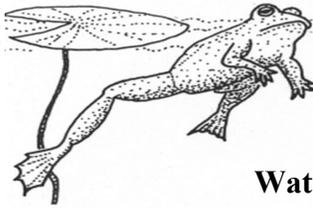
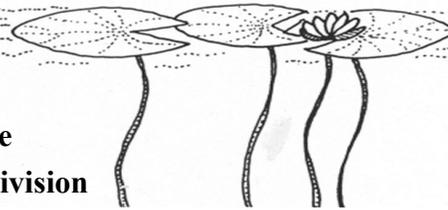


Out of the Blue



A Newsletter of the
Watershed Management Division



Winter 2012 No. 40

Vermont Agency of Natural Resources
Department of Environmental Conservation

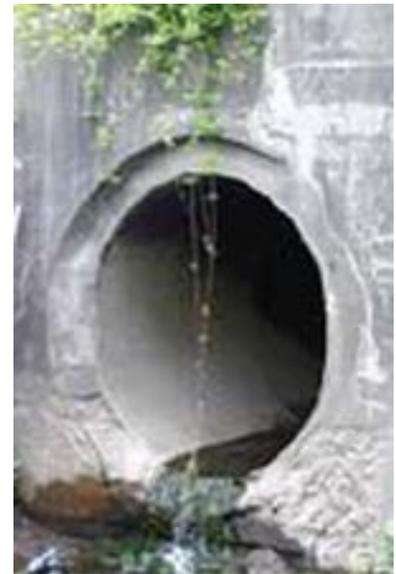
Cleaning Up Wastewater Discharges to Stormwater Drainage Systems

Typically, untreated wastewater is easy to identify. But is it possible to detect wastewater leaked from a sewer line, diluted with groundwater, intercepted by a stormdrain, and then discharged to a river? Yes, given the right test conditions and dogged persistence.

Dave Braun from Stone Environmental Inc. in Montpelier receives funding from the Vermont Watershed Management Division's Ecosystem Restoration Program to sleuth around in rural towns for raw wastewater and other contaminated flows entering stormwater drainage systems. He starts the process using a baseline map of stormwater infrastructure produced by the Ecosystem Restoration Program.

Stormdrain outfalls, catchbasins, and manholes are assessed for presence of contaminated flows by observation and water quality testing. To increase the likelihood of detecting wastewater and other contaminated flows, sampling is performed during dry weather, avoiding dilution

See page 6, "Cleaning Up"



Flows during dry weather periods raise red flags

Letters to *Out of the Blue*

September 28th, 2011

Help Protect Our Rivers!

From Kelly Stettner,
Director of the Black River Action Team

"What is a river but the very soul of movement? A river's essential nature is change; lifting gravel here and depositing it there, washing fine sediments from this area to that, charting a new course every moment of every day, changing constantly. Sometimes that change comes in ways that are all but invisible to the human eye in the human time-frame; other times, that change is astoundingly swift, frightening in scope and devastating - even deadly.

As rivers around the state of Vermont swelled with the rains from Hurricane Irene and the sudden deluge from mountain streams,

it became obvious even to the untrained eye that moving water needs room to roam - if it doesn't have it, it will take it by any available means.

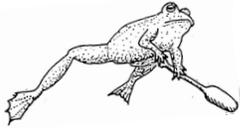
Homes were lost by the hundreds, livelihoods ruined, and lives were lost in the wake of the flooding, yet Vermont rebuilds. The tragedy now is that our rivers and streams are being altered in alarming ways, using methods that are undoubtedly going to cause even worse floods in the future. By being allowed to dig gravel from the river beds, by attempting to deepen, straighten or otherwise change the river's

See page 2, "Help Protect Our Rivers"

In This Issue

Algae in Vermont	4
Aquatic Invasive Species Highlights	5
Spring Trout and Tree Sales	8
2012 - A Watershed For Every Classroom	8

Out of the Blue
Available on the Web



*All issues in color on the web page of the
Watershed Management Division*
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:

Vermont Agency of Natural Resources
Dept. of Environmental Conservation
Watershed Management Division
Lakes and Ponds Section
103 S. Main Street, 10 North
Waterbury, VT 05671-0408
www.vtwaterquality.org
Tel. 802-338-4835
*(phone number for temporary
offices in Winooski)*

NEWSLETTER STAFF and CONTRIBUTORS:

Amy Picotte, Editor
Ann Bove
Angela Shambaugh
Dave Braun
Jim Pease
Leslie Matthews
Susan Brittin
Susan Warren
Tim Hunt

*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) Help Protect Our Rivers

course, many individuals are making a bad situation much worse, encouraging streams and rivers to not only flood again, but to flood faster and cause more damage than before. A steeper, straighter river moves **MUCH** faster, has more power, and is far more likely to flood more destructively than a river that is slowed by winding curves and a gentler slope.

Much is at stake: indiscriminate and unsupervised excavation and alteration of the stream beds threatens the clarity and health of our waterways, our bountiful fisheries, the diverse wildlife that depends on the river, and the health and survival of the forests and other lands along the banks.

The human community is also at great risk from this behavior: faster water can carry more gravel, rocks, boulders and trees, clogging culverts and ramming bridge abutments, gouging river banks and eventually eating roads, sewer lines and other human infrastructure. Even more homes, farms, businesses and possibly lives will be sacrificed in the future if we fail to learn from this flood.

Vermonters need to recover from this devastating natural event, but we must do it cautiously and wisely, or else face dire consequences for decades to come."

Sincerely, Kelly Stettner

Reply from Barry Cahoon, Vermont River Management Section September 29, 2011

"Very well stated, Kelly. This is exactly the message the ANR River Management Engineers have been sharing dozens of times with hundreds of people every day since the flood, with the purpose of guiding individuals, municipalities, and state government in a direction that recognizes and addresses both the immediate needs, our vulnerability and resiliency in future events, and just as importantly, that we share intimately with the rivers this beautiful place in which we live and call Vermont.

We cannot and are not separate from rivers. We cannot isolate ourselves from rivers, confine rivers to where we per-

ceive they are "supposed to be, belong, or always were," or ignore the message we have been given, that the rivers often need the space we have chosen to take away from them; the space that we mistakenly believe is ours, and ours only, not to be shared with the rivers.

This is the nature, the spirit, and the energy of rivers; that will never change, and that we must not ignore. We can only control our response, and, going forward, the extent to which we choose to recognize and acknowledge that how we conduct this flood recovery, profoundly influences whether we exacerbate, or alternatively, reduce our risk, vulnerability, and endangerment of public safety in the next flood.

With all that we have invested over generations, in our homes, our commerce, and our public infrastructure, we have created tremendous conflict with the physical imperatives of rivers,

and a certainty of extreme devastation, and economic and ecological loss, when rivers are energized by storm events, now of increasing frequency and magnitude. Irene has stated this most emphatically.

To protect that in which we have invested for our livelihoods, does require strategic separation and confinement of these incredibly powerful and dynamic natural systems; but not to the degree, extent, and manner in which much of the flood recovery operations are being conducted;



photo by Adam Hadlock, August 30, 2011
Sharon, Vermont

which, as you state, simply makes us more vulnerable to the next storm, and embeds, into another generation, the idea that we are separate from rivers, not One.

I am hopeful that we are moving in a positive direction in which there is a transition from the

urgency and expedience that has characterized the immediate flood response and recovery period, to a more measured operational mode both at the state and municipal levels, that embraces an informed recognition and im-

plementation of fluvial conflict reduction options for the benefit of this and future generations, and the rivers.

A flood is never a disaster, until we get in the way."

Barry Cahoon, P.E.

Vermont River Management Engineer,

Dept. of Environmental Conservation

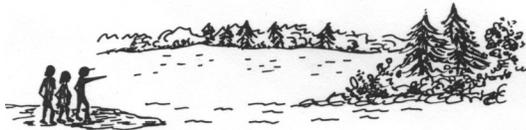
barry.cahoon@state.vt.us

Tel. 802-751-0129

*A flood is
never a disaster,
until we get in the way.*

Barry Cahoon,
Vermont River Management

State of the Lakes



Algae in Vermont

Will 2011 Floods Affect 2012 Algae Blooms?

The rest of the story from the 2011 flood events is still to come. Many surface water quality questions, including how algae will respond to increased sediment and nutrients washed into Vermont lakes have been raised as a result of these extreme events. May 2011 rains and heavy snowmelt led to record high water levels and nutrient loading for Lake Champlain. Tropical Storm Irene on August 28th, 2011 and associated heavy rainfall and flooding mobilized even more nutrient-laden sediment and dropped it into ponds and lakes across Vermont. Nothing is ever wasted in the natural world, and algae are likely to take advantage of the nutrient bonanza provided by these storms.

Local weather conditions, such as water temperature and available sunlight, strongly influence how well algae grow in a particular year. However, in general, more nutrients mean more algae. In lakes with historically low nutrient levels, algae may appear for the first time or if occasionally noticed before, may be visible for a longer period of time. In moderately to highly nutrient-enriched lakes, the amount of algae is likely to increase and/

or the dominant species may change. The upcoming 2012 growing season could be an exceptional year for algae growth across the state based on the 2011 water events.

Abundant algal growth can be a nuisance, and sometimes a risk to human and animal health. Cyanobacteria, also referred to as blue-green algae, are a group of algae that thrive under nutrient-rich conditions and can grow in any lake, pond, stream, or river. Some types of Cyanobacteria produce natural toxins or poisons. Parts of Lake Champlain experience cyanobacteria blooms each year. To avoid cyanobacteria, it's best to learn to recognize them.

A gallery of algae photos can be found on-line at the Vermont Lakes and Ponds Section web page: http://www.anr.state.vt.us/dec/waterq/lakes/htm/lp_cyanobacteria.htm.

A healthy waterbody needs algae because they are an important component of the aquatic food web, feeding a wide range of organisms from snails and insects to fish. Without algae, a lake or pond lacks food and shelter for its' larger inhabitants. When algae are abundant, often the first response is to 'do something' to get them under control. A web search will provide lots of options for algae control, but in Vermont a permit is required before using any product. The Vermont Lakes and Ponds Section provides information on algae and aquatic plant control (and permits), at http://www.anr.state.vt.us/dec/waterq/lakes/htm/lp_pondinfo.htm.

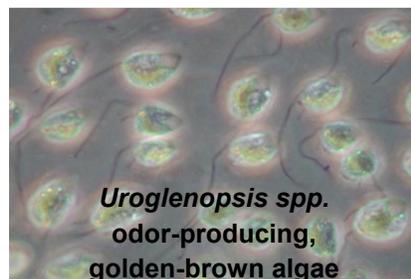
For the rest of the story of how the 2011 floods have impacted Vermont lakes, stay tuned for 2012 water quality results from the Long-Term Lake Champlain Monitoring and the Vermont Lay Monitoring Programs. For questions about algae, contact Angela Shambaugh at the Vermont Lakes and Ponds Section, at 802-338-4821, or Angela.Shambaugh@state.vt.us.



Anabaena spp.
filamentous cyanobacteria



Bulbochaete spp.
hairy filamentous, green algae



Uroglenopsis spp.
odor-producing,
golden-brown algae



Mallomonas spp.
golden-brown algae

Most algae are microscopic and their beauty rarely seen, as displayed by these photos taken by Angela Shambaugh from the Lakes and Ponds Section. Also, check out the web site of the Micropolitan Museum for a closer look at algae and other pond inhabitants at: <http://www.microscopy-uk.org.uk/micropolitan/index.html>

HIGHLIGHTS

Aquatic Invasive Species

Two new Eurasian watermilfoil waters were confirmed this summer: 210-acre Shadow Lake in Glover (see "VIPS" below) and 13-acre Rutland City Reservoir in Rutland. This brings the total number of known lakes with Eurasian watermilfoil to 68 and 27 other waters. However, roughly 79% of our lakes, greater than 20 acres in size, are not infested. Note: in three of the 68 lakes, Eurasian watermilfoil has not been found for a number of years.

An incipient population of **water chestnut** was found in Little Lake in Wells. (Little Lake is connected to the southern end of Lake St. Catherine.) All rosettes found were removed by hand. With the addition of Little Lake, the total number of known water bodies with water chestnut rose to 23.

Nineteen inland lakes deemed vulnerable to zebra mussel establishment and one river (Connecticut), were monitored for the presence of zebra mussel veligers (juveniles). Microscopic examination of these samples did not identify any veligers. Known zebra mussel populations in Vermont remain at two: Lake Champlain and Lake Bomoseen.

Grant-in-Aid funding supported 36 municipal aquatic invasive species projects during the 2011 season: 22 Eurasian watermilfoil control projects, eight of which also included a boat access area "greeter" program; one rusty crayfish monitoring and education project; and one curly leaf pondweed control project. Grant-in-Aid funding also supported 12 spread prevention projects, all of which included public boat access area "greeter" programs.

Applications for 2012 funds are due March 12, 2012, http://www.vtwaterquality.org/lakes/docs/ans/lp_grantinaid-announce2012.pdf#zoom=100

Although the Department of Environmental Conservation allocated up to \$15,000 from state motorboat registration receipts to manage the two **variable-leaved watermilfoil** populations in the state - Missisquoi Bay, Lake Champlain and Halls Lake – none of these funds were expended. Contracted suction harvesting of variable-leaved watermilfoil from Missisquoi Bay was postponed due to expected spread resulting from high floodwaters in May and again in August, and the need for additional population information. No funds were needed to support staff-initiated management efforts on Halls Lake - searches and handpulling. Unfortunately, **variable-leaved watermilfoil** was also discovered in the South Bay of Lake Champlain in New York. Due to the size of the population, New York officials determined that eradication would not be feasible. Future efforts will be focused on spread prevention.

The First Notice of Intent filed under Vermont's new **rapid response emergency general permit** was approved in May 2011. The general permit allows the commissioners of the Departments of Environmental Conservation (DEC), and Fish and Wildlife to seek coverage for rapid response to a new invasive species invasion. DEC Commissioner Mears obtained coverage under the general permit for diver operated suction harvesting of variable-leaved watermilfoil in Missisquoi Bay.

See page 8 for news on the **National Pollution Discharge Elimination System - Pesticide General Permit**.

Vermont Invasive Patrollers (VIPs) volunteer monitoring early detection success story! Last summer a volunteer alerted DEC staff that an Eurasian watermilfoil fragment had been discovered on the shore near the Shadow Lake (Glover) boat ramp by a boat launch greeter/inspector. Follow up by volunteers and DEC staff led to the discovery of an incipient population and rapid initiation of a control effort. While spread prevention is the first line of defense against new infestations, early detection and rapid response are also vital, as they greatly improve the prospects for preventing an invasive species from becoming permanently established. Certified VIPs documented at least 30 surveys on 17 waterbodies in 2011.



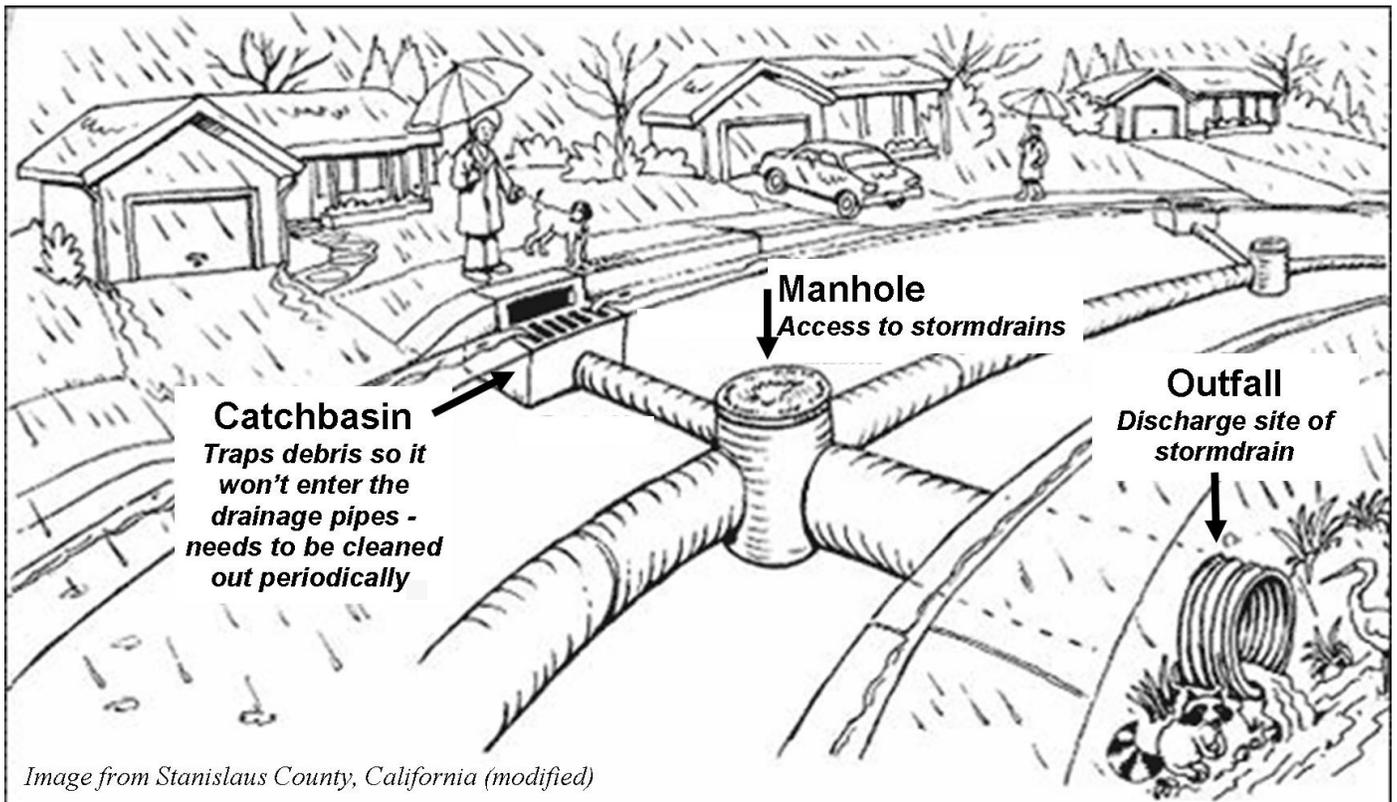
by stormwater runoff. Using the stormwater infrastructure map, the discharge sites are located and their condition is recorded along with any observations concerning dry weather flows, such as offensive odors, suds, or petroleum sheens. If flowing liquid is seen in the structure, samples are then collected for analysis of ammonia; detergents (methylene blue active substances--used in common detergents); electrical conductivity; and fluoride or chlorine, if the municipal water supply is not fluoridated. The assessment also includes testing for optical brighteners, fluorescent dyes added to most laundry detergents. This test involves securing cotton pads enclosed in plastic mesh in the flow stream in every flowing outfall and selected catchbasins and manholes. The pads are left in place for a week, then rinsed, dried, and viewed under a long-wave ultraviolet lamp. Fluorescence usually indicates the presence of laundry detergents although petroleum can also cause fluorescence.

If the first round of sampling suggests wastewater contamination, then additional samples are collected for bacteria (*E. coli*) and nutrient analysis. Since none of the tests alone can definitively

differentiate between diluted wastewater sources and uncontaminated stormwater or groundwater, a "weight-of-evidence approach" is used in interpreting the data to determine which dry weather flows are likely to be contaminated. (See the Data Interpretation Table on page 7 for how contaminated water is identified.)

After the water quality testing, comes the "find and fix" stage, in which the sources of contaminated flows are identified and a plan is made to correct them. Nearly all the wastewater contamination problems result from leaking pipes or plumbing mistakes, such as when a bathroom drain is inadvertently plumbed to a roof leader; few appear intentional. Most towns have ordinances prohibiting the discharge of wastewater into anything but their sanitary sewer system so in general municipalities are committed to following up when problems are brought to their attention. Larger communities, such as Montpelier, Barre City, and Brattleboro have located and eliminated direct sanitary wastewater connections to stormwater drainage systems using closed circuit television inspection and dye testing. The Vermont Rural Water Association offers assistance to

Typical Storm Drain System



smaller towns with fewer resources to finish an investigation and make the necessary repairs.

To date, 17 out of 89 towns identified for assessment have been evaluated. In most of these towns, one or more sources of wastewater entering stormdrains and discharging to streams was found. On average, during dry weather, half the stormdrain outfalls have flow and 4 percent have shown evidence of raw wastewater. Petroleum-contaminated groundwater from contaminated sites (former industrial sites, gas stations, a town public works garage); contaminated discharges from current industrial facilities; and municipal tap water leaks also have been identified. Other problems also have been addressed, from trash dumping and runoff from vehicle washing to

improper disposal of pet waste. This work has reduced the phosphorus loading to Lake Champlain by an estimated 230 kg per year.

Detecting, finding *and* fixing illicit discharges represent a field science that is still evolving. Future water quality testing should enable more definitive identification of human wastes, including tests for hormones, pharmaceuticals like acetaminophen and ibuprofen, and caffeine. Currently, these tests are prohibitively expensive.

For more information on cleaning up illicit wastewater discharges, visit Stone Environmental Inc. at www.stone-env.com or visit the Watershed Management Division's Ecosystem Restoration Program at <http://www.vtwaterquality.org/erp.htm>.

Data Interpretation Table - Determining Contaminated Water

Test	Benchmark	Remarks
<i>E. coli</i>	≥ 400 <i>E. coli</i> /100 mL	Undiluted municipal wastewater will generally have <i>E. coli</i> levels an order of magnitude higher than this benchmark. Pet waste and wildlife sources can also cause elevated <i>E. coli</i> levels.
Ammonia	≥ 0.25 mg/L	In the absence of other wastewater indicators, follow-up investigation is performed when the ammonia concentration is 0.5 mg/L or higher. If other wastewater indicators are present, then the 0.25 mg/L benchmark is used. Decomposing vegetation under anoxic conditions can release ammonia to water, which can be misleading.
Detergents (methylene blue active substances in anionic detergents)	≥ 0.2 mg/L	Detection of low concentrations (0.1-0.3 mg/L) of anionic detergents is common at stormwater outfalls. Most detections are not correlated with other wastewater indicators and do not lead to a definite source. These detections may be attributable to outdoor washing. However, concentrations as low as 0.2 mg/L have occasionally led to significant wastewater sources that might otherwise have been missed; therefore this is a useful test to trigger further investigation.
Optical Brightener	presence	Presence usually indicates contamination by sanitary wastewater or washwater. Exposure of the test pad for 5-10 days means that diluted and intermittent discharges can be detected. Unfortunately, oil fluoresces at the same wavelength as optical brighteners. Optical brightener testing in catchbasins and manholes is an effective method to bracket sources of contamination within storm sewers.
Fluoride or Total Chlorine	Fluoride: ≥ 0.3 mg/L Total chlorine: ≥ 0.1 mg/L	Fluoride is more stable than chlorine and is therefore preferred for detection of wastewater and tap water. Chlorine may be used if the municipal water supply is not fluoridated. Municipal tap water typically contains 1-2 mg/L fluoride. Natural fluoride levels in groundwater in Vermont rarely exceed 0.1 mg/L. The fluoride test is subject to interference by dissolved iron.
Specific Conductance	>600 μ S/cm	Flows contaminated with wastewater generally have specific conductance above 600 μ S/cm, though alone, specific conductance is not a reliable indicator of wastewater contamination. Road salt and metals from pipe corrosion can show 1,000-10,000 μ S/cm.

ANR Pesticide General Permit

In November 2011, the Vermont Agency of Natural Resources issued a Pesticide General Permit (PGP), which will satisfy the pollution control requirements under Vermont's federally delegated National Pollutant Discharge Elimination System (NPDES) program. The PGP will cover pesticide applications to, over or near Vermont waters for mosquito and other flying insect pest control; weed and algae control; animal pest control; and for forest canopy pest control.

Recently, EPA was legally forced to change how they regulated these types of pesticide applications. It was determined that under the federal Clean Water Act, biological pesticides and chemical pesticides with residuals are "pollutants" that require NPDES permit coverage prior to discharge to waters. Although Vermont's PGP will cover the requirements under the NPDES program, the need to obtain a state Aquatic Nuisance Control permit has not changed for pesticide applications.

The PGP clearly describes the categories of entities that must apply for coverage (submitting a Notice of Intent application). However, irrigation return flows and agricultural stormwater runoff do not require NPDES permits even when they contain pesticides or pesticide residues, as the Clean Water Act specifically exempts these categories of discharges.

A copy of the NPDES PGP with fact sheet and a Notice of Intent application are available at www.vtwaterquality.org or by calling Susan Brittin in the Lakes and Ponds Section at 802-338-4814.

Spring Trout and Tree Sales

This spring, pond owners who are residents of Chittenden County, Washington County, and the towns of Orange, Washington, and Williamstown can purchase brook, brown, and rainbow trout by visiting the web site of the Winoooski Natural Resources Conservation District for order forms (due in by March), at www.vacd.org/winooski, or by contacting Justin Kenney at 802-828-4493, justin.kenney@vt.nacdnet.net.

Additionally, the WNRCD has been selling bareroot trees and shrubs for over 28 years and has a wide selection to choose from. Profits from the WNRCD trout and tree sales go towards efforts to protect Vermont's natural resources.

Other Conservation Districts offer annual spring fish and tree sales as well. Check out the Association of Vermont Conservation District's web page to learn which Districts are offering what, <http://www.vacd.org/home>.

2012 WEC!
starts up in July

A WATERSHED
FOR EVERY CLASSROOM

Teachers and others, come learn and understand more about the Lake Champlain basin by touring its watershed to investigate geology; water quality; aquatic and terrestrial plants and animals; climate; and current issues. To learn more, visit the Lake Champlain Basin Program at: <http://www.lcbp.org/cbei.htm>, or contact Colleen Hickey at 802-372-3213, or chickey@lcbp.org



January 14, 2012 - Winter Day at Lake Willoughby, Westmore