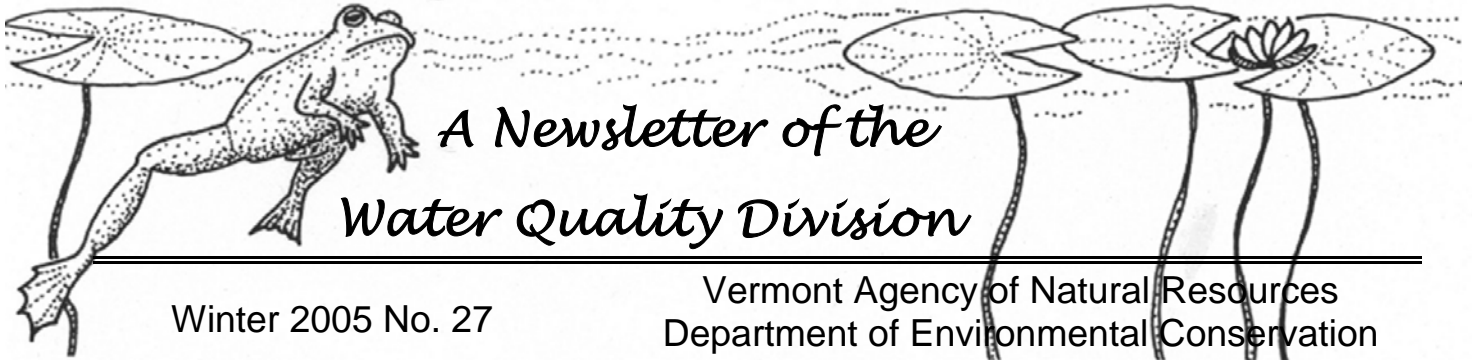


Out of the Blue



Winter 2005 No. 27

Vermont Agency of Natural Resources
Department of Environmental Conservation

Education Outreach: An Essential Tool for Water Quality Management

Current research is confirming the benefits of what the Vermont Water Quality Division has been practicing for years, incorporating education outreach as an essential tool for good water quality management.

Based on the fact that education outreach efforts can help protect surface waters by encouraging conservation by the public, recent studies have targeted which outreach efforts are the most effective. Last June a national symposium was held at the University of Wisconsin in Madison to help natural resources management and outreach professionals choose appropriate education techniques for their water resource programs. More than a dozen presentations focused on research of "Best Education Practices for Water Outreach Professionals." A "best practice" is defined as a program or a practice that has been clearly defined, refined through repeated delivery, and supported by a substantial body of research.

Examples of BEPs for water management programs discussed at the Madison symposium included holding shoreland revegetation workshops; promoting high quality volunteer monitoring; offering urban homeowner stormwater run off programs; and making available hands-on, experiential educational programs. In addition to offering the BEP examples mentioned above, the Vermont Water Quality Division also leads an aggressive outreach program for engineers and construction and site workers seeking permits for stormwater runoff. Workshops have been held throughout the state, including a November 2004

See page 2, "Education Outreach"

Fish Kills: Ugly, Alarming, But Mostly Natural

A "fish kill" is when large numbers of fish die from a specific cause in a short period of time. The majority of fish kills in Vermont are seasonal and are the result of natural causes, such as oxygen depletion; sudden or excessive temperature changes; lightening; bacterial, viral or fungal infections; spawning stress; and abnormal fish population structure. Seasonal, natural fish kills are referred to as winter, spring or summer fish kills. Although occurrences are documented annually, very few of the fish kills in Vermont are the result of human-caused pollution. Moreover, fish kills producing human health hazards are rare.

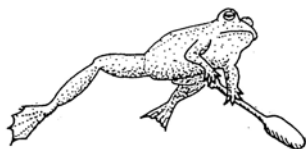
Winter Fish Kills: Winter kills occur during exceptionally long, cold winters when ice and snow continually cover lakes and ponds, preventing the waterbody from maintaining sufficient oxygen levels for the fish. In winter, the dissolved oxygen content of a lake largely depends on the amount of air that was mixed in during fall "overturn." It also depends on the rate of oxygen production by aquatic plants and the rate of oxygen consumption by living aquatic

In This Issue...

See page 4, "Fish Kills"

ANS Highlights	3
Lowe's Construction Project	5
State of the Lakes	6
Volunteer Monitoring and Analytical Results .	6
Purple Loosestrife	7
Vermont's Clean and Clear Action Plan	7

**“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
Ben Copans
Kim Greenwood
Michael Hauser
Neil Kamman
Padraic Monks
Tom Jones

The Vermont Agency of Natural Resources, Department of Environmental Conservation, is an equal opportunity agency and offers all persons the benefits of participating in each of its programs and competing in all areas of employment regardless of race, color, religion, sex, national origin, age, disability, or other nonmerit factors.

(continued from page 1) — **Education Outreach** —

conference on the latest erosion control methods and materials for site work and federal and state permitting requirements (see page 5 for more on stormwater permits).

In many of the Water Quality Division programs, education has moved to the forefront of water management strategies. Below is a sampling of the water education outreach efforts the Division offers and supports. For more information on these programs, contact Crystal French at the Division’s main number, 802-241-3777.

Education Outreach	Audience
Project WET: Water Education for Teachers	K-12, Hands on Education Curriculum
Healthy Water, Healthy People Program	Investigative Water Resource Activities for Students and Adults
Better Backroads Workshops	Towns, Road Commissioners, Lakes and Watershed Associations
Shoreland Revegetation Workshops	Lake and Watershed Associations and Landowners
Watershed Survey Workshops	Lake and Watershed Associations, Conservation Commissions and Town Residents
Vermont Lay Monitoring Program	Citizen Volunteer Lake Monitors
Aquatic Nuisance Species and Spread Prevention Trainings	Citizen Volunteer “Watchers”
Analytical Lab Services Partnership Program	Volunteer Monitoring Groups
Green Lawn Coalition	Burlington Community
Vermont Basin Planning	Whole Community Participation
Stormwater Runoff Workshops	Engineers, Site Managers and Construction Workers
River Geomorphic Presentations and Trainings	Lake and Watershed Communities and College Students
Wetlands Presentations	Real Estate Agents, Schools and Town Personnel
Out of the Blue Newsletter	The Public: Available Upon Request and on the Web

Aquatic Nuisance Species

HIGHLIGHTS

Water Chestnut. During the summer of 2004, VTDEC crews, contracted hand-pullers, Army Corps of Engineers interns, and volunteers from The Nature Conservancy and the Otter Creek Audubon Society pulled an estimated 152,000 pounds of water chestnut from more than 80 sites in and around Lake Champlain. Mechanical harvesting crews removed more than 2.5 million pounds of water chestnut from Lake Champlain and covered a mile more of the lake than in 2003. VTDEC crews and contracted hand-pullers pulled more than 29,000 rosettes in Brookside Pond on Route 22 in Orwell after a new infestation was discovered there.

Eurasian Watermilfoil. During the summer of 2004, Eurasian watermilfoil was found in Beaver Pond in Mendon. VTDEC initiated a hand-pulling effort in the pond and involved town officials in future management planning. To date, the invasive plant has been found in 59 lakes and 16 rivers in Vermont.

Zebra Mussels. Zebra mussel adults continue to be found in only Lake Champlain and Lake Bomoseen. Zebra mussel veligers (larvae) that likely came from Lake Bomoseen were found in a sample taken from the Castleton River in Fair Haven. Malletts Bay and the Inland Sea have smaller populations of zebra mussels than the south, central, and northwestern parts of Lake Champlain. A zebra mussel adult, estimated to be three years old, was found for the first time in Missisquoi Bay of Lake Champlain, approximately 2.5 miles north of the Route 78 causeway.

Purple Loosestrife Biological Control. In 2004, six school groups and individual volunteers helped to increase the number of beetles (*Galerucella* spp.) released by over 48% to 106,826 beetles. Beetles were released at 27 new sites covering 63 acres in nine towns across the state. Monitoring of past beetle release sites continued to show increased damage to purple loosestrife with over 52% of release sites showing significant damage (see page 7 for more information).

Grant-in-Aid. The 2004 Vermont Grant-in-Aid Program awarded 34 grants to municipalities working on ANS management, often in conjunction with lake associations. Seven of the awards are for projects to prevent the introduction of an ANS into uninfested waterbodies. Awarded funds total approximately \$489,000 and are supported by a portion of Vermont motorboat registration receipts and the U. S. Army Corps of Engineers, thanks to the efforts of Senator Leahy. To receive an application for 2005 funds (deadline is March 2, 2005), contact Vicky Barney at 802-241-3777.

New ANS Signs. The Vermont Legislature added a provision to the 2004 Capital Bill requiring new 24" x 24" ANS signs to be developed and placed at all Vermont Fish & Wildlife boat accesses on waterbodies infested with an aquatic nuisance species. The new signs will be posted in the 2005 summer.

Lake Seminar. The Federation of Vermont Lakes and Ponds held a Lake Seminar in June 2004 in Waterbury. More than 80 people representing 32 lakes and ponds attended the seminar, which focused on lake watershed protection and Eurasian watermilfoil.

Aquatic Plant Trade Industry. During 2004, the VTDEC increased efforts to educate licensed aquatic plant distributors throughout the state and on the world-wide web about invasive aquatic plants, especially those species that are currently illegal to sell and distribute in Vermont. All pet and aquarium shops in Vermont that sell live aquatic plants were visited by a VTDEC staff member and were provided with copies of a new information sheet. Information was also provided to more than 50 online plant retailers. For information, contact Ann Bove at 802-241-3782.



organisms. Once the ice forms in early winter, the ice cover seals the lake and prevents it from mixing with atmospheric oxygen. A dense ice layer covered by snow will also reduce the amount of sunlight reaching aquatic plants, which slows or halts photosynthesis and oxygen production. Consequently, the aquatic life is solely dependent on the amount of oxygen that was stored in the waterbody when it froze over.





Shallow and highly nutrient-enriched waterbodies have low oxygen-storage capacity and high rates of oxygen-consuming decomposition, making them good candidates for winter fish kills. Without a good midwinter thaw, oxygen supply in these waterbodies does not get recharged by photosynthesis and melt water, increasing the possibility of winter kill.

Spring Fish Kills: Many fish species reproduce in the spring and become highly susceptible to diseases during this stressful time. Outbreaks of disease that result in high mortality are associated with upsetting environmental changes (rapid temperature increases), high population densities, or shortages of food.

Typically, spring fish kills are evident by finding just one fish species that has died off in great numbers. For example, it is common to see rainbow smelt fish kills in Lake Champlain and in some inland lakes during the spring.

Summer Fish Kills: Similar to winter fish kills, during the summer, fish will die when the oxygen levels in waterbodies become too low. However, unlike winter conditions, oxygen depletion in the summer is caused by more complex situations, such as fish overstocking or excessive nutrients entering the lake from increased runoff. Excessive nutrients can trigger bursts of plant and algae growth that eventually lead to increased organic matter decomposition, a process that requires dissolved oxygen. Another condition leading to a summer fish kill is high water temperatures. Water can hold much less oxygen when its temperature is above 80°F. Relatively shallow, nutrient-rich lakes and ponds are most susceptible to summer fish kills. As with the winter kills, summer kills effect more than one species and age.

Although most fish kills are caused by natural causes, occasionally death is directly

Fish Species		Tolerance of Low Oxygen	related to pollution or improper use of herbicides or other chemicals. Vermont Fisheries Biologists investigate fish kills to determine the extent and cause of the kill. If the cause of the kill cannot be tied to natural causes, then a Vermont Environmental Enforcement Officer will conduct an investigation into the source of the fish kill. Fish kills should be reported to the Vermont Fish & Wildlife Dept. at 802-241-3700.
Trout	<i>rainbow trout</i>	Low	
Walleye Bass Bluegill		Intermediate	
Northern Pike Yellow Perch Pumpkinseed		Good	
Bullheads Some Minnows		High	

Lowé's Construction Project Floats Through "Stormy Waters"

In 2000 the Agency of Natural Resources issued a renewed State Stormwater Permit to "Lowé's Home Centers and the Hannaford Brothers Company" for a construction project, located along Route 7 in South Burlington. A renewed permit was required because the original permit, issued in 1995, was about to expire and the new proposed work would increase the amount of impervious surface. Stormwater runoff from impervious surfaces is known to degrade water quality and contribute to stream instability. The State Stormwater Permit is intended to minimize the impacts of stormwater runoff from impervious surfaces.



Shortly after the issuance of the State Stormwater Permit, the Conservation Law Foundation (CLF) appealed the permit on the grounds that the permit unlawfully authorized a new and measurable discharge of pollutants into a receiving water, Potash Brook, that did not meet Water Quality Standards. Potash Brook is listed as a stormwater impaired stream (i.e., a stream that does not meet minimum Vermont Water Quality Standards).

In reviewing the appeal, the Water Resources Board determined that because the project was improving the existing level of stormwater treatment there would be no increase in pollutant load over actual conditions. After the first of many delays with the Lowé's construction project, the Water Resources Board upheld the State Stormwater Permit, allowing for work to continue.

Lowé's construction work was halted again because of another appeal. This time CLF appealed the federally required (but state administered) Construction General Permit.

Under the federal Clean Water Act, all construction projects in the United States disturbing five or more acres at once or over time (as part of a "common plan of development") must have authorization to discharge stormwater runoff from the construction site. This authorization involves the development and implementation of an erosion

prevention and sediment control plan and other requirements. There are two options for obtaining this authorization:

1. Coverage under a Construction General Permit (CGP): everyone has the same permit conditions and uses the same permit; or
2. Authorization under a Construction Individual Permit: permit conditions are specific to that project.

The Construction General Permit states that if a project "will cause, or have reasonable potential to "cause or contribute to a violation of water quality standards," an Individual Permit is required instead. The

Agency of Natural Resources issued authorization for the construction of the Lowé's Home Center under a Construction General Permit believing that none of the reasons that would require an individual permit applied in this case.

On appeal of the permit, several questions were raised by the Conservation Law Foundation, including whether this project would cause or contribute to an impairment. After review, all expert witnesses for the Agency of Natural Resources, CLF, and Lowé's agreed that construction sites, even with the best erosion prevention and sediment measures possible, still have the potential to discharge sediment. Because the project has the potential to contribute to the existing impairment of Potash Brook, the Water Resources Board ruled that construction could not be authorized under the General Permit. Due to the Board's ruling construction projects discharging to stormwater-impaired waters are, for now, ineligible for coverage under the CGP and must instead obtain a Construction Individual Permit.

Today, the Lowé's project is fully stabilized and all construction is halted. Lowé's has applied to the Agency of Natural Resources for a Construction Individual Permit, which is currently under review. For more information, please contact Kim Greenwood at 241-3770.



Working on Watersheds

Many lake associations across Vermont are involved in projects to manage their watersheds and reduce phosphorus enrichment. Below is a sampling of projects and the grant sources that fund them.

Watershed Grants (Conservation License Plate):

Lake Rescue (Ludlow) – The association is conducting shoreline surveys and stream and sediment sampling to understand the sediment accumulation around the lake.

Franklin Watershed Committee (Lake Carmi, Franklin) – The committee is funding a nutrient

management program for watershed farmers, septic system assessment and pumpouts, and outreach.

Section 319 (Federal Nonpoint Source Funds):

Ticklenaked Pond Association (Ryegate) – A three year watershed project has focused on reducing sources of phosphorus to the lake, including road erosion, farm runoff, and beaver pond failures.

Caspian Lake and the Town of Greensboro – Shoreland vegetation management and landscaping is the emphasis of this project to encourage the continued use of vegetation to stabilize the shoreline and provide habitat and scenic benefits.

Better Backroads Grants:

Shadow Lake (Glover) and *Curtis Pond* (Calais) – In both cases, watershed surveys identified road erosion problems and the following year the associations assisted their towns in applying for a Backroads Grant to fix serious ditch erosion problems.

For more information on these projects or watershed funding sources, contact Susan Warren at the Lakes and Ponds Section.

Volunteer Monitoring and Analytical Results

The Volunteer Water Quality Monitoring - Analytical Services Partnership Program finished a second successful year, with some hardy volunteers collecting their final samples on a cold December 9, 2004. In 2003, the Water Quality Division started to provide analytical lab services through the state LaRosa Laboratory in Waterbury to volunteer water quality monitoring programs.

In 2004, citizen volunteers more than doubled their 2003 monitoring efforts, as nearly 4,500 samples were processed. This reflects the hard work of 12 individual watershed and lake organizations. Additionally, the LaRosa Laboratory staff worked diligently to make sure the volunteer groups received quality data that met the needs of their organizations.

The Water Quality Division offers analysis for volunteers' samples on a competitive basis. During 2004 these lab services supported several watershed-scale assessment programs. Waters monitored included the West, Williams, Saxtons, LaPlatte, Lewis, Little Otter, Lemon Fair, Otter, New Haven, Middlebury, Poultney, Mettawee, and Winooski Rivers, and associated tributaries. Sampling programs in the Hunting-

ton River watershed, the Bloody Brook in Norwich, Curtis Pond in Calais, and Lake Willoughby in Westmore were designed to attribute real or potential *E. coli* bacteria contamination in swimming waters to watershed sources. Lakes St. Catherine and Willoughby were sampled for traditional tests relating to eutrophication. The St. Albans Area Association initiated a novel partnership with the University of Vermont to identify the likely contributions of urban/suburban and agricultural sources of phosphorus to St. Albans Bay. Finally, credit is due to the Addison County River Watch Collaborative for successfully coordinating four separate sampling events of 62 sites per event, each sampling event falling within a four-hour time slot.

The Water Quality Division and the LaRosa Laboratory plan to support the Partnership Program for 2005, and proposals are being accepted until **February 11, 2005**. For more information about the lab services available, contact Neil Kamman at the Lakes and Ponds Section, or email, Neil.Kamman@anr.state.vt.us.

Purple Loosestrife: Biological Control Program

Everyone knows the famous line about “purple mountains majesty,” but what about “purple **wetlands** travesty?” In 1997, this danger faced the fields and wetlands of Charlotte, and many other areas of Vermont.

In Charlotte, the invasive purple loosestrife plant had taken over the wetland areas surrounding the intersection of Ferry Road and Route 7, choking out all native vegetation and wildlife habitat. The state-funded Purple Loosestrife Biological Control Program released a population of purple loosestrife-eating beetles into the 30-plus-acre wetland, and subdued the growth and spread of purple loosestrife, allowing the area to regain a natural balance.

Since 1996, the Purple Loosestrife Biological Control Program has released leaf-eating beetles throughout Vermont. Each season, between May and October, this program, working closely with public agencies, private landowners, garden centers and volunteers, rears and releases *Galerucella* spp. beetles, which are a natural predator of purple loosestrife.

Purple loosestrife is an invasive plant originally introduced from Europe and Asia in the early



1800s. Having no natural predators and many ecological advantages, it grows and spreads quickly, overtaking native plants. By choking out native plants, it reduces food and shelter for other species, such as waterfowl, muskrat and fish. It is not an agreeable food source for livestock, and diminishes the quality of pasture and hay crops when it invades wet meadows. By filling in open waterways and reducing the diversity of wetland wildlife, it reduces the quality of recreational activities such as boating, bird watching, and hunting. Currently, it has been sighted

and mapped on more than 1200 acres of land in 178 towns throughout Vermont.

To date, the Biological Control Program has released over 425,000 beetles in 67 towns across Vermont. Besides rearing beetles, the Program is continuing to see successful results of the biological control efforts. In 2004, more than 25 percent of purple loosestrife was defoliated on over 211 acres by the *Galerucella* spp. beetles, and flowering was significantly reduced. While there is still plenty of purple loosestrife to combat, for now it appears the Program is gaining an advantage. To volunteer with the Program, please contact the Wetlands Office at 802-241-3770.



In 2003, Governor Jim Douglas introduced one of the most significant water quality initiatives ever undertaken, the **Clean and Clear Water Action Plan**. The goals of this plan are to provide leadership, financial resources, and a sustained commitment to efforts designed to ensure that Vermont's waterways meet high water quality standards.

The Lake Champlain Basin, which encompasses nearly half of Vermont and includes Lake Champlain and its numerous tributaries, is one of the main targets of the Clean and Clear Action Plan. Actions identified in the plan will improve

water quality by reducing the amount of phosphorus entering the lake via

runoff from urban areas, eroding streambanks, construction sites and farms. Phosphorus is a major pollutant that promotes excessive growth of algae. In some areas massive floating mats close beaches, impact tourism, impede recreation, and release dangerous toxins. The plan is designed to achieve phosphorus water quality standards established previously for the lake using data from the Lay Monitoring Program.

Many of the actions of this plan reduce other pollutants in addition to phosphorus. The clean-up plan includes measures to protect Vermont's waters with streambank stabilization, implementation of erosion control measures at construction sites, maintenance of back roads, and better management of agricultural lands. For more information, visit the web: www.anr.state.vt.us/cleanandclear/



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

Happenings

2005 Analytical Lab Services Available for Volunteer Water Quality Monitoring Groups

To learn how these analytical services could help your volunteer monitoring program, please contact Neil Kamman at the Lakes and Ponds Section or visit the web at www.vtwaterquality.org

February 11, 2005 is the deadline for applying for these services.



pond fun during Vermont winter time

Annual Lake Seminar

When: June 24, 2005

What: The Federation of Vermont Lakes and Ponds invites you to their annual, one-day Lake Seminar, held in Waterbury, Vermont. For more information contact Jackie Sprague, President of the Federation, at Jackie@sprague.org or 802-482-2885, or Susan Warren in the Lakes and Ponds Section.



Volunteer Surface Water Monitoring Guide... in the Works!

This Guide will walk groups and organizations through the steps of designing an appropriate monitoring program for lakes, streams, rivers and wetlands. This Guide is also significant in that it celebrates and highlights past and ongoing efforts of volunteer monitors and their programs in Vermont. Contact Amy Picotte in the Lakes and Ponds Section for more information.