, primarily washed in from the Missisquoi River, from leaving the bay. In contrast, the Agency of Natural Resources has advised the Agency of Transportation that removing the rocky causeway will not significantly change the excessive nutrient levels in Missisquoi Bay.

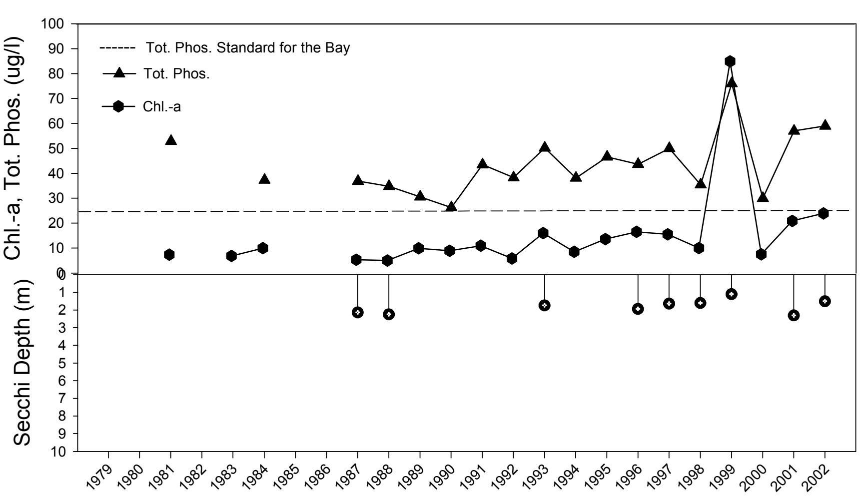
Beyond what the citizens would like or how the Agency of Natural Resources interprets the situation, there is a third party that has the most influence of all. The eastern spiny softshell turtle, an endangered species, has made the rocky causeway its largest of four overwintering sites in Lake Champlain. For various possible reasons, the population of these turtles has been declining. During winter hibernation, a turtle's metabolism and mobility slow dramatically, making it vulnerable to any disturbance.

Restrictions within the Agency of Transportation's Threatened and Endangered Species permit issued in January 2002 by the Vermont Department of Fish and Wildlife allow only limited causeway removal. The residents are upset over this decision and are asking for complete causeway removal.

There is no question that water quality problems in Missisquoi Bay are serious. The graph below shows the long term Lay Monitoring

Missisquoi Bay Lay Monitoring Data

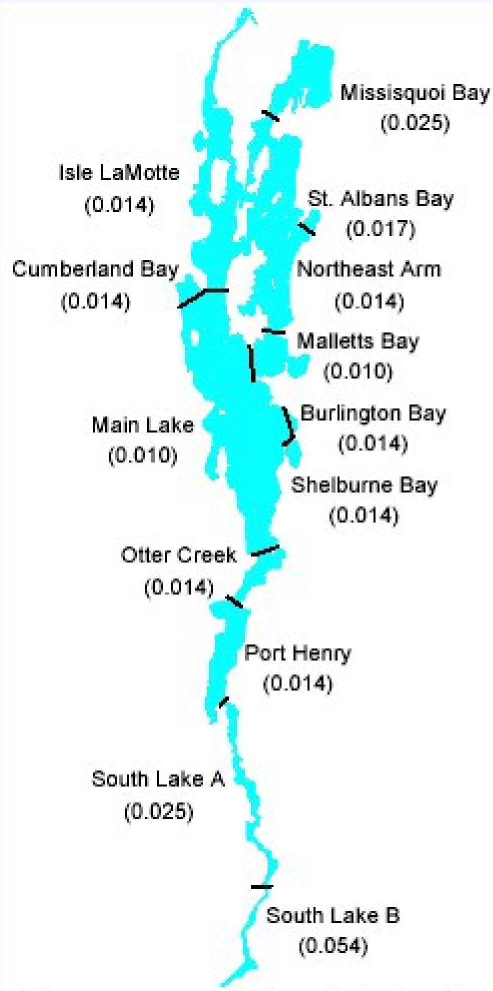
Annual Means from 1979 -2002 for Total Phosphorus, Chlorophyll-a, and Secchi Water Clarity Readings



data for the Bay. There is a slight, but noticeable increase in the chlorophyll-a (the green plant pigment used to measure the amount of algae in the water) and total phosphorus concentrations. (Phosphorus is a naturally-occurring nutrient, but causes unpleasant changes to water conditions when in excessive amounts.) Currently, the long-term average of total phosphorus in the Bay is 0.034 mg/l (milligrams per liter) which is higher than the phosphorus standard of 0.025 mg/l established for the Bay (see figure of Lake Champlain). Numerical values for total phosphorus were determined for the 12 segments of Lake Champlain by matching same day Lay Monitoring water quality data with public perceptions of "acceptable" water conditions. These numerical standards were signed into agreement by New York, Vermont, and Quebec in 1993. So, would removing the causeway actually improve the water conditions and help the Bay achieve its phosphorus standard?

Two hydrological studies, one by the Agency of Natural Resources' Water Quality Division and the other by an outside scientific consulting firm offered predications about what would happen to water quality if the causeway were removed; both concluded that significant improvements were unlikely. Apparently, the causeway acts more like a log, partially fallen in a river, than it does a dam. Instead of blocking water, it channels the same volume of water to a narrower, deeper area. This channeling affect may be precisely what makes the causeway so attractive to a hibernating turtle. The channel creates an area of deep, well oxygenated, moving water critical during the winter.

If the causeway were removed, the water flowing from Missisquoi Bay to the adjacent Inland Sea would flow over a wider area, but the same volume would pass through. Changes in sedimentation patterns might occur in the immediate area of the causeway, but significant changes in the Bay itself are unlikely. The Water Quality Division's study points out that any water quality improvements that did occur in the Bay would only lead to a corresponding degradation of water quality in the Northeast Arm of the lake. Though water quality is indeed a problem in the Bay, causeway removal is unlikely to be an effective solution.



Phosphorus concentration criteria (mg/l) in Vermont Water Quality Standards for Lake Champlain segments.

To understand Missisquoi Bay's water quality problems, one must also understand the hydrologic forces that influence it. The Bay is a shallow body of water (14 feet at its deepest) covering over 30 square miles, but with its only outlet in its southwestern corner. Every acre receives water and associated background levels of nutrient pollution from 40 acres of land (for comparison, the ratio is 1:19 for Lake Champlain as a whole and the highest ratio for the Great Lakes is 1:3 for Lake Erie). These factors make the Bay a naturally eutrophic system (nutrient enriched).

So What Can Be Done For the Bay?

In addition to the physical constraints of the Bay, vast quantities of nutrients, particularly phosphorus, enter the Bay each year because of land-use practices in the surrounding basin. Each

See page 4, "Missisquoi Bay"

(continued from page 3) **—Missisquoi Bay—**

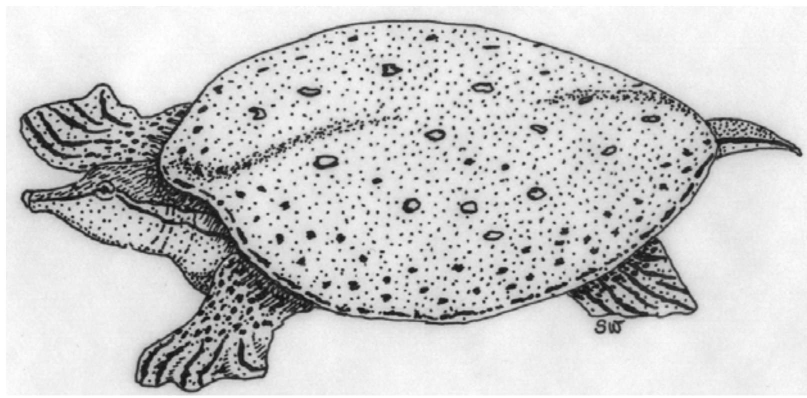
year, about 150 metric tons of phosphorus enters through the Rock, Pike, and Missisquoi Rivers. Approximately 70% of the total phosphorus load comes from agricultural sources that account for only 26% of the land area. A higher density of animals on farms in the Missisquoi Basin compared to other parts of the Lake Champlain Basin leads to the disproportionate loading from agricultural sources. An additional 15% comes from developed land, a percentage that has risen in recent years. Unlike the physical constraints of the Bay itself, there is something that can be done to manage the nutrient loading, or runoff from the land and tributaries.

For water quality to improve, the gap between actual phosphorus loads and numerical, target loads must close. The Water Quality Division has determined that, for the water conditions in the Bay to meet standards, no more than 92.7 metric tons can enter it yearly, nearly a 40% reduction from the current loads. Farms can reduce their phosphorus loads by leaving buffer strips between fields and water, fencing animals out of waterways, balancing the amount of phosphorus that comes into the farm with what is needed, or implementing other best management practices. Of course implementing any new management strategy requires money and many farms are already operating on the edge. Vermont and the federal government offer cost share programs to help farmers utilize best management practices, but resources are often limited.

In addition to obvious sources of nutrients like cows, unstable streambanks account for a large proportion of the non-point phosphorus loads. Most phosphorus is bound in the upper soil. When this soil moves into the water through overland erosion or eroding streambanks (often caused by the loss of vegetation), the phosphorus comes with it. Erosion can be amplified by upstream construction projects, movement of cows into and out of streams, and large storm events like the 1997 floods in the Missisquoi Bay watershed.

Identifying and reducing phosphorus inputs from unstable streambanks is a challenging problem. One must identify the unstable banks, determine why they are unstable, and implement a strategy to stabilize them. None of these steps are intuitively obvious. The tool of choice for beginning to answer these questions is a geomorphic assessment of the watershed. A geomorphic assessment results in identification and prioritization of river restoration and protection projects.

(continued on bottom of next page)



spiny softshell turtle

The Lake Champlain Committee has recently received a grant from the Lake Champlain Basin Program to undertake a geomorphic assessment of the Tyler Branch, one of the principal sub-watersheds of the Missisquoi River. The work will be done in conjunction with the Missisquoi River Basin Association (MRBA), the Northwest Regional Planning Commission, and the Vermont Agency of Natural Resources. The MRBA, the partners most familiar with the Missisquoi River watershed, selected the Tyler Branch as a pilot project because the watershed size is manageable as a first project (65 square miles out of the 1,200 square miles of the entire Missisquoi River watershed) and the assessment can contribute to future efforts to develop a watershed plan for the River. Also, the MRBA has recently received several requests for streambank stabilization assistance along the Tyler Branch.

(continued from page 1)

Algae

and during spring time the number of algal predators (microscopic animals called zooplankton) are low, making conditions good for algae growth.

As summer progresses and the sunlight increases, the availability of nutrients decreases because of the effects of temperature and lake stratification. A lake will become layered, or stratified, into two or three temperature zones that do not mix with each other. The warmest layer is on the top, near the surface, and the coldest layer is at the bottom. Often the top layer will be nutrient poor (earlier algae already have used up the nutrients in the season) but sunlight rich. The lower water layers will be nutrient rich but sunlight deprived, making it difficult for algae to grow anywhere. Additionally, zooplankton communities have grown up, exploiting the algal populations and depressing standing algal stocks to a mid-summer minimum. Therefore, algae blooms would be typically less noticeable mid-summer than in spring. However, in some Vermont lakes, large summer algae blooms do occur when weather events mix nutrient rich waters back above into the top layers, allowing algae to take advantage of these conditions and bloom anew.

As fall progresses, with lower temperature and increased winds, lakes will "turn-over," mixing up all the layers of the lake and releasing the nutrients stored in the deep waters back through the entire column. Algae take advantage of this mixing, and in turn, so do zooplankton, until the sun angle is sufficiently low such that algal growth is limited to the uppermost waters of the lake, and zooplankton stocks decline to their winter minima.

Winter presents a special situation. Lake surfaces are frozen and often covered with snow. Temperatures are cold, waters are well mixed, and nutrients are well distributed throughout the water column. Zooplankton numbers are also quite low. Thus, on bright days and when snow cover is limited, the small amount of light penetrating into the water can provide sufficient solar energy to fuel an algal bloom. These blooms only occur at depths very near to the undersurface of the ice, where the algae can take advantage of the available light. Certain algae, such as the cyanobacteria *Oscillatoria* spp., have the ability to move up and down in the water column, stopping at the water depth where light and nutrient levels are maximized. The red cyanobacteria *O. rubescens* is one such species. In Vermont, it is not uncommon to observe this red algae under winter ice. Its bloody appearance oozing from an ice fishing hole can provide ice fishermen with some great, gory, algae stories!

(continued from previous page)

Missisquoi Bay

There are no magic bullets for improving water quality in Missisquoi Bay. A geomorphic assessment is only one step in a long process. Unlike causeway removal, it is a step that targets the pollution entering the Bay rather than trying to shift pollution from one portion of the Lake to another, and threatening an imperiled species in the process. Managing pollutant loading offers the only hope for achieving lasting gains in water quality for the Bay.

This article was adapted and reprinted with permission from the Lake Champlain Committee's article by Mike Winslow "Mixing It Up in Missisquoi Bay." The Lake Champlain Committee (LCC) is a citizens' group dedicated solely to protecting the natural resources and beauty of Lake Champlain and its surrounding watershed in the states of New York and Vermont and the province of Quebec. Contact the LCC on the web at: **www.lakechamplaincommittee.org** or at: **106 Main St., Suite 200, Burlington, VT 05401**, Tel.# **802-658-1414**, or by email: **lcc@lakechamplaincommittee.org**

(Continued from page 1) —— Bacteria ——

How much *E. coli* is too much?

One of the things Vermonters love most is swimming in the great outdoors and enjoying the wide variety of wildlife in the state. Naturally, some of the fecal material of wildlife makes it into the surface waters. But this condition does not necessarily mean swimmers (by swallowing some water) will contract gastrointestinal illnesses. The more fecal contamination in a water body, the more likely that human viruses and pathogens are going to be present. So then, how is it known when the level of fecal contamination is high enough to increase the risk of human illness to an unacceptable level? One way would be to measure the amount of *E. coli* in swim waters and record the amount of people that become ill. The study would need to be repeated over and over again until there was a wide range of *E. coli* measurements. The illness rate could then be related to the amount of bacteria measured. The U.S. Environmental Protection Agency used findings from epidemiological studies like the above example to set bacteria standards. EPA decided that eight in 1,000 swimmers getting sick would be an acceptable level of risk, and set their most stringent single sample standard at 235 colony forming units (cfu) of *E. coli* to correspond to this illness rate. By the federal standard, as long as *E. coli* remains below this level, waters are considered safe to swim in.

Although the presence of *E. coli* is an indicator that there may be pathogens in the water that will make humans sick, it is not an actual measurement of those pathogens. This point is important to keep in mind when reviewing a standard like 235 cfu and thinking "hey why not make that standard zero?" Zero is used for drinking water standards, but unless people want to exterminate all wildlife and chlorinate the waterbodies, then people need to and can coexist in a healthy manner with some level of fecal contamination in the surface waters. People tend to think that all bacteria are bad, but it is important to remember that bacteria are a vital component of the aquatic and terrestrial food webs.

Does Vermont have an *E. coli* standard?

In 1986, EPA published the Ambient Water Quality Criteria for Bacteria. Since then, states have been encouraged to adopt these standards or ones more stringent. In 2002, EPA issued updated guidance for implementing the 1986 standards. States can use the average (geometric mean) of all the samples collected in a 30-day period, a single sample maximum bacteria density value, or a combination of both to determine whether a water body has exceeded the criteria. EPA recommends that states set the freshwater criteria threshold at an illness rate of eight illnesses per 1000 swimmers (single sample = 235 cfu), although EPA even allows for a lesser standard for certain waterbodies, depending on their "uses."

Vermont has adopted a water quality standard for *E. coli* bacteria for Class B waters (waters suitable for bathing and recreation, irrigation and agricultural uses; good fish habitat; good aesthetic value; acceptable for public water supply with filtration and disinfection) not to exceed 77 organisms/100 milliliters of water. This is the most stringent standard in the nation and much more strict than any of the standards recommended by EPA. Using the findings from the epidemiological studies EPA set their criteria on, this standard level equates to an illness rate of four illnesses per 1000 swimmers, or half that of EPA's standard. Hence, Vermont's standard sets a more conservative level of risk.

Why *E. coli* as the indicator?

There are plenty of other indicators of fecal contamination, however, *E. coli* is relatively easy to measure and the analysis is inexpensive. The drawback to *E. coli* is that, while it is faster than some other indicator processing procedures, the result is not instantaneous. Currently, there is no instantaneous test to measure for fecal contamination and measuring *E. coli* is the best option. Unfortunately, it takes a couple of days to get the results of a water test since the sample needs to be cultured and incubated for 24 hours. By the time the results are in, the swimmers that were present when the sample was taken are long gone. There is no sampling that can be done to protect swimmers just before they swim. When bacteria results are ready from the lab, if the *E. coli* level is higher than 77cfu (235cfu, EPA standard), more than four in 1,000 (or eight in

1,000, EPA standard) of the swimmers exposed might get sick. In Vermont, beach closings occur two to three days after the actual excessive bacteria count, and do not re-open until a second sampling test shows no violations of the bacteria standard persists. Although there is nothing that can be done to avoid this delayed response, how and when beaches are closed shows the shortcomings of bacteria monitoring.

Artwork by Mary Azarian, used with permission

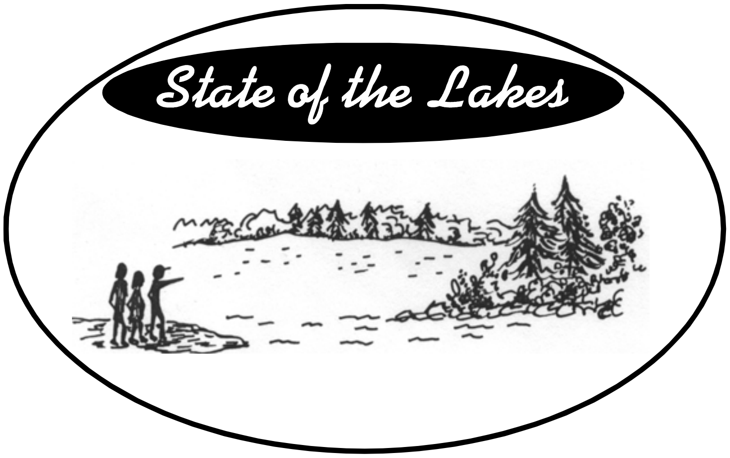
E. coli concentrations vary over short distances and times. Depending on where the samples are taken at the beach, there will be very different *E. coli* readings. In a recent Massachusetts beach study, sampling at ankle depth consistently gave higher readings than samples at waist level, which gave higher readings than sampling at chest level. The same study found that sampling in the morning gives higher readings than sampling at high noon, because *E. coli* is degraded by sunlight. This finding does not mean that the pathogen levels necessarily are degraded by sunlight. Also, according to this study, there was more variation in the level of bacteria measured away from shore than there was along the shore, and that levels were higher when the wind was blowing onto the swim beach instead of in the opposite direction. The nature of *E. coli* in the environment along with sampling methods makes the results of bacteria monitoring difficult to interpret and to determine if the beach is safe for swimming.

To Monitor or Not?

There are two major reasons to implement a bacteria monitoring program. The first and most popular reason is to try and protect swimmers at a local beach from exposure to waterborne pathogens that will make them sick. Secondly, bacteria monitoring is done to identify and therefore be able to clean up a pollution source somewhere in the watershed. These two purposes are related and it may be that one, both, or neither gets used. Depending on the reason, the design and scope of the monitoring program will be different.

Bacteria monitoring is limited and not necessarily an absolute test to indicate whether or not swimmers are going to get sick from exposure to the water, or whether fecal pollution is entering the lake. However, when done properly and its limitations understood, it can be an effective and valuable tool. Based on the reasons above and the specific question asked about bacteria in the water, one of three very different monitoring approaches can be used: 1) Bacteria monitoring can be used as a routine monitoring tool that may pick up an episodic increase in bacteria levels, which would not protect swimmers already exposed, but could be used to prevent further exposure. 2) Bacteria monitoring can be used to determine rainfall thresholds. So, in the future depending only on a certain level of rainfall, a swim area could be closed to prevent exposure to the resultant elevated levels of *E. coli* from the runoff. 3) Bacteria monitoring can be used to hone in on the pollution sources in the watershed, so that efforts could be made to reduce the fecal contamination.

To learn more about how and why to design a bacteria monitoring program, please look for the forthcoming Bacteria Monitoring Guidance Document at the Water Quality Division's web site. www.vtwaterquality.org



Vermont Federation of Lakes and Ponds

The Federation held its first annual meeting as a state-wide association in July 2002. (Previously, there had been both a Northern Vermont and a Southern Vermont federation.) The meeting featured speakers on the new bill increasing the boat registration fee (to provide more grant funds to municipalities for aquatic nuisance control projects), the state's basin planning process, the new sewage disposal law (see article on next page), loon monitoring and conservation, as well as the popular lake reports. The Federation has 37 member associations, and is growing. The Federation board met in early September for the purpose of strategic planning. Goals for this year include developing a website, continuing to publish a newsletter, visiting with lake associations at their annual meetings, and keeping abreast of current legislative activities. In addition, the federation has begun planning a seminar on Eurasian watermilfoil for June of 2003. Watch for further announcements on this seminar.

Watershed and Lake Associations Listing

The Water Quality Division has recently updated the publicly available listing, "Watershed and Lake Associations of Vermont." While lake association names are included, lake association contact people are listed only with permission. This listing is now posted on the web at: www.vtwaterquality.org/lakes.htm. Lake association contacts often change annually, and letting the Lakes and Ponds Section know this information is appreciated.

Nonpoint Source Pollution Control Grants

The Water Quality Division is pleased to announce an opportunity for watershed groups to apply for federal Clean Water Act Section 319 funding to assist in the management and control of non-point sources of water pollution. Project proposals are due to the Water Quality Division on or before Friday, February 21, 2003.

Susan Warren from the Division's Lakes and Ponds Section would be glad to assist any lake association in discussing potential projects and developing a proposal. Susan is also available during the spring, summer, or fall to conduct a field survey to look at existing conditions both in and around a lake and to help develop project ideas to address any discovered problems. Generally, Section 319 funding is available annually. Therefore, planning during the summertime for a project to be implemented the following year would work well with this grant program.

Additional details regarding these grants, eligible activities, and the process for submitting applications can be found in the Request For Proposals and the recommended work plan format, which is available from the Water Quality Division at 802-241-3770 or by visiting the web at: www.vtwaterquality.org/grants.htm.

Water Sample Analysis Grants

The Water Quality Division is pleased to announce the availability of a new grant program offered jointly by the Division and the LaRosa Analytical Laboratory. Beginning with the 2003 field season, the Division and LaRosa Laboratory are making available to volunteer watershed and lake associations, and other groups, grants of laboratory analytical services (actual funds will not be provided) for the 2003 field season. These grants are intended to support monitoring and assessment projects for waters of joint interest to the applicants and to the Water Quality Division.

Grants are to be awarded on a competitive basis, and proposals are being accepted until March 14th of 2003, for analyses to be performed beginning June 1, 2003. The complete Grant Opportunity Description is available on the web at: www.vtwaterquality.org/grants.htm. If possible, please refer to the material posted on the website prior to contacting the Division.

New Sewage Disposal and Groundwater Law

A new law changes the way on-site sewage disposal will be managed in Vermont. The July 2002 Sewage Disposal and Groundwater Law will have significant and far-reaching implications to land use in Vermont. Several features of this law are highlighted below, with emphasis on those that would affect existing and new lakeshore development.

Before this new law took effect, unless a town had its own sewage disposal ordinance, a septic system could be installed on a parcel of land 10 acres or greater in size, right along the lakeshore or stream bank, without any review of its adequacy for either design or siting. The new law requires that all new septic systems, and most renovated ones, on property lots of any size undergo state review. In addition, for the first time several new innovative disposal technologies will be allowed that could make septic systems possible on difficult sites.

Several Key Features of the Sewage Disposal and Groundwater Law

- As of July 2002 this law closed the "10-acre loophole" for new subdivisions, and by 2007 for existing lots. In other words, new lots over 10 acres, which were previously exempt from state standards, now will be required to support a septic system that meets state standards. Septic systems installed on existing lots between November 1, 2002 and July 1, 2007 must be in compliance with the technical standards, but a state permit is not required. The system engineer or site technician must provide written statements that the water and wastewater systems comply with the rules and file them with the Agency of Natural Resources (ANR) and in the town records.
- Development in towns without municipal sewage disposal regulations (a significant number in Vermont) will be reviewed by the state regional engineer, unless a town chooses to take delegation of the state sewage program. Several options for overseeing this new state law are open to towns that currently have a municipal sewage ordinance.
- Owners of existing septic systems, such as for a camp on a lakeshore, will not be allowed to work on the septic system after July 1, 2007 without a state permit. If a conventional system cannot be sited, an alternative system might be needed, or possibly the wastewater would need to be pumped uphill to a more suitable disposal site. Work conducted on existing septic systems between 2002 and 2007 must have septic systems that comply with the new state rules and an engineer or site technician must provide written statements to the ANR and to the town.
- The new sewage disposal rules allow some alternative designs that may be able to help retrofit a poor system on a bad site. For instance, new leachfield technology can take up less room, be installed on a steep slope, or be installed with a reduced separation from the groundwater level. Any lakeshore camp's septic system located closer than 50 feet from the shoreline could possibly be improved with some of the alternatives now allowed.
- Holding tanks will be permitted only as a last resort for existing, failed systems, since more in-ground design options will be available. As in the past, the ANR will work with the landowner to see that the "best fix" is installed on a site; rarely would a property be shut down altogether.
- The ANR will not conduct widespread inspections of lakeshore septic systems. If a system is not failing, and the size or use of the camp stays the same, then it is unlikely that the camp would come under the jurisdiction of the new rules. However, camp owners are encouraged to take advantage of the alternative systems now allowed and fix or upgrade camp septic systems that are functioning poorly.
- After July 1, 2007, all seasonal dwellings converted to year round use will need a state permit requiring full compliance with the new septic rules. Conversion prior to this date requires compliance with the new septic standards and a verification letter from a site technician or engineer, but not an actual permit.

Many existing lakeshore septic systems eventually will need upgrades. The new Sewage Disposal and Groundwater Law provides guidance and minimal technical standards to follow. Over time, lakes

See page 10, "Septic Systems"

Stormwater Stirrings

Stormwater runoff is precipitation that does not infiltrate into the soil. Stormwater runoff is increased by impervious surfaces such as paved and unpaved roads, parking areas, roofs, driveways, and walkways. Stormwater runoff can adversely affect both water quality and water quantity. The increase in runoff can cause local flooding, stream bank erosion, and loss of infiltration to groundwater as well as pick up pollutants such as sediment, oil, fertilizer, and waste and deliver them to the nearest river, lake, or other surface water.

Stormwater runoff has been identified as a major threat to the health of Vermont's rivers and lakes. In May of 2000, the Vermont state legislature ruled that the management of stormwater runoff would be necessary through a new enhanced stormwater management program. The Stormwater Management Program (SMP) focuses on providing regulatory oversight and technical guidance so that stormwater discharges are managed in a way that is consistent with the Federal Clean Water Act and the Vermont Water Quality Standards. Specifically, the SMP has updated stormwater management procedures, has implemented the issuance of general permits, and has developed Watershed Improvement Permits.

Stormwater runoff often occurs because development has decreased the available permeable ground for water to infiltrate. Those individuals or groups responsible for the developed lands are subject to stormwater regulations. Under the SMP, stormwater discharges currently are regulated through both state-issued stormwater permits for stormwater discharges from developed areas exceeding 2 acres of impervious surface (1 acre if discharging to a smaller stream), as well as federally-mandated stormwater permits for specified sectors of industrial activity and for construction activities that disturb more than 5 acres of soil (1 acre after March 2003). Watershed Improvement Permits are being developed for waters principally impaired by stormwater runoff. Nine of the 20 streams in Vermont that are impaired primarily due to stormwater runoff are in Chittenden County. Watershed Improvement Permits are intended to reduce the overall load of pollutants from existing and new discharges in order to restore impaired waters and achieve compliance with water quality standards.

To learn more about the SMP and related stormwater permits, visit the Water Quality Division's web site at www.vtwaterquality.org and view under "stormwater."

(continued from page 9)

Septic Systems

will benefit from fewer old and inadequate systems along their shores. Ultimately the new law will help keep Vermont lakes clean and healthy for generations to come.

For further information, call the nearest ANR District office at the numbers listed on the right.

Permit Specialists or the Regional Engineers:

Barre: 476-0190
Essex: 879-5656
Rutland: 786-5900
St. Johnsbury: 751-0130
Springfield: 885-8855

Aquatic Nuisance Species

HIGHLIGHTS

- **Water Chestnut.** Management of the Lake Champlain water chestnut population continued in 2002. Further progress was made in reducing the population in the Benson Landing area through mechanical harvesting while only handpulling was required of lake populations to the north. No new populations of water chestnut were discovered in Vermont in 2002.

- **Eurasian Watermilfoil.** Eurasian watermilfoil was discovered in several new waterbodies in Vermont in 2002, bringing the total to 57 Vermont lakes and ponds where the invasive plant has been found. A moderate population was discovered in Lake Elmore and a light population was discovered in Deweys Mill Pond, a small, artificial waterbody in Hartford. Also, a moderate population of Eurasian watermilfoil was found in the West River close to its confluence with the Connecticut River in Brattleboro.

- **Hydrilla in Maine.** A well established population of hydrilla (*Hydrilla verticillata*) has been confirmed in Pickeral Pond, a 46 acre pond in Limerick, Maine in the southwestern corner of the state. This is the first sighting of hydrilla in Maine and follows recent discoveries of the highly invasive plant in Connecticut and Massachusetts. The VTDEC is developing a new hydrilla watch card in coordination with the Northeast ANS Panel for distribution throughout northeastern U.S. To date, hydrilla has not been found in Vermont waters.

Hydrilla stems can grow up to 30 feet long
drawing from the Center for Aquatic and Invasive Plants U. of Florida, IFAS

- **New Water Quality Division ANS Staff Member.** The Lakes and Ponds Section warmly welcomes Susan Jary, who joins the Section from the Florida Dept. of Environmental Protection's Bureau of Petroleum Storage Systems. Susan will coordinate the Aquatic Nuisance Control Permit Program.

- **New Lake Champlain Basin ANS Coordinator.** Lisa Windhausen has been hired by the Lake Champlain Basin Program to serve as the Lake Champlain Basin ANS Coordinator. Lisa will coordinate implementation of the Lake Champlain Basin ANS Management Plan. The position is supported by funds awarded by the U.S. Fish & Wildlife Service for implementation of the Plan.

- **New State ANS Funds.** The 2002 Vermont Legislature approved new surcharges on motorboat registrations to benefit the state aquatic nuisance control grant program. The surcharges are expected to increase the annual state funds available for aquatic nuisance control grants from approximately $175,000 to more than $300,000.

- **ANS Watchers Needed Statewide.** Early detection of new ANS infestations is essential for effective management. The Water Quality Division can provide training materials and technical assistance to lake groups and other groups who would like to establish ANS watcher programs. For more information contact Michael Hauser, 802-241-3777, mikeh@dec.anr.state.vt.us

- **Aquatic Plant Management Society Meeting.** The 43rd annual meeting of the Aquatic Plant Management Society is to be held July 20-23, 2003 in Portland, Maine. For more information go to: www.apms.org/2003/2003.htm

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

Forwarding Service Requested

Printed on Recycled Paper

Save The Date

NALMS

2003 Annual Symposium of the North American Lake Management Society

- November 4th–8th, 2003
- Foxwoods Resort Casino, in Mashantucket, CT
- Details on NALMS' website at: http://www.nalms.org

Water Quality Education

HEALTHY WATER HEALTHY PEOPLE

The Vermont Project WET (Water Education for Teachers) program hosted the first in-state Healthy Water, Healthy People workshop Jan. 22, 2003 at the University of Vermont's Rubenstein Laboratory. John Etgen from the National Project WET staff flew from Bozeman, Montana to offer this special training. The workshop was designed to train educators in surface water quality monitoring, and included demonstrations of activities from the program's new *Educator's Guide* book and from the water quality monitoring book, the *Testing Kit Manual*.

The Hach Scientific Foundation and Project WET, drawing from more than fifty years of success in water quality test kit manufacturing and water education, partnered to create Healthy Water, Healthy People. This new program encourages deep investigation of water quality topics and issues through development of user-friendly materials that are appropriate for all levels of users - from beginner to advanced. For more information on Project WET and the Healthy Water, Healthy People program, please contact Amy Picotte at the Lakes and Ponds Section, 802-241-3789.