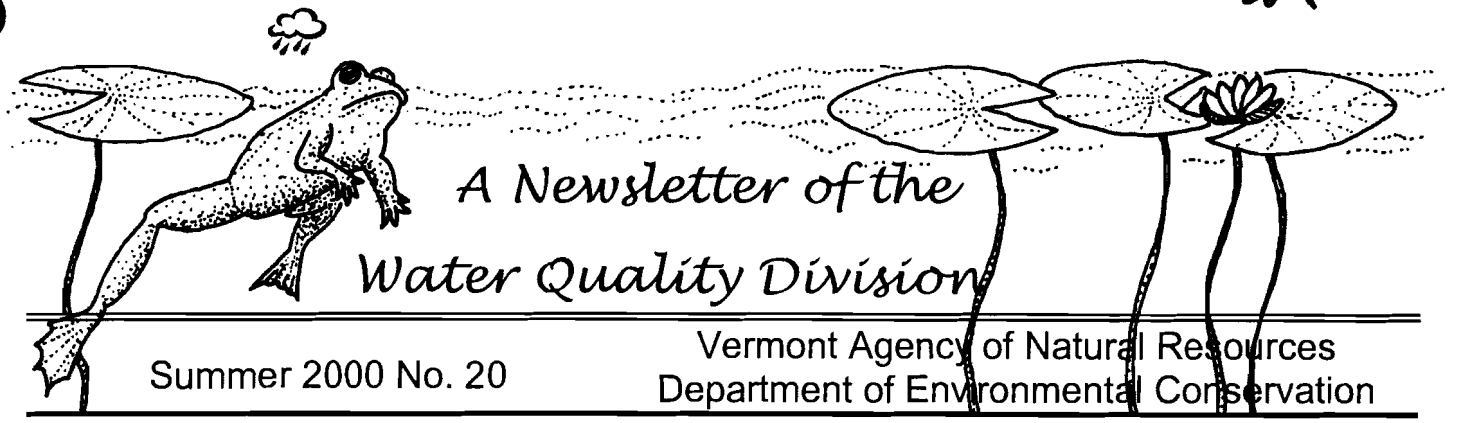
Out of the Blue



A Newsletter of the Water Quality Division

Summer 2000 No. 20

Vermont Agency of Natural Resources
Department of Environmental Conservation

Toxic Blue-Green Algae Blooms

There were two separate incidents last summer where dogs died after eating toxic blue-green algae from Lake Champlain. In the past, but only rarely, Vermont farm animals have died after drinking from ponds with dense toxic algae.

However, last year's news of these healthy dogs suddenly dying after playing and drinking in the waters off Point Aur Roche State Park (NY) and Juniper Island in Lake Champlain raised public concern about the safety of our Vermont waters.

The following article describes how toxic blue-green algae occurs, the symptoms of poisoning, and what can be done to prevent blue-green algae blooms.

Blue-green algae (scientifically called cyanobacteria) are very common and found in virtually all lakes. For reasons unknown, occasionally a strain of blue-green algae becomes toxic. After a heavy blue-green algae bloom (of the toxic variety) starts to die off, the toxins are released to the water. Eventually the toxins will break down and are destroyed naturally, but if a bloom concentrates along a shoreline or near the surface of the water, there is a chance for animals and people to come in contact with the algae.

Although animals have died from eating the algae, no known human deaths in North America have been attributed to poisoning from blue green algae.

Toxins from blue-green algae affect either the nervous system or liver function. Signs of neurotoxin poisoning usually appear within 15 to 20 minutes after ingestion. Symptoms of neurotoxin exposure may include: excessive salivation;

See "Toxic Blue-Green Algae" page 10

New Approaches for Managing Watersheds

Several issues related to water resource protection and restoration have been in the news lately in Vermont, and often have been the subject of hot political debate. A few of these are summarized below.

TMDLs and the Impaired Waters List

The un-elegant acronym TMDL stands for "total maximum daily load." It is basically a modeling process to determine how much of a particular pollutant (e.g. phosphorus or sediment) a stream or lake can absorb and not be negatively affected. This pollutant amount is then divided among all the sources in the watershed and used to determine the necessary reductions. Although the TMDL process has been used for many years to control industrial or municipal discharges (point sources), people are beginning to look at TMDL development as part of the process to reduce land runoff (non-point) sources of pollution.

The Vermont Department of Environmental Conservation maintains an "Impaired Waters" list as required by the US Environmental Protection Agency. The list represents all waters in the state currently shown to be violating the state's Water

See "Watersheds" page 11

In This Issue...

OUT OF THE BLUE

is produced semi-annually by the Lakes and Ponds Section. Our purpose is to share information on lake environments, water quality and state activities through articles on lake ecology and Section 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:

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Clarifications

On the back page of last fall/winter's *Out of the Blue* issue No. 19, we printed "Quotes About Water" and "Facts About Water." The information came from the US Environmental Protection Agency's website, http://www.epa.gov/OW/facts-quotes/facts.html. One of our readers wrote us to question one of the statements. We think Mr. Keefe's point is correct and with permission have reprinted his letter for your information and comments.

Hello, March 3, 2000

I was reading "Out of the Blue" #19 over lunch today, and I was puzzled by references to the constancy of the world's supply of water. National Geographic is quoted as saying that "all the water that will ever be is, right now," and Linda Hogan apparently said that "the amount of water remains constant; there is never a drop more, never a drop less."

I've heard this concept before, that water evaporates, precipitates, freezes and thaws, but never is created from something else or becomes something else. It's a very tidy and wonderful concept, but unless I'm missing something, it just isn't true.

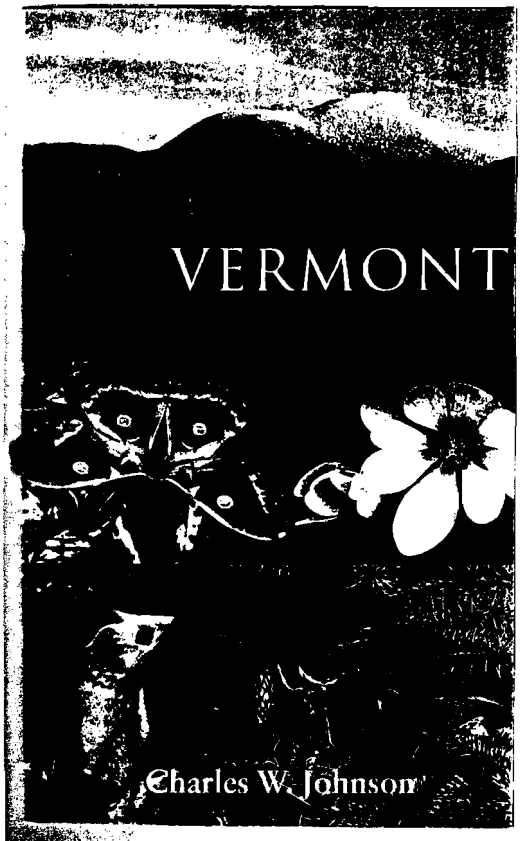
I'm thinking of two processes in particular. In high school, many of us conducted an experiment where water was separated into hydrogen and oxygen, using electrolysis. Does this not reduce the amount of existing water?

The other example involves combustion. When we burn a hydrocarbon (oil, gas, wood, tobacco, whatever), the hydrogen in the fuel combines oxygen to produce water vapor. This is counter-intuitive to most of us, but even if there is no water in fuel and no water is added to the process, combustion invariably creates new water, in this case water vapor.

So that's how it looks to me. Sometimes, hydrogen and oxygen combine to create water, and sometimes water is broken up into those same two components. Am I misunderstanding something? If so, I'd very much appreciate a response and an explanation to correct my confusion. A phone call would be fine. I like your publication. Thanks. Sincerely,

David Keefe,
Fairfax, VT

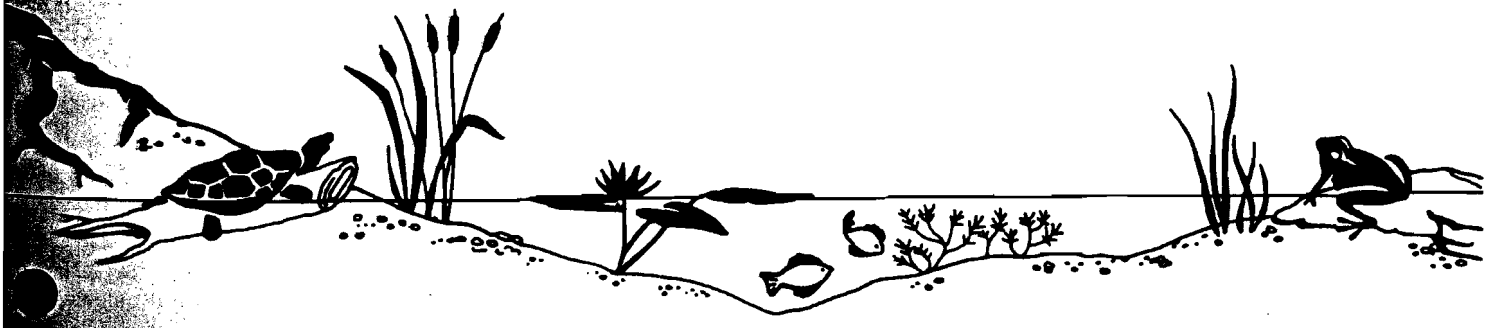
In last fall/winter's issue of *Out of the Blue*, No. 19, we covered a millenium story by taking a look at Vermont's watery history in the article, "More than a Millennium Look at Water Through Time." The article focused on the role time (millions of years) played in changing Vermont's waters. To clarify the sequence of events, we have included a time line from the book "The Nature of Vermont" by Charles W. Johnson.



Geological Timetable

ERA and PPERIOD	BEGAN–Years Before PRESENT	VERMONT and REGIONAL EVENTS	WORLD EVENTS– PLATE TECTONICS
Cenozoic			
	0-2,000	Cooling trend.	Many large Ice Age mammals become extinct.
	4,000-6,000	Warming trend (hypsithermal interval). Rise of Native American cultures	
	10,000	Last glacier leaves Vermont	
Quaternary	3 million	Continental glaciers begin (Ice Age).	Origin of human beings.
Tertiary	65 million		Himalayas born (25 million years ago). Mammals at maximum. Rocky Mountains born (75 million years ago).
Mesozoic			
Cretaceous	136 million	Younger igneous intrusions. White Mountains formed.	Dinosaurs become extinct. Origin of birds. Origin of mammals.
Jurassic	195 million	Mountain continue to erode; new rifting east of Green Mountains	Breakup of Pangaea, North America begins to move west.
Triassic	225 million		Rise of dinosaurs.
Paleozoic			
Permian	280 million		Origin of reptiles.
Pennsylvanian	320 million	Alleghenian orogeny.	Vast swamps–origin of modern coal.
Mississippian	345 million	Older igeneous intrusions (e.g., Barre).	Continents collide, Pangaea formed.
Devonian	395 million		Origin of amphibians.
Silurian	440 million	Formation of Taconic and Green Mountains (Taconic orogeny).	Origin of fish. First vertebrates.
Ordovician	500 million	Corals and other marine life in Iapetus Ocean.	Continents begin to converge. No land life.
Cambrian	Cambrian	570 million	
Precambrian			
	1.0 billion-4.5 billion	Grenville orogeny, Adirondacks formed. (1-1.3 billion years ago).	Archaic plat convergences and separations. Oldest fossils (3 billion years old). Oldest rocks (3.7 billion years old).

Charles Johnson, "Geological Timetable:,pp 10,11 from The Nature of Vermont" 1998 by the State of Vermont, reprinted with permission of University Press of New England.



Aquatic Nuisance Species

HIGHLIGHTS

- **ANS Management Plan Approved.** In May, the Lake Champlain Basin Aquatic Nuisance Species Plan, developed cooperatively by the states of Vermont and New York, and the province of Quebec, was approved by the national Aquatic Nuisance Species Task Force. The Task Force receives federal appropriations specifically to assist states with implementation of approved ANS management plans. Efforts are underway to request funds for the current fiscal year to begin implementation.

- **Grant-in-Aid Program.** The VTDEC Grant-in-Aid Program has received applications from 20 municipalities for funds to support aquatic nuisance management projects in lakes in their towns during the 2000 summer season - the majority for Eurasian watermilfoil management. Funds are available this year to support most projects at 60% funding. The Grant-in-Aid Program is supported by a portion of motor boat registration receipts. Additional funds are also available this year from the U.S. Army Corps of Engineers, thanks to the efforts of Senator Leahy (see next bullet).

- **Aquatic Control Program Funding.** This year the VTDEC has a $622,000 cooperative cost-share agreement (50/50 match) with the US Army Corps of Engineers' Aquatic Plant Control Program. Federal and State dollars, including $140,000 from the New York State Department of Environmental Conservation, will be used to harvest and/or handpull water chestnut from Lake Champlain, Dead Creek, Parson's Mill Pond, and Lake Bomoseen. The program will also provide funding support for Eurasian watermilfoil control (handpulling, mechanical harvesting, and/or suction harvesting) on Beebe Pond, Lake Bomoseen, Burr Pond, Lake Carmi, Chipman Pond, Lake Dunmore, Fairfield Pond, Lake Hortonia, and Lake St. Catherine.

- **Water Chestnut In Quebec.** VTDEC ANS Program staff met with officials of the Quebec Ministry of the Environment and other interested non-governmental groups in March to discuss the recent discovery of a water chestnut population in the South River in Noyan, Quebec. The Ministry of the Environment has committed to develop an action plan to manage the infestation and inform Quebec citizens.

- **Eurasian Watermilfoil Chemical Treatment.** In December of 1999, the VTDEC issued an Aquatic Nuisance Control Permit for the use of the aquatic herbicide, Sonar, to control Eurasian watermilfoil in Lake Hortonia and Burr Pond. The initial treatment occurred on June 4, 2000. Supplementary booster treatments may occur within 45 days of the initial treatment to keep the concentration of Sonar high enough to be effective in controlling milfoil. Water use restrictions associated with the treatments will be posted at F&W access areas, along adjacent roads, in informational fliers to property owners and renters, and in press releases and public service announcements. Sonar is a slow-acting herbicide so milfoil plants will gradually die over a period of about 60 days. For more information call the Lake Hortonia Property Owners Association/Burr Pond Association at (802) 273-3655 or the VTDEC at (802) 241-3777.

- **ANS Fine Set.** The Vermont Court Administrative Office set the fine for transportation of Eurasian watermilfoil, water chestnut, zebra mussels, or quagga mussels to or from and Vermont surface water at $150 for each violation (10 VSA §1266 and 23 VSA § 3317).

Aquatic Nuisance Species HIGHLIGHTS

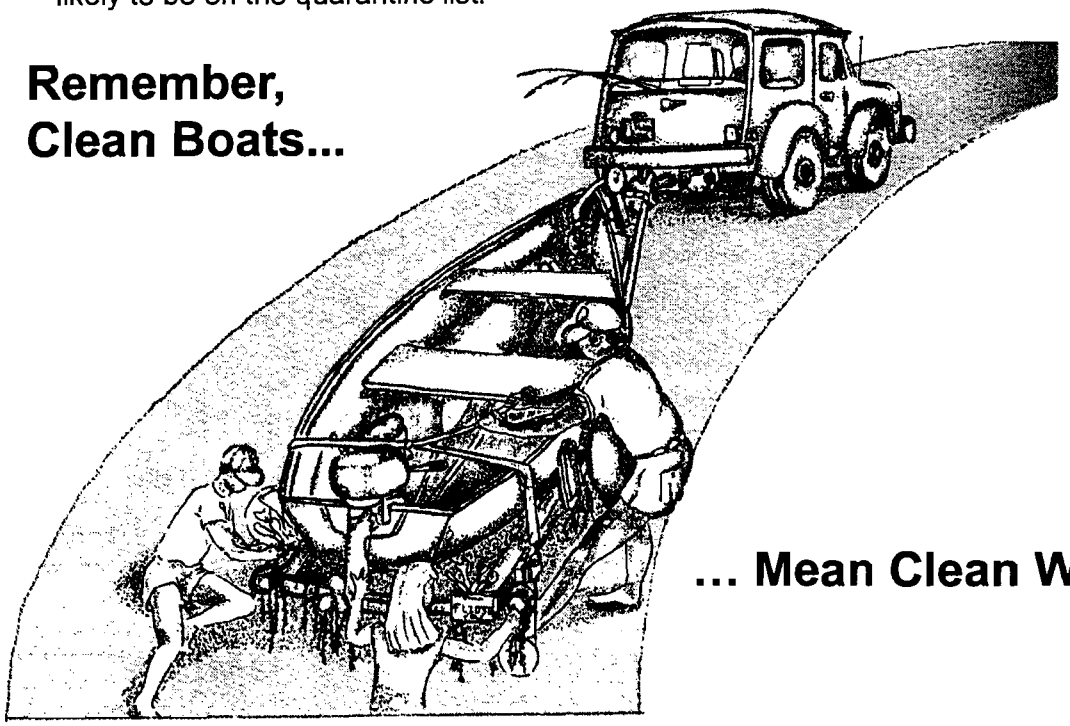
- **ANS Task Force Comes To Vermont.** The national Aquatic Nuisance Species Task Force will hold its summer meeting in Burlington, July 31 - August 2. This will be the first time that the Task Force, charged with overseeing the implementation of the National Invasive Species Act of 1996, will hold a meeting in Vermont. The meeting will include a field trip to the South Lake of Lake Champlain to observe water chestnut and other aquatic nuisance plants, and presentations on regional ANS issues. For more information call Michael Hauser at (802) 241-3777.

- **Purple Loosestrife Biological Control Program Continues.** The VTDEC expects to rear and release more than 65,000 *Galerucella* beetles to control purple loosestrife this summer. Letters have been sent to 400 plant selling nurseries and stores in Vermont with information about the purple loosestrife control efforts and the importance of selling native species (see story on page 9).

- **Boater Survey/Transport Law Media Campaign.** With assistance from Senator Leahy, the VTDEC has secured a $50,000 grant to assist with ANS spread prevention efforts. Some of the funds are being used to participate in a multi-state mail survey of boaters to evaluate the effectiveness of ANS education and outreach efforts. The rest of the funds will be used to develop and implement a comprehensive media campaign concerning Vermont's recently amended ANS transport law (see above).

- **Draft Plant Quarantine Rule.** The VTDEC is working with the VT Department of Agriculture, Food and Markets on a draft Quarantine Rule. If adopted, the Rule will help prevent damage to natural communities and managed lands by regulating the movement, sale, possession and distribution of certain noxious weeds. Some aquatic plants are likely to be on the quarantine list.

Remember, Clean Boats...



... Mean Clean Waters!

Only You...Can Save Your Lake!

The actions of lake and pond shoreland owners are critical to healthy waters. The following is a brief list of how you can save your favorite lake and protect its ecology, health and your enjoyment into the future. "How-to" pamphlets are available on any of the topics below from the Lakes and Ponds Section. For more detailed information contact your lake or pond associatio or the Lakes and Ponds Section, VT Agency of Natural Resources (802-241-3777) Bldg 10 North, 103 South Main Street, Waterbury, VT 05671-0408.

Please...	How	Why
Go Wild!	• Leave trees and shrubs in a strip up to 100 feet wide along the shore. • Replant native trees and shrubs between your camp and the water. • Reduce lawn size adjacent to the lake. • Don't use fertilizers or pesticides on lawns near the lake. • Instead of repairing or installing a retaining wall, create a vegetated bank.	• Lawns are not effective at erosion control or filtering runoff. • Natural vegetation: ✓ stabilizes the bank; ✓ enhances in-lake habitat; ✓ looks nice from the lake; and ✓ provides shoreland bird and animal homes and food. • Fertilizer and pesticide runoff unnecessarily pollutes the lake with nutrients and toxins.
No Beach is a Good Beach	Don't add sand or other fill to the lake. (Natural beaches are, of course, fine but rare in Vermont!)	Adding sand suffocates the natural bottom habitat, plus can introduce polluting silt to the water. (A permit is required to add fill to a lake, call 802-241-3777 for information.)
Keep Soil on the Ground	Keep land disturbance well back from the water. Surround a work area with a filter screen; mulch, reseed, and replant as soon as possible; and complete work before September 15 (so seed can sprout before winter).	• Eroded soil is the number one pollutant to Vermont lakes and ponds! • Sediment carries the nutrient phosphorus to lakes, causing algae blooms and excessive weed growth. • Turbidity threatens fish and other aquatic life.
Mind your Driveway Manners	Maintain your driveway so that runoff from it cannot reach the lake or pond. • Install waterbars to direct flow into vegetated areas. • Rock-line steep ditches. • Crown it annually. • Relocate it if necessary. Work with your town road commissioner on preventing erosion of town roads.	• Eroded soil is the number one pollutant to Vermont lakes and ponds! • Sediment carries the nutrient phosphorus to lakes. • Turbidity threatens fish and other aquatic life. • Good driveway maintenance saves you money over the long-run.
Don't "Go" in the Lake	• Learn about your septic system. • Conserve water. • Don't add garbage disposals, washing machines or dishwashers unless you're sure your system meets current standards. • Replace systems that don't meet standards. • Pump septic tanks every 3-5 years.	• If any part of your septic system is closer than 50 feet to the lake, or less than 2 feet above the lake level, you could be polluting the lake. • A poor or overloaded system can introduce disease-causing organisms into the lake, resulting in a human health threat and can introduce nutrients into the lake, causing algae blooms and excessive weed growth.
Watch those Ducks	Don't feed waterfowl.	Resident duck and goose populations increase disease causing bacteria in the water, and can increase the incidence of "swimmer's itch." Ducks or geese can even be a significant source of nutrients to lakes or ponds.

Please...	How	Why
Be Careful Who You Invite Home	Make sure you aren't transporting organisms from one lake to another. Carefully wash and inspect your boat (and other gear) before moving it to another lake. Learn to identify **Eurasian watermilfoil**, **water chestnut**, and **zebra and quagga mussels**. Keep a watch out for them in your lake. Plant only native species along the lakeshore. Don't dump bait buckets or aquariums into the lake.	Exotic plant and animal infestations are a serious problem in Vermont lakes, causing significant recreational and ecological damage. Only careful vigilance by all lake users can prevent the spread of harmful exotic species. It is against the law to transport these four species from one surface water to another in Vermont.
Gas and Water Don't Mix	Replace 2-stroke boat engines with 4-stroke or direct-injection 2-stroke engines.	• 2-stroke motors emit 20-30% of the fuel-oil mixture unburned into the lake. • 4-strokes are quieter, use half the gas and have 90% fewer emissions.
Be Kind to Your Neighbors	Protect and support the local wildlife; • stay away from loon and other nest areas; • protect shoreland wetlands; and • enhance your shoreline with native vegetation (see "Go Wild" above).	Lakes are part of the diversity of native habitats in Vermont. Their important role in providing food, shelter and breeding areas for Vermont fish and wildlife cannot be overstated.
Get the Lead Out	Switch from lead sinkers to those made from steel or other materials.	Lead sinkers lost in the lake are often mistakenly eaten by fish or water fowl. In 1998-9, 53% of the loon deaths investigated in Vermont were caused by lead poisoning.
Build Responsibly	Any work in the lake such as dock or wall building may require a Shoreline Encroachment permit. (Call 802-241-3777.)	Artificial structures alter the natural functions of a shoreline, by removing vegetation and altering the natural lake bottom. Also, improperly done work can cause excess turbidity in the water.
Be safe!	Learn about Vermont's boating safety laws (call 802-244-8727 for a booklet).	Make lakes safe and enjoyable for everyone!
Work Together	• Join the local lake or pond association, or start one. • Get involved in town policy and planning discussions; assist the planning commission with lake protection issues.	• Many lakes and ponds have associations dedicated to taking care of the lake. They are involved in projects such as water sampling, landowner education, boating safety and watershed management. • Town Select Boards, planning and conservation commissions are good allies for lake protection.

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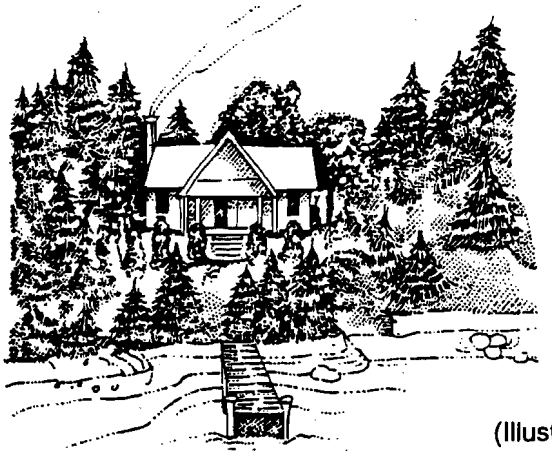

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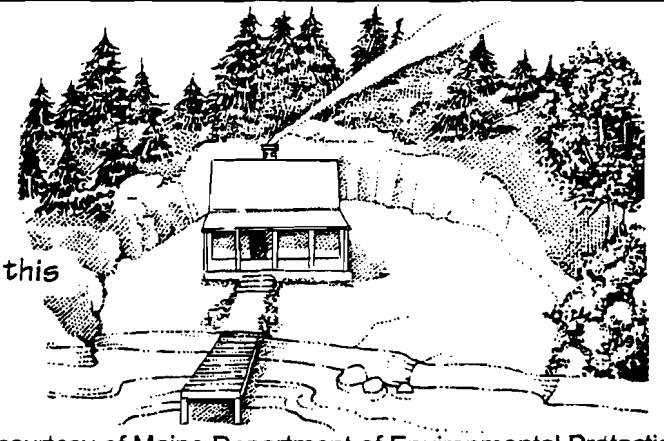


(Illustration courtesy of Maine Department of Environmental Protection)

— Mercury in Our Lakes: A Status Update on the REMAP Mercury Project —

With the support from the US EPA, there is a collaborative effort going on to study the chemical mercury in Vermont and New Hampshire lakes. The project is known as the Regional Monitoring and Assessment Program or REMAP. The overall goals of this study are to determine which large, publicly used Vermont and New Hampshire lakes are of the type that:

- have significant quantities of mercury in their waters and sediments;
- have the necessary chemical conditions to transform the mercury into its toxic form; and
- manifest high levels of mercury in plankton, fish, and fish-eating wildlife such as the merganser (*Mergus merganser*) and the common loon (*Gavia immer*); and
- to use the sediment record to determine the history of mercury deposition to Vermont and New Hampshire lakes.

The results of this study will be used for fish tissue consumption advisories in Vermont and New Hampshire, to learn more about bioaccumulation of mercury in New England freshwater species, and to provide baseline chemical and biological indicators against which regional and national-scale reductions of atmospherically emitted mercury can be measured.

As of this writing, two of three years of field sampling have been completed. A total of 105 lakes have been visited, and an impressive number of sediment, water, yellow perch, and piscivore (loons, mergansers, kingfishers) samples have been collected. This summer, zooplankton samples will be collected from about half the study lakes for taxonomic and mercury analysis.

Recent research tells us that the taxonomy of the zooplankton community has a critical impact on the transfer of mercury from sediments or waters up into the fish and 'higher' levels of the food chain.

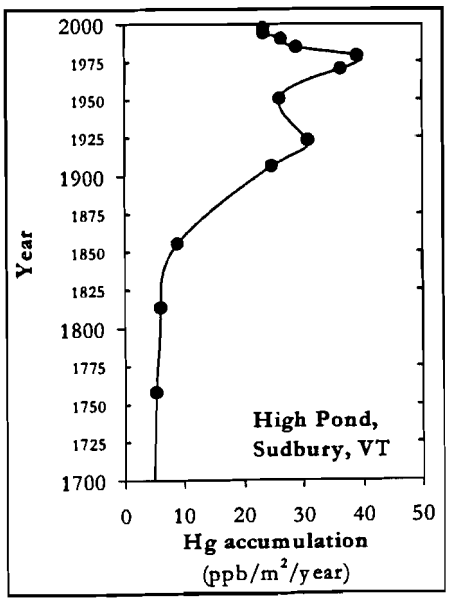
To date, data from the REMAP Project tell us:

- The concentration of mercury in water ranges from about **0.001 to 0.015** parts per billion. These are very low concentrations.
- The concentration of mercury in wet sediments ranges from **0.6 to 180** parts per billion, averaging at 4.3. At the high end of this range, the literature tells us that there is a low to moderate probability of toxic effects on sediment-dwelling biota (living organisms).

The concentration of mercury in yellow perch ranges from **14 to 1,300** parts per billion. The high side of these mercury levels validate the need for the Vermont Department of Health to continue the advisory on the consumption of freshwater fish due to mercury contamination.

The expected concentration of mercury in yellow perch differs for various lake types.

For every lake studied, there is a synchronous historical increase in the accumulation of mercury to lake sediments. This increase above 'baseline levels' corresponds to approximately the year 1850 (see diagram). There is also a nearly synchronous decrease in the accumulation of mercury to lake sediments, which begins in approximately 1980 and continues to present. On average, lakes accumulate about 4 times the mercury than they did during the period before 1850.

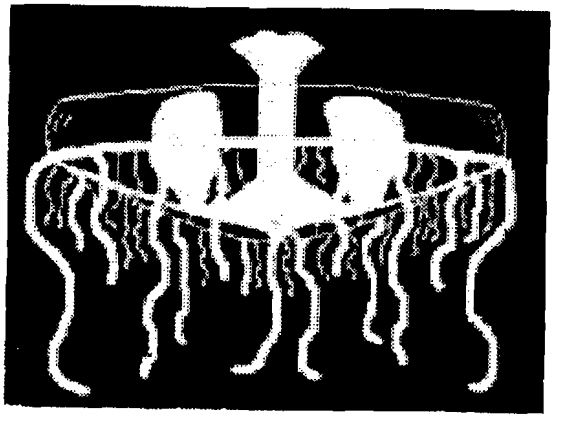


Accumulation of mercury (Hg) to the sediments of High Pond, Sudbury, VT.

Mercury levels determined from piscivore tissue tell us that loons can be considered at high risk of mercury exposure on 11% of the Vermont lakes studied, and on 29% of the New Hampshire lakes studied.

During the fall of 2000, REMAP collaborators will be actively analyzing the information provided by the study. A key portion of this work is to identify the specific lake types which can be expected to have elevated mercury in fish and upper food-chain biota. The type of lakes which are NOT expected to have elevated mercury in fish and upper food-chain biota are also of significant interest, since fish consumption advisories on these lakes might be relaxed. Finally, the data collected by this study will form a baseline set against which future changes in mercury levels can be assessed. For more information about the REMAP mercury study, contact Neil Kamman, at VTDEC.

Freshwater Jellyfish Reported in Vermont



Freshwater jellyfish have been reported in at least four Vermont lakes. Although not a "true" jellyfish, freshwater jellyfish are part of the same phylum, or scientific classification, (Cnidaria) as their saltwater cousins. This phylum includes sea anemones, corals, jellyfish and sea pens. One freshwater species of jellyfish, *Craspedacusta sowerbii* is found in the United States.

As noted on the **Freshwater Jellyfish Web Page** from the Indiana University of Pennsylvannia, www.iup.edu/~tpeard/jellyfish.htmlx, jellyfish have been reported in four Vermont lakes: Fern Lake in Liecester; Greenwood Lake in Woodbury; Lake Groton in Groton; and West Mountain Lake in Maidstone.

Freshwater jellyfish are translucent, bell shaped and about an inch in size (about the size of a quarter). They swim or float just below the water's surface and feed upon microscopic zooplankton. Each creature has 50-500 stinging tentacles which they use to immobilize prey. Their tentacles will not be felt by or harm humans as they can not penetrate skin. Jellyfish typically appear in the summer months when lake temperatures rise and food is plentiful.

The jellyfish life cycle includes two stages; the medusa and the polyp. The medusa stage is the typical "jellyfish" form. This form reproduces sexually to form polyp buds. The polyp buds can reproduce asexually to form other polyps and create polyp colonies; or the polyp buds can break off to form a medusa. Since polyps are microscopic, they are not commonly observed.

Much of the natural history of these animals is a mystery. One year, great numbers of jellyfish will appear on a lake that never had a sighting before. The following year they may disappear entirely and never return. Researchers at the Indiana University of Pennsylvania are currently studying this animal and trying to answer among many questions, if water quality affects jellyfish appearance. If you find jellyfish this summer, please either contact the UPI web site directly, or give the staff a call at the Lakes and Ponds Section.

Loosestrife for Lunch

The Purple Loosestrife Bio-Control Program is at the start of its fourth field season. To date, more than 90,000 beetles have been released on 490 acres throughout Vermont in an attempt to control purple loosestrife. Purple Loosestrife is an invasive, non-native plant taking over wetlands and choking out native species such as cattails and sedges.

The beetles *(Galerucella spp.)* used in the bio-control program are the plant's natural enemy from England. They were brought to the United States after years of intensive research, that determined these beetles only eat purple loosestrife. By munching loosestrife's leaves, they are able to decimate the plant The beetles are being reared in the state laboratory's greenhouse and will be released where loosestrife is prevalent throughout Vermont. In addition to beetles, this season the

VTDEC Wetlands Office plans to begin rearing root boring weevils (*Hylobius tranversovitattus*) to aid in the reduction of purple loosestrife.

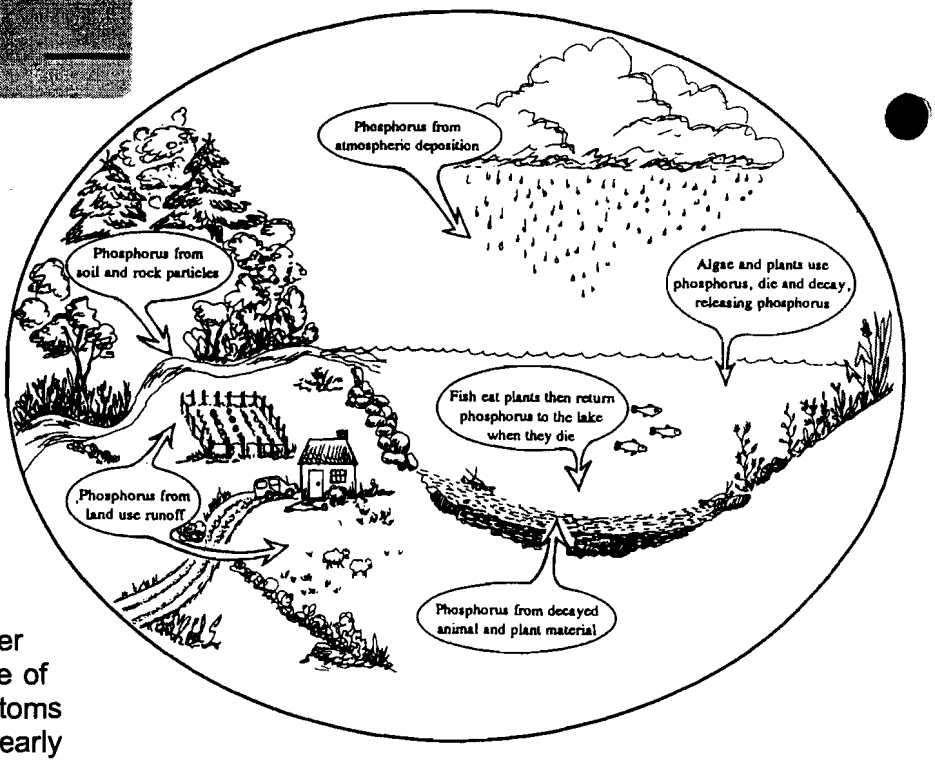
Many nurseries have been selling cultivars of loosestrife because cultivars were thought to be sterile. However, recent studies have shown these cultivars are not sterile. Letters have been sent to 400 plant selling nurseries and stores in Vermont with information about the purple loosestrife control efforts and the importance of selling native species. While planting your garden or landscaping your home, please be sure to do your part in controlling this invasive, exotic plant, and stay away from purple loosestrife cultivars.

(Continued from page 1)

Toxic Blue-Green Algae

muscle twitching and cramping; fatigue; paralysis; convulsions and suffocation. Death can occur in minutes due to respiratory failure resulting from paralysis of respiratory muscles. There is no known antidote to these toxins.

Symptoms of liver toxin exposure may include: jaundice; shock; abdominal pain/distension; weakness; nausea/vomiting; extreme thirst; rapid/weak pulse; and death. It may be hours or days before signs of liver poisoning appear.



Blue-green algae grow in large numbers in some lakes mid to late summer and into the fall. A typical seasonal cycle of algae starts early in the spring with diatoms blooming, followed by green algae in early summer, and then by an increase in growth of blue-greens during late summer and early autumn. This cycle may be somewhat familiar to many Vermont Lay monitors who typically experience lower water clarity readings during August when the blue-green algae start to bloom.

Although any type of algae can bloom throughout the summer, large algae blooms generally occur under sunny, calm weather and when there are high concentrations of nutrients, such as phosphorus available in the water column. Human activities along a lake's shoreline and further up in the watershed can lead to excessive amounts of phosphorus entering the lake.

Blue-green algae, including those species with toxic strains, are most often found in large numbers in phosphorus rich lakes and ponds. Severe blue-green blooms occur each summer in highly phosphorus enriched areas of Lake Champlain such as St. Albans Bay and Missisquoi Bay. Such blooms often have a "pea soup" or "green paint" appearance. Toxic strains can not be distinguished from the more common, non-toxic strains through rnicroscopic identification. Only through bioassays (injecting the algae into rats) or through chemical analysis can a strain be identified as poisonous. It is not known why the blue-green algae in Lake Champlain apparently became toxic last summer.

Maintaining Vermont's commitment to point and nonpoint source phosphorus reduction in Lake Champlain is the best long-term management response to reduce the potential for toxic blue-green problems in the future. At the local town level, it is important that everyone do their part to prevent nonpoint source runoff. Please see the box below for examples of good personal property practices or Best Management Practices to use for preventing sediment and phosphorus run-off.

If you come across an algae bloom and are concerned about it, please report it to our office. And, thanks for spreading the word about using good personal property practices for helping to prevent toxic blue-green algae blooms in the future.

Good personal property practices to control or reduce the amount of phosphorus from entering the lake include:

- maintain a buffer strip between any waterbody and a land disturbance (lawn, garden, driveway, etc.);
- maintain dirt roads properly to minimize erosion;
- avoid using fertilizers or pesticides close to a lake or stream;
- have septic systems pumped regularly;
- follow other Best Management Practices, such as fencing animals from streams and using silt fences at constructions sites to control erosion.

(Continued from page 1)

Managing Watersheds

Quality Standards. The TMDL process will be applied to these listed waters to design clean-up plans. To apply TMDLs to waters affected by non-point source pollution is a fairly new idea. How exactly this idea will be carried out is unclear. As a basic scenario, if a stream is found to be violating Water Quality Standards due to excessive sedimentation, then the various sources of erosion in the watershed will be encouraged or required to reduce their sediment output by an amount needed to meet standards.

The current Impaired Waters list includes the following lakes:

Lake Champlain - most sections violate phosphorus concentration standards and mercury concentrations in fish flesh limit consumption;

Lake Carmi - violates swimming and non-contact recreation uses due to excessive phosphorus;

Shelburne Pond - violates aesthetic, recreation and aquatic habitat uses due to low dissolved oxygen levels and excessive phosphorus concentration;

seven lakes violate fishing/recreation due to excessive mercury or PCB concentrations in fish; and

thirty-six lakes violate aquatic habitat use due to acidification.

Other lakes may show the beginning indications of pollution problems, but unless Water Quality Standards are being violated these lakes are not put on the list. (While several lakes are considered impaired by Eurasian watermilfoil populations, at this time exotic nuisance aquatic plants and animals cannot be addressed through the TMDL process.)

One hundred and twenty three impairments on 69 river and stream waterbodies are on the Impaired Waters list. Sedimentation, nutrients, and pathogens are the primary causes of impairment for rivers. The Impaired Waters list is revised every two years, so if you have questions about whether or not a waterbody is listed, please contact the Water Quality Division.

Water Quality Standards

New Vermont Water Quality Standards were recently adopted by the Vermont Water Resources Board, and are expected to become effective within a year. The Water Quality Standards are the basis for making various management and regulatory decisions concerning a water resource. The standards dictate what water quality should be maintained. For instance, whether a hydroelectric facility is re-licensed, a large dock is permitted, or an aquatic nuisance control project is funded. The standards are a mix of specific numerical criteria (e.g. phosphorus concentration should not exceed 14 micrograms per liter in Shelburne Bay) and "uses" for which the water should be of high enough quality to support (i.e. contact recreation or aquatic habitat).

A major change in the new standards is the inclusion of biological criteria for determining whether or not a waterbody is providing adequate habitat. The "Aquatic Biota, Wildlife and Aquatic Habitat" section of the Standards states that "biological integrity is maintained." Further discussion in the legislature regarding the specifics of implementing these new standards is likely. In particular the methods by which the "biota" (e.g. fish and insect populations) in streams will be evaluated, in order to determine ecological health, will be under discussion this winter. Biological criteria for lakes are still under development.

Most lakes are currently classified as Class B and will initially fall into the new Class B Standards, which requires that, for instance, aquatic habitat be of "high quality." Class A lakes (mostly water supplies or waters over 2500' elevation) will remain Class A. However, part of the new standards will likely allow greater fine-tuning within the classes such that certain values can be protected (e.g. exceptionally high quality habitat) or certain uses can occur (e.g. water level fluctuations for water supply or hydro-power generation).

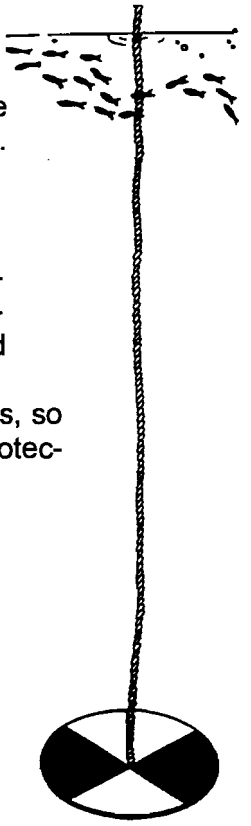
Watershed Initiative

The Agency of Natural Resources is creating new staff positions as "watershed managers" to assist local watershed and lake associations with watershed-based planning and provide funds to carry out pollution clean up or prevention programs in their watersheds.

These watershed managers will provide information and solicit local input to prepare required Basin Plans for each of the 17 watersheds in Vermont, update the TMDL list, assessing the conditions of the area waters, and perhaps reclassify each watershed's waters through the new Water Quality Standards.

Lake FEST 2000

Join the annual celebration of lakes and the work lake associations do to protect them. Lake FEST 2000 will take place the weekend of **July 21-23** on lakes and ponds throughout the state. These celebrations sometimes coincide with a Lake Association's Annual Meeting. Although the celebration is statewide, all activities and events are planned and advertised locally. Vermont has a lot of terrific Lakes and ponds, so why not celebrate clean lakes and the lake protection efforts by local groups and lake associations!



The Great American Secchi Dip-In

For the sixth consecutive year, Vermont Lay Monitors have the opportunity to participate in the National Great American Secchi Dip-In, scheduled from **July 1st to July 16th**. Secchi water clarity readings taken each week by the lake Lay Monitors on more than 70 lakes throughout Vermont are used to provide a snapshot of the transparency of the nation's waters. Vermont waters typically rank 4th or 5th in the nation.

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