Out of the Blue

A Newsletter of the Water Quality Division

Summer 2007 No. 32

Vermont Agency of Natural Resources
Department of Environmental Conservation

Vermont Rivers Seek Floodplains For Happily Ever After

75% of Assessed Stream Miles in Vermont Eroding Due to Floodplain Loss

The Data Tell the Story

Studies of the physical properties of the rock, soil and water in and around a stream, called stream geomorphic assessments, are all telling the same story. Since European settlement, repeated watershed and stream channel modification, such as deforestation, ditching, dredging and armoring the stream banks, has led to channel down cutting and a widespread loss of floodplain function. Rivers, now confined to deeper, straighter channels, do not have access to historic floodplains and are in fact seeking to re-make them.

The increased power of larger floods, contained within the channel, has led to higher rates of bed and bank erosion. The average $18-20 million being spent annually in Vermont to keep rivers disconnected from their floodplains and static in the landscape, has become unsustainable. Erosion hazards and flood losses are increasing.

River management has become a futile cycle where flood recovery and structural constraints (channel straightening and berming and rip-rapping the stream banks) have led to human developments along rivers in areas where the rivers formerly meandered and flooded.

See page 3, "Floodplains"

2007July Storm Causes Major Flood Damage in Barre, Vermont

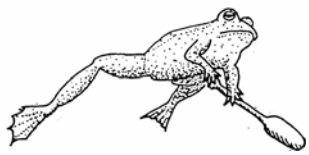
In This Issue

Essex Student Work Leads to Cleaner Surface Waters

For more than a decade, students in the Town of Essex schools have worked in partnership with the Vermont Department of Environmental Conservation's Water Quality Division on a variety of stormwater, river and stream improvement projects in their hometown and other towns across Chittenden County. Examples of student water quality improvement projects include:

See page 4, "Essex Student Work"

"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, please contact:

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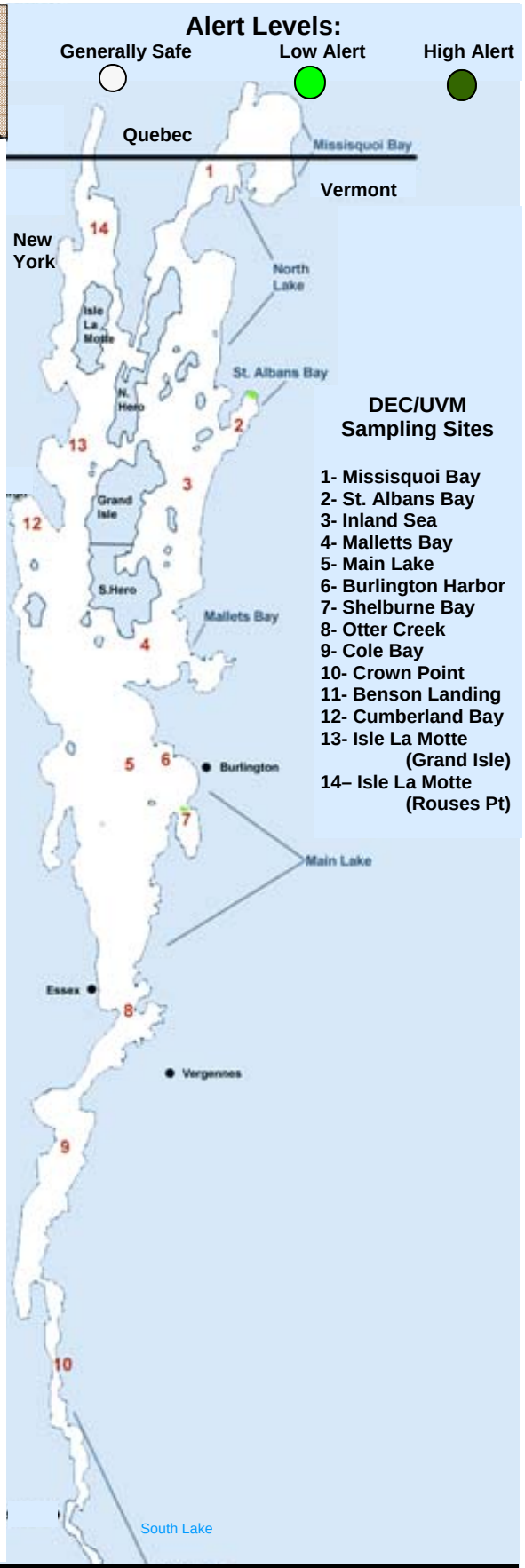
Blue-Green Algae Updates

Through a collaborative monitoring effort of volunteers, the Lake Champlain Committee, The University of Vermont, and the Department of Environmental Conservation, weekly blue-green algae updates are provided to the public and posted on the Department of Health's web page.

Some kinds of blue-green algae produce natural toxins or poisons. When these algae die and break down, toxins can be released into the water. If animals ingest the toxin, they can be quickly paralyzed and die.

Blue-green algae is made up of extremely small organisms that are hard to pick up and hold; it is not stringy. Their blooms may look like thick pea soup; green paint; or appear a bluish, brownish or reddish color. When a blue-green algae bloom washes up on shore, it can form a thick mat or a foam on the beach.

Not all blue-green algae produce toxins, however there is no way to tell just by looking at them. Avoid contact with water containing the thick algae and keep your pets away from the water.



http://healthvermont.gov/enviro/bg_algae/bgalgae.aspx
Call 1-800-439-8550 to Report a Blue-Green Algae Bloom

(continued from page 1) Floodplains

Inevitably, and often decades after these floodplains have been developed, a large flood occurs. The structures to control the river fail, causing major damage to people's homes, villages and livelihoods, which starts up flood recovery work. The economic, social, and environmental costs are increasing for these river and flood management processes.

If this cycle is not broken, land developments will suffer economically because, in addition to erosion hazards, channelization (controlling a river in a manner that separates it from its floodplain) leads to a loss of sediment storage and a net export of life-giving soil and nutrients from a watershed. In other words, the rivers carry away rich earth that would otherwise support a diversity of ecological and economical activities.

Floodplains Key to Lake Champlain Health

Without floodplains and meanders, lakes and reservoirs are the first quiet waters in which rivers deposit the eroded soil and nutrients. About half of Vermont flows to Lake Champlain, and with its major tributaries, disconnected from their floodplains, excessive amounts of phosphorus continue to enter the lake. Rivers without access to their floodplains helps explain the increasing enrichment and algae along the shores and bays of Lake Champlain.

The goal of achieving stream stability to benefit Lake Champlain as well as other Vermont lakes is being aggressively pursued through landowner and municipal incentives to protect and restore stream equilibrium. Floodplains are essential to stable streams and sustainable water quality management.

July 11, 2007 Storm Causes Severe Flood Damage along Route 302 in Barre, Vermont

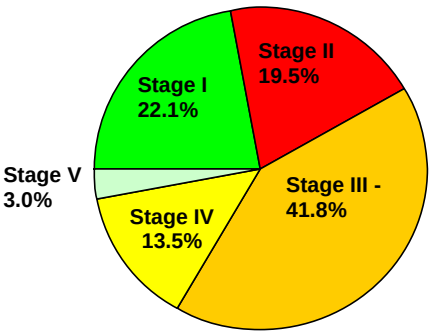
Natural Channel Evolution:

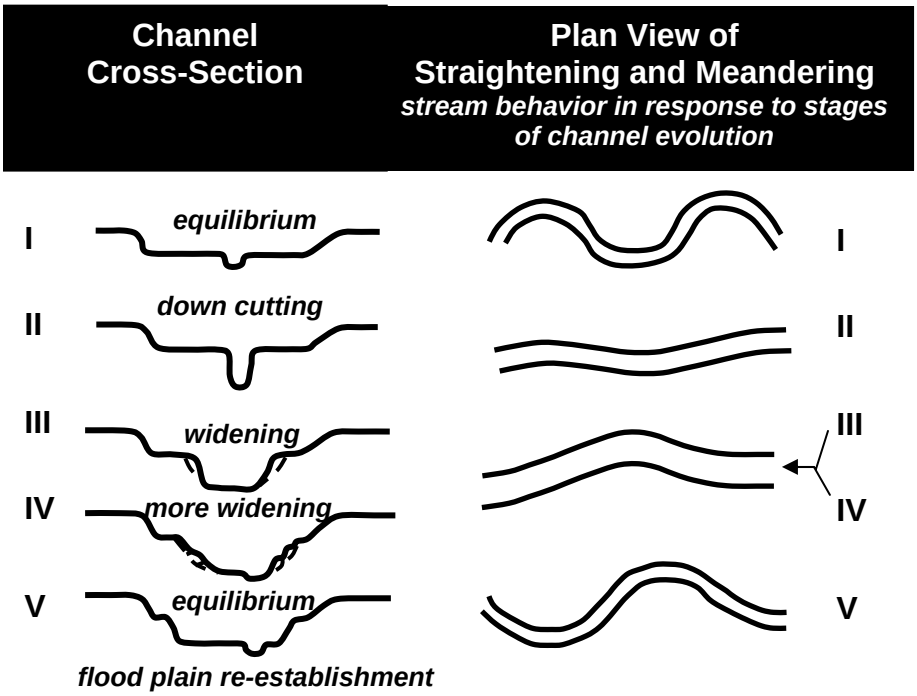
A Flood Driven Process Taking Place Over Decades

Rivers that have down cut and lost access to their floodplains will erode their banks until new floodplains are formed. During the early stages of channel evolution, floods remain within deepened channels, and powerfully erode and carry away anything that enters them.

Vermont Assessed Stream Miles in All Stages of Evolution

Streams in stage II and III do not have access to their flood plains. Note the majority of streams are in Stage III because of human changes in the watershed.





(continued from page 1) **Essex Student Work**

- The restoration of a damaged wetland in front of the Essex High School;
- Chemical and biological monitoring of Indian Brook in the Village;
- Stream side riparian buffer planting and educational outreach on Indian Brook and Allen Brook in Williston;
- Green-up Day clean-ups; and
- Gully erosion control on Alder Brook in Essex and Muddy Brook in Williston.

History of water quality educational work

In 1993 Tom Keck, from the Essex Center for Technology, engaged his students in monitoring and assessing the water quality of Malletts Bay in Lake Champlain. His students built a floating classroom from an old pontoon boat, funded by a Toyota Tapestry grant, which they named "SOS," Science Off Shore. In 1997 John Modalena, an Essex High School science teacher, was awarded a grant from the Toyota Corporation to educate and employ students in the field of natural resources. John's students elected to reconstruct a two and half acre wetland in front of their high school. And, during 1997-2001, Essex students from all town schools helped plant over 1000 trees on the Onion River Farm along Allen Brook just across the Winooski River in Williston. The project created a large riparian buffer on close to a mile of stream bank.

In 1998 Mark Paul, also an Essex High School science teacher, started stream monitoring and stream buffer education projects on Indian Brook with his classes. In the future this project may help the Village of Essex meet one of its federal stormwater permit requirements. Mark Paul was awarded a *Most Valuable Volunteer Award* by the Chittenden County Regional Stormwater Education Program for 2006. Perhaps his students' achievements throughout these projects, are best shown by their 2005 and 2007 Envirothon wins. The Envirothon is a statewide, high school level, natural resources challenge program, with State Champions continuing on to compete in the National Envirothon event, held in different locations throughout the country each year.

Recently Justin Sorenson, a natural resources and engineering teacher at the Essex Center for Technology, and his class constructed a dozen erosion control check dams on a tributary to Muddy Brook in Williston. The project was done in collaboration with John Jaeger of South Burlington Realty. The dams were constructed from cedar posts and brush and were built using a design developed by the Soil Conservation Service during the "dust bowl" of the 1930s. The students learned how to assemble the sediment trapping dams and completed the job in about a week. The dams will reduce erosion and sediment movement into Muddy Brook and the Winooski River and allow the stream banks time to stabilize with vegetation.

Essex students' assembled sediment trapping dam

Lastly, an ongoing field experience connects Essex Middle School students with their watershed as they annually monitor the water quality of the Browns River with their teachers, Laurie Wight and Lindsey Halman among others. Essex school teachers have done an outstanding job involving students in water quality issues, not only by helping with useful community projects, but also by preparing these students to solve future water quality issues. Water resources are increasingly becoming more important and essential for healthy communities in Vermont and throughout the world, and Essex students are well prepared to help manage these waters in the future.

Essex Technical Center's Floating Classroom*, Science Off Shore,* moored in Lake Champlain's Malletts Bay

"Model" Riparian Buffer Ordinance

The Vermont League of Cities and Towns has produced a model riparian buffer ordinance for towns interested in protecting water quality. It is designed to offer a straightforward framework that is simple to develop and administer.

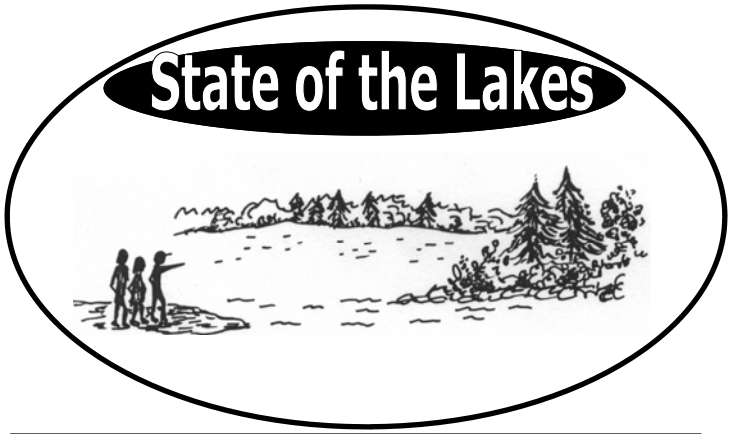
Local governments have clear legal authority under state statute (Chapter 117 of Title 24) to regulate riparian buffers. Poorly planned development along waterbodies can threaten water quality, aesthetics, wildlife habitat, municipal infrastructure and private property. In Vermont, the impacts of most small scale or incremental development must be addressed locally.

The model riparian buffer ordinance can easily be modified and incorporated into existing land use regulations. It can also dovetail with the objectives of the National Flood Insurance Program and fluvial erosion hazard mapping. For assistance, contact Milly Archer, Water Quality Coordinator at the VLCT Municipal Assistance Center, at 1-800-649-7915 or email marcher@vlct.org. To access the on-line version of the VLCT model riparian buffer ordinance and companion technical paper, visit the Resource Library on the web at: www.vlct.org.

Purple Loosestrife: First You See It, Now You Don't

The widespread distribution of purple loosestrife at the Ferry Road, Charlotte monitoring site is captured in this 1997 photo to the right. The image was taken prior to the release of the beetles (*Galerucella* spp.) used in the bio-control program at this site. These beetles, native to England, are the plants natural enemy and were brought to the United States after intensive research showed them to eat only purple loosestrife with a few exceptions.

The Ferry Road site seen again in 2003, following the release of an estimated 9,910 beetles (*Galerucella* spp.) over the course of five years. The beetles' effectiveness can be observed through the eradication of purple loosestrife at this three acre site. This success as well ones from other sites is largely thanks to the work of numerous volunteers, who have cared for the plants and beetles, located potential release sites, met with landowners and relayed findings to the program coordinators. To learn more about how to volunteer with the purple loosestrife control efforts, please contact the Wetlands Office at 802-241-3777.



Stabilization Measures for an Eroding Lakeshore

Stabilizing erosion can be expensive if done with a constructed wall or the use of riprap. In many locations there are simpler, cheaper and more lake-friendly alternatives. These are presented below from cheapest to most expensive.

A Naturally Vegetated Shore is the Best Insurance Against Erosion

To maintain or re-establish vegetation:

◆Cease lawn mowing on the lake's bank. Leave at least a 10-15 feet wide strip along the shore to "go wild." Add native trees or shrubs in the zone, or let them seed themselves. It is the mixture of types of plants (trees, shrubs, groundcover) that provide stability with root masses; grass alone is easily undermined.

◆Minimize your access points to the lake or dock so that other stretches of your shoreline can be allowed to revert to a more native vegetation scheme. By leaving natural sections of the shore you increase the fish habitat values near your property.

But what about the view?

◆Prune lower branches and thin out shrubs to open up or maintain partial views, without eliminating the vegetation all together. Allowing some small trees to grow is recommended as eventually the large ones will need "replacing." The spongy "duff" layer of decomposing leaves under trees and shrubs also is a very important aspect of filtering uphill runoff, and is why lawns do not work as well as the natural forest floor.

◆Shallow water emergent or floating leaved plants help to dampen wave energy, so let them continue to grow along your shore if they are there already. Limit the removal of aquatic plants to those directly in the way of a swimming and docking area.

Where erosion has already occurred, consider methods that mimic a natural shore, rather than building retaining walls.

Walls are expensive to build, offer no lake habitat or ecological benefits, are a barrier to wildlife, and will require replacement over time.

◆Most undeveloped natural shores have a line of cobble and rocks right at waters edge. If rocks are already present at the waters edge, leave them there. Rocks in the 6-12 inch size are typically better than larger ones because large rocks tend to just transfer the wave energy elsewhere. It is important to have vegetation overhanging the rocks to keep the sun from heating up the rocks and the water.

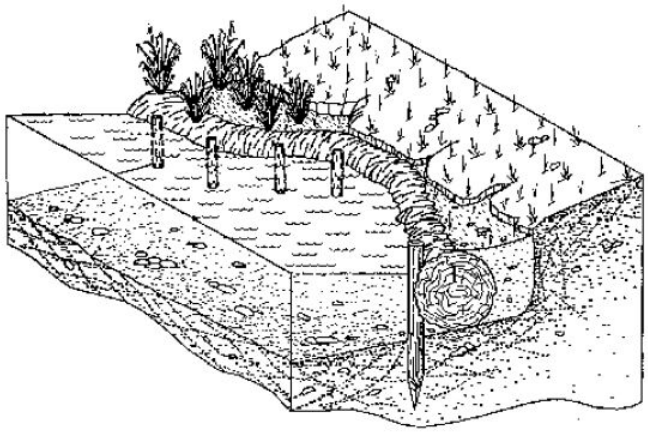
◆Reslope, if necessary to smooth erosion gullies, and replant native species above the rock toe.* A 2:1 slope (2 feet horizontal to 1 foot vertical) or less can generally be stabilized with just vegetation. Use erosion control blanket to cover bare soil while herbaceous vegetation becomes established.

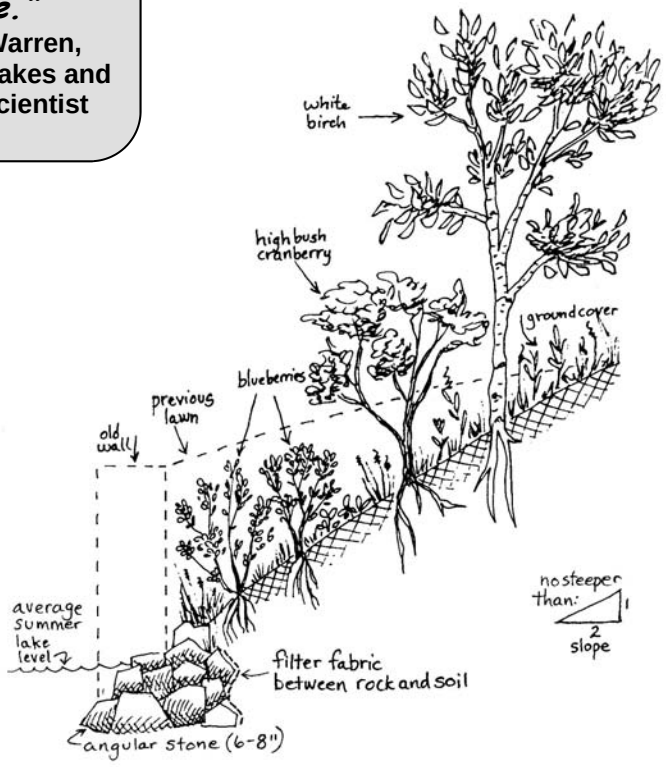
◆Plant water-loving plants just below the eroding area.* These will dampen the wave energy and trap eroding soil from above. Unless the erosion is severe, it may eventually self-stabilize. Choose quick growing native species and stay away from invasive species.

◆A single row of medium sized rocks (less than 1 foot high) might be effective at the waters edge in an area that receives a lot of use and foot traffic, such as where you access the lake or a dock.* It is important particularly where the groundcover is grass, as grass is shallow-rooted and easily undercut by wave erosion. Install filter fabric behind the rocks so that fine soils do not wash out from behind the rocks.

◆If the area is undergoing serious erosion, it may be necessary to excavate in order to establish a rock toe.* Install filter fabric against the back side of the rocks to prevent soil from washing out from behind the rocks. The rock toe need only extend about 6-9 inches above the water level. Using this approach allows you to mimic and reestablish and naturally vegetated shore.

"Maintaining or re-creating a naturally vegetated shore for its habitat and scenic benefits allows you to enjoy the lake and know you are helping it at the same time."
Susan Warren, Vermont Lakes and Ponds Scientist





◆An alternative to rock is the use of a coir fiber roll.* It is pinned securely to the soil, at or above the water line. If this is used, the erosion occurring can be allowed to self-stabilize as the fiber roll will catch the sediment and begin to establish a new stable slope. Native vegetation can be added to the base of the slope as the new slope establishes itself.

* Note that any work (fill, construction, walls, moving stones, rock toes etc.) beyond (i.e. lakeward) the normal summer water level requires a Shoreland Encroachment Permit. Contact Steven Hanna at 802-241-3791 for information.

Aquatic Nuisance Species HIGHLIGHTS

- **Vermont Invasive Patrollers Early Detection Network.** VIPs are off and running – or should we say "floating!" Approximately 80 people have attended VIP training workshops this summer to learn how to identify native and exotic plants and animals, and conduct surveys for new aquatic invasions. Thirty-three workshop participants representing 20 different waterbodies have signed the VIP Statement of Commitment promising to conduct surveys twice each summer and report their results to the Vermont Water Quality Division. More workshops are planned, and we are looking for lake associations that would like to host a workshop in their area in 2008. For more information visit www.vtwaterquality.org, Lakes and Ponds section, email leslie.matthews@state.vt.us, or call 802-241-3777.

Participants in the June 9 VIP training workshop held in conjunction with the 2007 Federation of Lakes and Ponds Lake Seminar search for native and invasive plants and animals in North Montpelier Pond.

- **New Potentially Invasive Algae Species Reported in Vermont.** *Didymosphenia geminata* ("didymo" or "rock snot"), a diatom algae species that inhabits fast-flowing, cold-water river and stream environments and has the potential to cause nuisance blooms, was discovered in the northern reaches of the Connecticut River and the White River, and also in the Batten Kill River. These findings are the first official reports of the species in the northeast United States. Staff from the Vermont Departments of Environmental Conservation and Fish and Wildlife initiated a rapid response campaign in cooperation with representatives from the fly fishing community, several watershed organizations, and staff of New Hampshire Department of Environmental Services and U.S. Fish and Wildlife. The campaign is focused on public education about spread prevention since eradication is not feasible. For more information visit www.vtwaterquality.org.

- **Lease for Mechanical Harvesting Equipment.** The Agency of Natural Resources and the non-profit, Lake Champlain Restoration Association, entered into a lease agreement in June 2007 to operate mechanical harvesting equipment on Lake Champlain. The Association will use a 400 cubic foot capacity mechanical harvester and transport vessel to remove nuisance aquatic plants, primarily Eurasian watermilfoil from designated spots in southern Lake Champlain. The lease term is three years.

- **Grants-in-Aid.** The Aquatic Nuisance Control Grant-in-Aid Program awarded 36 grants to municipalities for projects involving the management of aquatic nuisance species. The majority of the projects are for the management of Eurasian watermilfoil. Other projects include purple loosestrife and nuisance native plant management, and preventing the introduction of

invasive species. Awarded funds total approximately $401,000 and represent both state and federal dollars. State grant funds are from a portion of Vermont motorboat registration receipts and federal grant funds are from the U.S. Army Corps of Engineers, thanks to Vermont's congressional delegation. For information on the grant program visit: www.vtwaterquality.org and click on "Grants."

- **LCBP Boat Launch Stewards.** The Lake Champlain Basin Program initiated the Lake Champlain Boat Launch Steward program this summer. Four lake stewards are staffing access areas on both the New York and Vermont sides of Lake Champlain to educate boaters about invasive species and spread prevention and to conduct courtesy boat inspections. The stewards received training through Paul Smith's College (NY) Adirondack Institute Watershed Stewardship Program and the LCBP. This program is the first of its kind on Lake Champlain.

Lake Champlain Boat Launch Stewards Callie Krumholz and Caroline Donahue talk with a boater at the VT Dept of Fish and Wildlife Mallets Bay access area.

- **Renovate Treatments for Eurasian Watermilfoil.** On June 24, 2007, four areas of dense Eurasian watermilfoil in Lake Morey, Fairlee were treated with the aquatic herbicide, Renovate, active ingredient, triclopyr, as part of a long-range management plan to control watermilfoil in the lake. Thirty acres were treated with the liquid formulation of the product (Renovate 3) and 15 acres were treated with the flake formulation (Renovate OTF). Efforts to monitor herbicide levels and impacts on both milfoil and non-target plants are underway. Additional Renovate treatments of milfoil sites in Lake St. Catherine, Poultney and Wells, Star Lake, Belmont, and Lake Hortonia, Hubbardton and Sudbury, also occurred in July as part of a long-range monitoring program. Similar monitoring efforts will occur in these waterbodies as well.

  Use of the flake formulation, Renovate OTF, in Lakes Morey, St Catherine and Hortonia in 2007 marks the first time this formulation has been used in a Vermont water body. The flake formulation carries the triclopyr to target plants in deeper water and localizes it where the plants are growing, effectively holding it "on target." This enables triclopyr to be used more effectively in areas of higher dilution. Unlike Sonar A.S. (an aquatic herbicide consisting of the chemical fluridone), which typically requires a contact time of up to 90 days or more to be effective on watermilfoil, triclopyr is taken up by the plants in just one to two days, with control of watermilfoil generally seen within approximately three to four weeks. Triclopyr is highly selective for watermilfoil and other dicot (broadleaf) plants so impact to non-target species should be minimal. The flake formulation is also less costly than the liquid formulation. All requests (permit applications) for use of the product are reviewed in accordance with Chapter 10 V.S.A. § 1263a(e), Aquatic Nuisance Control Permit Program.

Water Chestnut Battle Royal

For a quarter of a century, the Vermont Department of Environmental Conservation has battled the extremely invasive aquatic plant, water chestnut (*Trapa natans*). Water chestnut grows in shallow waters with soft, muddy bottoms. Uncontrolled, it creates nearly impenetrable mats across wide areas of water, which can create a hazard for boaters. This noxious plant also severely limits the passage of light into the water, a critical element of a well-functioning aquatic ecosystem, reduces oxygen levels which may increase the potential for fish kills, out competes native vegetation and is of little value to wildfowl.

Water chestnut has been in Lake Champlain since the 1940s and has been the subject of numerous containment, management, and eradication efforts since the late 1950s.

"...[water chestnut] endangers the continued human use of the recreational waters of Vermont. Study it, learn how to identify it, and please cooperate with your Fish and Game Service which is trying to control this plant. Your help will be of great service to the State of Vermont."

1958 Vermont Fish and Wildlife regulations brochure on "Water Chestnut Management"

To date, management efforts have worked to successfully control the spread of water chestnut, but have not eradicated it. All states and Canada that surround Vermont are infested with water chestnut. It is believed that water fowl coming in from these other areas are transporting the seeds, making the odds for eradication pretty low. Seeds are also spread with strong spring water currents. Once an area has been populated with water chestnut, seeds may remain dormant for up to 10 years before germinating and starting new plant populations.

Dense water chestnut bed, Lake Champlain

Water chestnut plant– This leafy portion of the plant floats on the surface of the water

In southern Lake Champlain, water chestnut currently invades a range of 47 miles, extending from Whitehall, New York in the south north to Ferrisburg, Vermont, and as of 2005 also is invading from the north; it has been found in wetland and river areas in Missisquoi Wildlife Refuge. In Vermont, mechanical harvesting and hand removal have been the main means of water chestnut management. Experience has shown that these methods can be successful at controlling and reducing the infestation if infested sites are targeted repeatedly for five or more years. Since water chestnut overwinters entirely by seeds that may remain viable for years, repeated control is critical to deplete seeds in the sediment.

Mechanical harvester

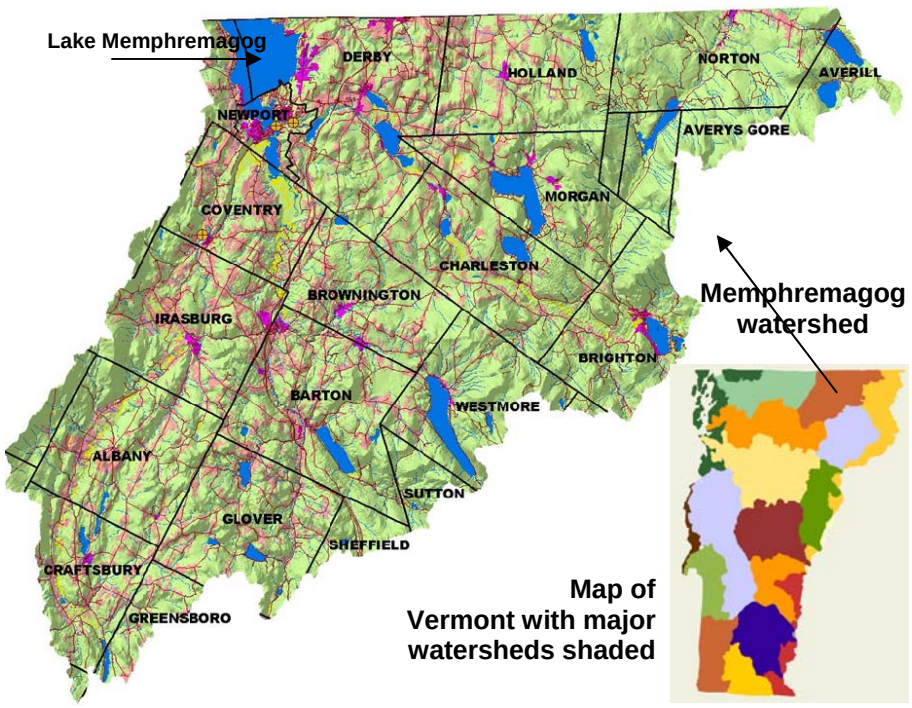
The Vermont Invasive Patrollers Program trains volunteers in aquatic plant and animal identification and how to search for invasive species, like waterchestnut. To learn more, contact Leslie Matthews at Leslie.Matthews@state.vt.us or at 802-241-3789.

Memphremagog Has a New Association

Residents of Lake Memphremagog recently came together to form an association to "restore and maintain the ecological integrity of the Lake Memphremagog Watershed area." The Lake Memphremagog watershed is large, extending from Island Pond in the east, Craftsbury in the south, and north all the way into Canada. It contains many of Vermont's deep coldwater lakes such as Lake Willoughby and Lake Seymour, but also many nice mesotrophic and eutrophic lakes such as Lake Parker and Salem Lake. The watershed's major rivers are the Black, Barton and Clyde, as well as the smaller Johns River running through the Town of Derby. In addition, residents of Holland, Norton and Averill Towns, which have areas that drain north into the Coaticook and Tomifobia Rivers, are included in the new association.

The association was off and running with a presentation for lakeshore residents about planting shoreland vegetation by Lakes and Ponds Scientist, Susan Warren. The group will be tackling a lake clean-up and a watershed survey of the Johns River this summer. For more information or to get on the mailing list for notice of future meetings, contact Chet Greenwood at 334-1590 or Ben Copans at ben.copans@state.vt.us.

Lake Memphremagog Watershed and Coaticook and Tomifobia River Watersheds



UVM Professor, Dr. Mary Watzin, addresses Lake Champlain issues with educators along the banks of the Missisquoi Bay area

A Watershed for Every Classroom

Nineteen teachers joined the *Watershed for Every Classroom* educators' training for five days during July. This place-based professional development program for educators in the Lake Champlain Basin will continue into 2008 as these teachers will travel to different sites within the basin to study geology, natural and cultural history, river and lake monitoring, wildlife and habit, as well as take a look at commerce within the basin.

This workshop is offered by the Champlain Basin Education Initiative (CBEI), a consortium of environmental education groups throughout the Lake Champlain Basin, including the Water Quality Division's Project WET Program (Water Education for Teachers). To learn about other professional development opportunities, contact Amy Picotte at 802-241-3789 or Amy.Picotte@state.vt.us, or visit the Lake Champlain Basin Program's web site at www.lcbp.org.

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National Lakes Survey

This summer Vermont is participating in the **National Lakes Survey**, a nation-wide initiative by the EPA to determine the ecological health and recreational value of the nation's lakes. The study includes 909 randomly chosen U.S. lakes, and is the first comprehensive national lakes survey since a study done by the EPA in 1972-76. Groups in each state, comprised of both citizens and government workers, will use consistent methods to gather data on the lakes in their region. In addition to the lakes picked for the national survey, Vermont is choosing to sample enough lakes to assemble a statistically-valid picture of the lakes in our state, as well as to contribute to the national study. This fieldwork will be carried out during 2007 and 2008.

Although the State has a long history of monitoring the water quality of Vermont lakes, this survey is an attempt to establish trends and make comparisons on a national level. The results of this study will help determine the overall health of our nation's lakes and the effect of key stressors (such as nutrients and pathogens) on lake status. To learn more about which Vermont lakes are being surveyed, visit the webpage http://www.anr.state.vt.us/dec/waterq/lakes/docs/lp_mon-natlakesurv.pdf, or contact Neil Kamman in the Lakes and Ponds Section, Neil.Kamman@state.vt.us or 802-241-3795.