the Water Column

A Publication of Maine Volunteer Lake Monitoring Program

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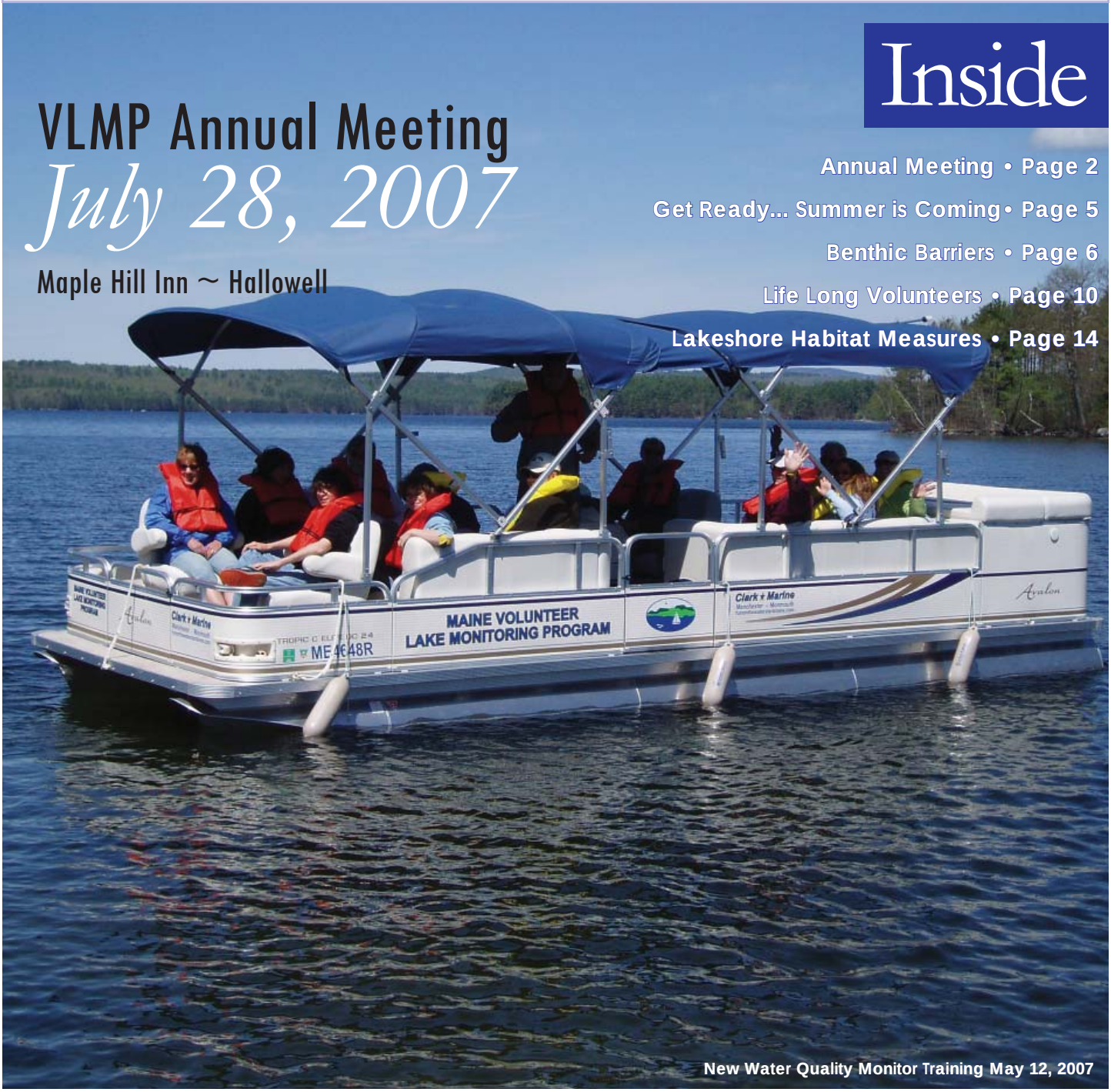
VLMP Annual Meeting

July 28, 2007

Maple Hill Inn ~ Hallowell

Inside



New Water Quality Monitor Training May 12, 2007

VLMP Annual Meeting Saturday July 28, 2007 Maple Hill Farm Inn Hallowell, Maine

VLMP Annual Meeting

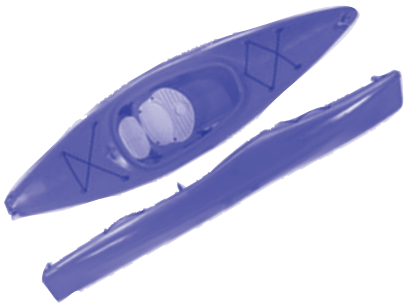
July 28
8:30 - 1:00

Join us as we celebrate the incredible efforts of Maine's Volunteer Lake Monitors. The half-day meeting will include technical presentations, volunteer awards, and lunch. This event is a great opportunity to meet and mingle with volunteer monitors from around Maine, staff from the VLMP and DEP, as well as others working in the lakes community.

The 2007 meeting will be held at Maple Hill Inn in Hallowell, recipient of Maine's first "Environmental Leader" certification for green lodging.

Win a kayak!

Certified Water Quality Monitors and Certified Invasive Plant Patrollers who attend the Annual Meeting can enter a free drawing to win a kayak and other prizes.

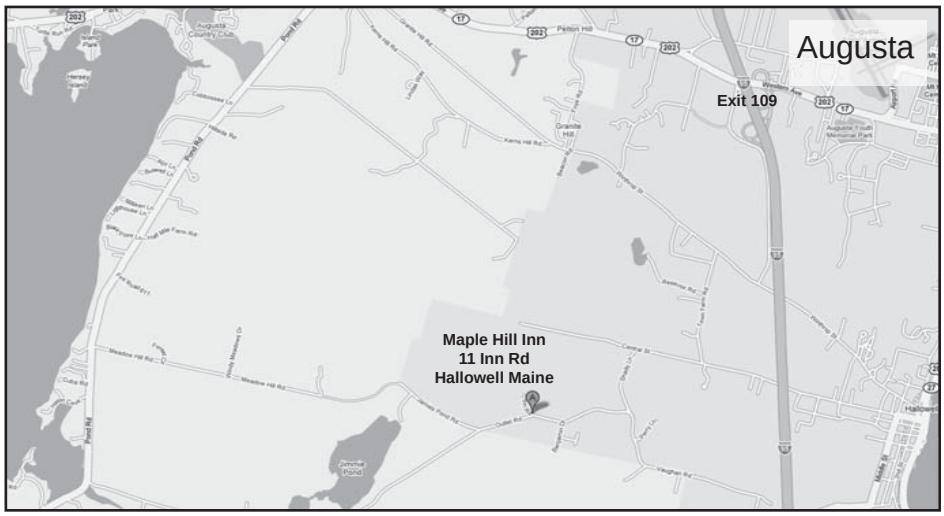


To Register

Complete and mail in the form on the back cover

Directions

From I95 exit 109 (109A southbound): Stay in the left lane on the exit ramp for Route 202 West (toward Winthrop), then as soon as you get onto Route 202 West, scoot right over into the left turn lane and take a left turn onto Whitten Road (at the first traffic light only a few hundred feet from the end of the exit ramp). Then just watch carefully for our blue and white signs directing you through a series of turns during the next 4 miles to Maple Hill Farm Bed and Breakfast on the Inn Road (our driveway) off the Outlet Road in Hallowell.
www.maplebb.com ~ 1-800-622-2708



Please note: Do not confuse Maple Hill Inn in Hallowell with the address of the VLMP's Brackett Environmental Center at 24 Maple Hill Rd. in Auburn.

VLMP Annual Meeting Agenda (Tentative)

8:30 - Registration & Refreshments
9:00 - Welcome
Scott Williams
VLMP Executive Director
9:05 - Climate Change and Maine Lakes
Dr. George L. Jacobson Jr.
Bryand Global Sciences Center at the University of Maine, Orono.
9:50 - Herbicides: Questions and More Questions
Roberta Hill
Director, Maine Center for Invasive Aquatic Plants
10:35 - Break
10:50 - The Water Looks Clean... Is It?
A summary of findings from the USGS/EPA study of stormwater runoff in the US.
Henry Jennings
Director, Maine Board of Pesticide Control
11:35 - VLMP Volunteer Awards
12:30 - Lunch
1:00 - Water Quality Re-certification Workshop
Please pre-register with the VLMP office for this workshop.

Keynote Presentations

In addition to volunteer recognition, great prizes, wonderful food and the opportunity to hobnob with other volunteer monitors from lakes throughout Maine, the 2007 VLMP Annual Meeting will feature three outstanding technical presentations by distinguished speakers:

Henry Jennings is the Chair of the Maine Board of Pesticides Control. He will discuss the findings of a recent study by the USGS, which investigated the composition and concentration of a wide range of pollutants in stormwater runoff from suburban communities. The results of this study have vast implications for Maine's lakes and ponds, as our watersheds become less rural, more developed, and more urbanized in character.

Dr. George L. Jacobson, Jr. is a Professor of Quaternary Biology at, and former Director of, the Bryand Global Sciences Center at the University of Maine, Orono. Dr. Jacobson will discuss recent findings concerning climate change, and ways in which this phenomenon may impact water resources. This topic has the potential to become the overarching issue affecting our lakes and ponds in the future.

Roberta Hill is the Director of the Maine Center for Invasive Aquatic Plants at the Maine Volunteer Lake Monitoring Program. Roberta will discuss the role of aquatic herbicides in controlling invasive aquatic plants in Maine lakes, including a summary of what is known, and what is not known, about this approach to controlling aquatic invaders. Decisions concerning the use of aquatic herbicides in Maine lakes will shape the future of response efforts to this threat.

What's Inside

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Lakeside Notes

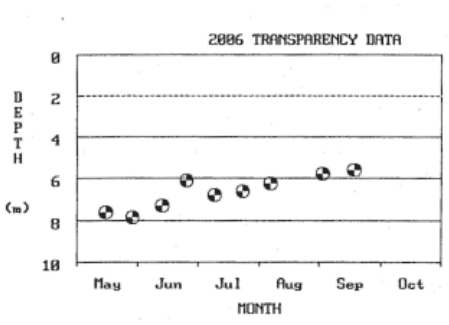
Scott Williams
VLMP Executive Director

The Value of Early Spring/Summer Secchi Data

By the time this newsletter reaches your mailbox, whether it's the one at the end of your driveway, or your email server, I hope most of you will have taken your first Secchi disk reading(s) of the season. Readings taken during the month of May (even earlier, if the ice is out, and you're up to the task) provide useful information about your lake in a number of ways. Water clarity in many lakes and ponds changes most dramatically during the early part of the monitoring season, due to the effects of : 1) winter snowmelt and spring storms, which produce stormwater runoff that carries moderate levels of sediment and phosphorus from eroded watershed soils to our lakes, 2) spring turnover, during which time the entire lake mixes, stirring up sediment and other debris from the lake bottom, and 3) spring diatom blooms, which occur naturally, and are generally of short duration, but may change water clarity noticeably.

Because lake water clarity can change so much during the course of a typical season, it's valuable to try to capture as much of the variation as possible, which is why we take readings approximately every two weeks during the May-September (minimum) monitoring period. One way to demonstrate the effect of shortening the monitoring season can be done while looking at the Secchi graph that illustrates the monthly transparency average for your lake (located on left side of the first page of your annual lake water quality report). Try covering over the early season readings to get a sense of how the picture for the year would change. An even better way is to simply recalculate the average Secchi transparency for the season, leaving out the May and early June data. In many cases, the change will be substantial, causing the average for the season to increase in some cases, and to decline in others. In other words, missing spring Secchi readings could result in a significant over (or under) estimation of the water quality of your lake. Over time, the effect of shortened monitoring seasons could result in both the mis-characterization of existing water quality, and insufficient information to identify changes (trends) taking place in a lake.

The following Secchi graphic from Green Lake in Oxford provides a good example of the seasonal range in Secchi transparency that occurred in 2006.



Possible Influences of 2007 Spring Weather on Secchi Readings

It seems like Maine has experienced a good deal of extreme weather in recent years. Last winter, many of our lakes and ponds didn't freeze over until well into the month of January, due to downright balmy weather from November through the first few weeks of 2007. Late winter snowstorms, and lower than normal spring temperatures have caused the weather throughout much of the state to swing from one extreme to another recently. Several weeks ago, much of the state experienced heavy rain and flooding, followed by warmer than normal temperatures and several days of strong winds, resulting in the posting of severe forest fire danger warnings. For the past several days in mid-May, nighttime temperatures have dropped down into the thirties, and cold, heavy rain has once again resulted in flood warnings for much of the state.

During the past two weeks, Secchi readings on several western Maine lakes that I have monitored over the years have been noticeably lower than average for the month of May. Considering the road washouts and shoreline erosion that have been evident as I've driven through the watersheds of these lakes, the low readings were not all that surprising.

Get Ready... Summer is Coming

Protect Your Backyard When Opening Up Your Cottage

By Bill Laflamme
Coordinator of the Maine Non-point Source Training and Resource Center with the Maine DEP's Bureau of Land and Water Quality

After a long Maine winter it's that time of year again when the earth starts to warm and the lakes shed their icy coats. Soon it will be time to have fun in the sun; swimming, boating and fishing at your summer retreat. But first there is much work to be done: the cottage needs to be prepared for the season; the waterline needs to be hooked up; the dock needs to be installed; and boats need to be launched.

When going through this yearly ritual, it is important to consider possible harm to streams and lakes and the surrounding environment from these activities. After all, one of the main reasons you go to the cottage is to enjoy the area's unspoiled beauty.

With regard to repair and maintenance to your retreat's buildings and grounds, take care when using cleaning agents, paints and stains. Use natural products like baking soda and lemon juice when cleaning.

When using paints and stains, consider using earth tone colors so that buildings and other structures will blend better with the natural shoreline. Paint or stain docks away from the lake and allow at least 14 days of drying time before putting them in the water. Make sure to clean brushes, etc. away from the water to prevent materials from washing into the lake.

This may be a surprise to you, but when cleaning up winter debris on the property, DO NOT rake up the duff layer of leaves and pine needles that build up under the trees! These leaves act like a sponge and filter and help prevent pollutants from getting into the lake. As a cottage owner it is one of the best things you can do to protect lake water quality.

Check the shoreline and other areas of the property for soil erosion. Stabilize these areas with vegetation or rock riprap. If more than minor maintenance and repair is required, or if structural measures are necessary, contact your local code enforcement officer and the DEP to determine if permits will be needed before doing the work.

With regard to your septic system, check the leach field for any breakouts and consider having the tank pumped if it has not been pumped in the last 3 years. A properly functioning septic system prevents harmful pollutants from getting into the lake.

When preparing your boat for another season, make sure to dispose of drained lubricating oils at a recycling facility or bring the oil to your local dealer for disposal. Wash the boat away from the water or at a commercial car wash. Check to make sure that the boat, trailer and other equipment are free of any hitchhiking plants. And tune-up that motor.

Following these simple rules when opening up your cottage will go far in protecting the natural resources you so enjoy as a cottage owner. We all must work together to ensure that our natural resources remain in good condition for future generations.

More information on cleaning products from less harmful materials can be found at the Maine Department of Environmental Protection's pollution prevention website: www.maine.gov/dep/oia/p2/consumerepp.htm.

Littorally Speaking

Benthic Barriers

By Roberta Hill

This article is the third in a four-part series focused on the challenge of controlling invasive aquatic plants in Maine. The first article looked at Maine's cautious approach to the use of aquatic herbicides. The focus of the remaining three installments is on the various "non-chemical" control methods (alternately referred to as "manual," "physical," or "mechanical" methods). Most groups currently involved in combating variable milfoil infestations in Maine are utilizing one (or more) of these non-chemical control methods. The first of the three, featured in the winter 2007 Water Column, was manual harvesting. This time we will look at the use of benthic barriers.

Some of the most successful invasive aquatic plant management projects in Maine involve the use of benthic barriers (also called bottom mats and bottom barriers). This method is especially effective in controlling pure (single species) stands of invasive aquatic plants such as variable milfoil, when the plants occur in dense, small-to-moderately-sized patches.

In larger infestations, benthic barriers are often installed in the high use areas only, such as boat channels, beaches, dock areas, etc., to establish "plant-free" zones, and to minimize opportunities for plant fragmentation and spread. However, in areas where boating occurs, barriers are recommended only in water deeper than five feet, to avoid entanglement with props. Control of entire larger infested areas (over 500 square feet) with benthic barriers, though not generally recommended due to the cost of installation and maintenance, *is* possible. Indeed several groups in Maine are now showing just how this technique can be effectively "scaled up" to larger infestations. An excellent example of a community that is pushing past previously held notions of the "limitations of benthic barriers" with great energy and innovation is featured in the *Lily Brook Case Study* on page 12.

IMPORTANT! All invasive aquatic plant control projects are subject to regulation under Maine's Natural Resources Protection Act. Before planning any control project, contact the Maine Department of Environmental Protection for specific permit requirements (1-800-452.1942 or milfoil@maine.gov). *All native aquatic plants are strictly protected by Maine law.*

The basic concept is simple. Tarp-like material is placed over the invasive plants, on the lake floor, to prevent light penetration, disrupt photosynthesis and smother the plants. Over a period of time (generally forty-five to sixty days), the plants beneath are killed, roots and all. To go back to our garden analogy from the previous article*: think "black plastic mulch."*

An LEA control team in the Songo River in Naples, unfurling a 40' X 60' benthic barrier, constructed from a common blue plastic tarp. Benthic barriers are a tool for killing invasive aquatic plants. They are basically weighted tarps that provide the same function as black plastic mulch in the garden. (Photo courtesy of LEA)

Jim Chandler of Bryant Pond has been a pioneer of benthic barrier design and use in Maine. He feels that placing benthic mats requires less time than to manually harvest the same size area and the mats produce a "cleaner" (more effective) result. However, if the infested area is not dominated by invasive milfoil (i.e., if there is a significant amount of native plant growth mixed with the invasive species) then manual harvesting, a more selective method of control, is more

appropriate. The exception to this is the mixed-vegetation stand where the sparsely distributed invasive plants persist despite repeated manual removal. In these cases small mats (5' X 5') may be placed strategically in order to "spot kill" the offending invaders, while allowing the natives growing around them to continue to thrive.

Which brings us to an important drawback with this method: benthic barriers are *not* selective. They will damage or kill *all* plants underneath, invasive and native, and can also negatively impact fish and bottom dwelling invertebrates. Negative impacts on non-target animal populations are minimized, *but not eliminated entirely,* by avoiding benthic barrier placement during fish spawning season (from April 1 through June 30) and by limiting the amount of area covered at any one time. The general rule is that no more than 10% of the littoral zone of the waterbody (or distinct portion of the waterbody such as a cove) should be covered at any one time. Larger infestations are managed by covering a limited portion of the infested area, and then moving each mat to the next adjacent infested plot, and repeating this process as necessary, every sixty days.

The most common materials used in the construction of benthic barriers include: fiberglass screening, geotextile or other heavy-duty landscape fabric, impervious pond liner, and burlap. In Maine, experimentation is under way with other recyclable and low-cost materials. Thanks to Lakes Environmental Association (located in Bridgton) and their work to control variable milfoil in the Songo River, Maine now has yet one more use for the ubiquitous blue plastic tarp. (For more information on experimental materials see "On the Cutting Edge" on page 9.

The PLPPA control team preparing to deploy one of the many 12.5' X 10' benthic barriers that have been used to control variable milfoil in Lily Brook. (Photo by Nikki Leamon)

Obviously there is a bit more to killing "weeds" in the aquatic environment than just rolling out the black plastic. And if we may go back to the plastic mulch analogy for a moment, and try to imagine installing the plastic sheeting to a "garden" under several feet of water, we soon glimpse the key challenges with benthic barriers: 1) the unwieldy material must be transported as efficiently as possible to a designated location on the lake floor; and 2) the material must be kept in place as water currents and surface activity above, and gas release below, conspire to dislodge it.

Let's start with the challenge of keeping the mats in place, since this needs to be determined and provided for in advance of deployment, and then work our way back to the challenge of transport and placement.

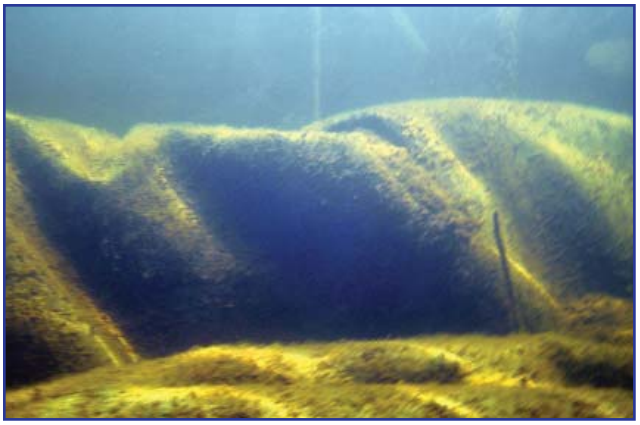
Most of the tarp-like materials used to construct benthic barriers will float and must therefore be anchored in place. Decisions regarding what type of weights to use and how they will be placed must be made well in advance of deployment. Sandbags, bricks, cinderblocks and rocks are all useful anchoring materials. The weights are simply lowered onto the mats in whatever pattern and frequency may be needed to make the material lie relatively flat on the bottom. If calculated and executed correctly, the combined effect of all individual weights is sufficient to keep them all in place.

Benthic barriers must be weighted to hold the tarp like material in place. Common methods are rebar attached with electrical ties, rock-bag anchors, and bricks.

Another type of weight system involves rebar rods (or rebar encased in perforated PVC pipe). In this case, the weighting devices are directly attached to the barrier material (often with "electrical ties") to ensure that they will maintain their position on the mats. One benefit to using rods is that some of the rods (those running across the width of the mat) may be attached to the mat prior to deployment, and then rolled up in the mat to provide the weight needed to get the mat to the bottom. (The rods that run down the sides of the mat are installed later, when the mat is in place.)

Regardless of the anchor used, the amount of weight needed to hold the mat in place will vary depending on the water depth at the deployment site and other localized conditions such as water currents, surface use activity, amount of plant material being covered, etc. In general, mats tend to be more stable in deeper, calmer water.

Some benthic barrier materials (e.g., fiberglass screening) are porous, allowing for gases to escape from under the barrier. Other barrier materials (geotextile, plastic tarps, etc.) are less permeable and have a tendency to trap gasses. Gas accumulation under the



Underwater photo of a benthic barrier "in action" in Lily Brook. Note that some mild billowing has occurred as a result of gas released from decomposing plants. (Photo by Lew Wetzel)

barriers can lead to billowing, and displacement. To keep these mats in place, perforations must be made at regular intervals prior to installation. Two-inch-long slits may be cut with a sharp knife, or holes may be burned into the material with a wood burning tool. Obviously, care must be taken to perforate the mat only as much as is needed to prevent billowing without diminishing the light blocking integrity of the mat.

Despite the best installation and weighting, boat anchors, propellers, swimmers or other localized activity may disturb, damage, or dislocate benthic barriers. Frequent (at least twice a month) visual inspection and maintenance are essential to ensuring that the mats stay in place and maintain their effectiveness. Maintenance chores include repair work, silt removal, and release of gas build-up to correct billowing problems. Clearly marking the treatment areas, and asking the public to temporarily avoid activity near the sites, will help to minimize disturbance problems.

Transporting and deploying the mats also requires advanced planning and preparation. Anchored buoys, floats, underwater marking devices (such as fiberglass rods or PVC pipe) and Geographic Positioning System (GPS) devices may be used to mark the perimeters or corners of treatment plots and the barriers once in place, and also to guide the control team to the deployment sites for maintenance and moving to a new location.

For offshore sites, barriers must be constructed in such a way that they may be efficiently transported, generally by boat, from shore to the designated location of deployment. Mats that have been constructed and packed (folded or rolled) for deployment on shore are loaded into boats and transported out to the pre-determined treatment plots. Working as a team, one person in the boat feeds and guides the mats to SCUBA diver (or divers) in the water, who then swims the mats to the lake floor. There the mat is "unpacked," spread out over the treatment area, and weighted. If manual harvesting is being done in combination with the barrier placement, the team may also include additional divers and weed handlers, fragment spotters, etc.

Benthic barriers vary significantly in size. Mat size is determined by a variety of factors such as the size and configuration of the infested area to be controlled, the number of individuals that can be brought to bear upon the task of installation and removal, the size of the boat to be used to carry the mats to the deployment site (for offshore areas), the types and amounts of material resources available, the storage space available, etc. Generally, the larger the mat size the more cumbersome it will be to move and manipulate. Benthic barriers used in control projects in Maine range in size from 5' X 5' to 40' X 60'.

Most barriers are designed to be removed after the treatment period, cleaned, repaired, and stored for later use. In some cases barriers may be removed from the water and placed in a new location; sometimes they are

"Locally Grown" Benthic Barrier Designs

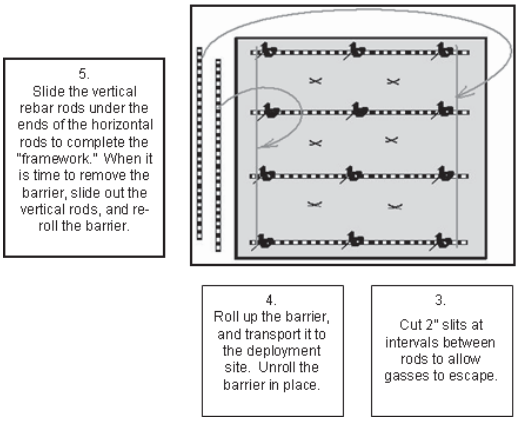


Diagram of a 10' X 12.5' benthic barrier designed by Jim Chandler, adapted from Maine Congress of Lakes Association's Winter 2006 Newsletter

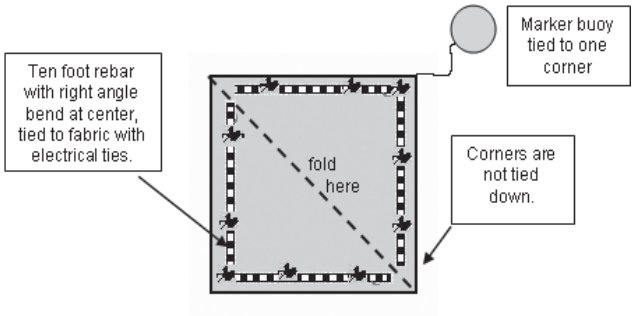


Diagram of a 5' X 5' "clamshell-style" benthic barrier designed by Trevor Tidd of Parker Pond/Pleasant Lake Association.

simply shifted underwater. (In some New England states, though not yet to our knowledge in Maine, non-removable barriers made out of non-synthetic, natural fibers such as burlap are installed and simply left in place to biodegrade.) Properly maintained reusable barriers may last for up to ten years, possibly longer, depending on the material composition, usage and maintenance.

Removable barriers installed during the growing season must be removed with in 60 days of installation. The only exception to this are barriers installed in late fall (when the 60 day time frame extends into the winter). Mats left overwinter must be removed from the lake or moved to a different site at the beginning of the following growing season.

Benthic barrier layering material costs vary in accordance with the type, quality and performance rating of the material. Massachusetts Department of Natural Resource Conservation provides a cost estimate of $0.22 cents to $1.25 per square foot, and a total cost per acre of $20,000 to $50,000. This cost does not include weights, barrier marking devices or any installation costs. New York State Department of Environmental Conservation estimates the additional cost of professional installation to be $10,000 to $20,000 per acre.

With the help of innovative, energetic and dedicated volunteers, lake groups in Maine are finding creative ways to minimize the costs typically associated with installing benthic barriers. Their work is also leading the way to more effective methods for controlling invasive aquatic plants moving forward. For a good example of this, please see the *Lily Brook Case Study* on page 12.

Thanks to Laurie Callahan, Jim Chandler, and the DEP Invasive Aquatics Team for their contributions to this article.

Invasive Plant Patrol Manual Control Workshops

Introduction to Manual Control
June 13, 9AM to 4PM ~ Sebago Lake State Park, Casco

Suction Assisted Manual Harvesting
June 16, 9AM to Noon ~ Little Sebago Lake, North Windham

If invasive plants are not removed, contained and disposed of properly, the removal project may cause more harm than good. Two distinct control workshops are being offered by MCIAP this year. The first is an introduction to manual control projects in Maine, and provides specific instruction and in-lake practice for those who plan to participate in manual harvesting and benthic barrier projects. The second workshop focuses on suction assisted manual harvesting equipment and techniques. These workshops are geared for SCUBA divers and non-divers who plan to provide surface support for control projects. PRE-REGISTRATION IS REQUIRED. Contact VLMP to register or for more information (207-783-7733 or vlmp@mainevlmp.org)

On the Cutting Edge

One of the most recent innovations to come out of the quest for lowering the cost of benthic barriers is now being tested in Shagg Pond in Woodstock. In 2006, the Community Lakes Association control effort, under the direction of Jim Chandler, began experimenting with the use of 10' X 40' mats constructed of 6-mil polyethylene black-plastic sheeting with 3/8" rebar attached across the width every six or seven feet. Electrical ties are used to attach the rebar to the sheeting and clear duct tape is used to reinforce the holes for the ties. At the both ends of the mat, the sheeting is wrapped around the rebar several times, reinforced with clear duct tape and tied with five electrical ties. Rope "handles" are attached to both ends to make the mats easier to maneuver into place. A box cutter is used to make a line of five, evenly spaced 2-inch slits midway between each set of rebars. No side bars are used in this application, and each mat is overlapped about one-foot with the previous mat. The slippery nature of the polyethylene sheeting enhances gas escape along the sides of the mats.

According to Jim Chandler, the polyethylene mats are much lighter and more cost effective than those made out of more commonly-used materials. A 10' x 40' "poly" barrier is of comparable weight to a 10' X 12.5" mat constructed from geotextile. The cost of the poly barrier is about 10 cents per square foot for the sheeting and rebars (about $4000 per acre not including installation costs). Eliminating the side bars further lowers materials costs and reduces installation time.

Contstruction of a 6-mil polyethylene benthic barrier.

So far the results from this new benthic barrier have been quite good, particularly in deep water. The question remains, of course, of how well these mats will hold up over time. But in the meantime, those who are battling the invaders in Maine are not wasting any time wringing their hands. They need their hands for more important things!

Life Long

34 Years
Joe Emerson, Upper Narrows Pond

33 Years
Robert Susbury, Howard Pond

32Years
David Hodsdon, Clary Lake

31 Years
Ralph Johnston, Highland Lake
Charles Turner, Panther Pond

30 Years
Charles McClead, Phillips Lake
Richard Offinger, Cathance Lake
Frank Perkins, Square & Wiley Ponds

29 Years
Thomas Dionis, Balch & Stump Ponds
Kenneth Holt, Bear Pond

27 Years
John Wasileski, Kennebunk Pond
Stan Wood, Swan Lake

26 Years
Kenneth Forde, Stearns Pond
Charles Hodsdon, Great East Lake

25 Years
Bill Mann, Round Pond
William Reid, Wesserunsett Lake
Bill Riley, North Pond

15 Years
Bert Breton, Round Pond
Claude Crandlemere, North Lake
George Cross, Center Pond
Bruce Eastman, Worthley Pond
Lawrence Lane, Nashs Lake
Martha Tracy, Jaybird Pond

Lake Monitors

10 Years

Danny Beers, Spednik Lake

George Bouchard, Horne Pond

Richard Bouchard, Crystal Pond

Rich Bray, Bear Pond

Yvonne Burckhardt, Lawry Pond

Brian Canwell, Flying Pond

John Devin, Nicatous Lake

Charles Furlong, Pleasant River Lake

Thomas Hamilton, Anasagunticook Lake

Richard Johnson, Hancock Pond

David Lagasse, Pattee Pond

Ellen McLaughlin, Keg, Bottle, and Norway Lakes

Kent Mitchell, Bear Pond

Gerry Nelson, Cushman Pond

Freda Parker, Bottle Lake

Teg Rood, Wilson Lake

Nancy Swanson, Swetts Pond & Brewer Lake

Tim Tetu, Sandy Bottom Pond

Mike Whitmore, Embden Pond

Rick Young, East Carry Pond

5 Years

Charlie Adkins, Parmachenee & Aziscohos Lakes

Victor Borko, Gull Pond

Dave Brainard, Twitchell Pond

Richard Brey, Fox Pond

Mike Cahill, Pemaquid Pond

Liz Carter, Pocamoonshine Lake

Don Childs, Moose Pond

Bill Creesy, No Name Pond

Robert Cyr, Little Ossipee Lake

Marilyn Dailey, Egypt & Marshall Ponds

Linda Dexter, Haley Pond

Patti-Ann Douglas, Sand Pond

Dave Drouin, Parlin Pond

Sue Glann, No Name Pond

Donna Heavel, Moose Pond

Lee Anna Hutchings, Little Pond

Richard Jacques, Parlin Pond

Georgie Kendall, Boyden Lake

Craig Killingbeck, Great & Long Ponds

Amy Kimball, Raymond Pond

Shari Latulippe, Great & Georges Ponds

Chip Liversidge, Loon Lake

Rene Mathieu, David & Basin Ponds

Bob Maxfield, Little Ossipee Lake

Richard Meyer, Trickey Pond

Susan Motley, Quimby Pond

Catherine Norkin, Pleasant Pond

Mike Rancourt, No Name Pond

Shelby Rousseau, Mooselookmeguntic Lake

Robert Sievert, Long Pond

Bob Silvia, Round Pond

Patty Silvia, Round Pond

David Trask, Moxie & Indian Ponds

Tonya Troiani, Meddybemps Lake

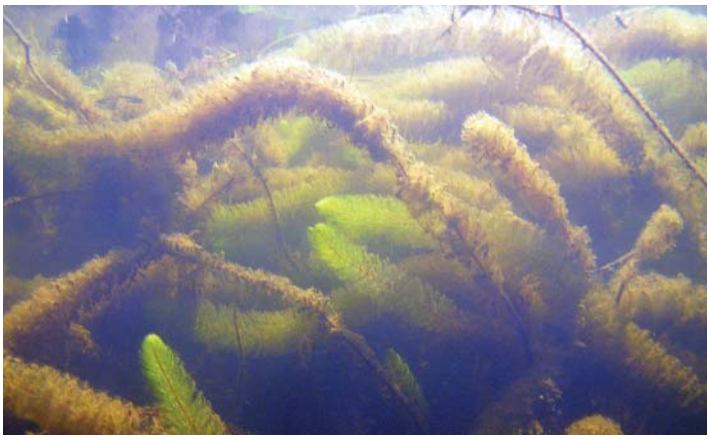
Willis White, Big Kennebago Lake

Verna Wilson, Mattanawcook Pond & Endless Lake

Lily Brook Case Study:

Controlling Variable Water-milfoil in a Small, Slow-Moving Stream

Excerpted and adapted from a Case Study by Volunteer Invasive Plant Patrollers Joel Bloom, Lew Wetzel, Fred Cummings and Pixie Williams; currently available on the VLMP website at: www.mciap.org/control/CaseStudies/MCIAPLilyBrookCaseStudy2006.pdf



This photo of Variable Water-milfoil in Lily Brook shows the density of invasive plant growth before control methods, including benthic barriers, were initiated. (Photo by Lew Wetzel)

This photo of a control site was taken several weeks after the benthic barrier was removed. The native plants are rebounding nicely! (Photo by Lew Wetzel)

Variable water-milfoil (*Myriophyllum heterophyllum*) was first documented in Lily Brook in August of 2000. Lily Brook is a slow moving stream that connects Pleasant Lake and Parker Pond in the town of Casco, in Cumberland County. Pleasant Lake and Parker Pond are popular recreation lakes, and Lily Brook has long served as a connecting stream for boaters traveling from one waterbody to the other. The water generally flows in a northerly direction, from Parker Pond through Lily Brook into Pleasant Lake. However, during periods of prevailing north winds, the water current reverses course and moves in the opposite direction, further increasing the possibility that the invasive plants in Lily Brook may spread to one or both adjacent waterbodies. By August 2001, the Lily Brook variable water-milfoil population had roughly doubled in size, and a pioneer colony was observed in the small outlet cove of Pleasant Lake.

It did not take long for the Pleasant Lake and Parker Pond Association (PLPPA) to respond to this disconcerting news with an aggressive and comprehensive action plan aimed at controlling the variable milfoil in Lily Brook and the outlet cove Pleasant Lake. Having been cautioned that eradication of an invasive aquatic plant, once well-established, is rarely possible, PLPPA decided to move systematically, with determination, toward complete eradication. In 2001, PLPPA formed a ten-member committee to develop and provide guidance for the management effort. Their management plan has evolved over time, and now includes the following strategies:

- Invasive aquatic plant screening and mapping surveys are conducted on Pleasant Lake, Parker Pond and Lily Brook twice a season. An additional six waterbodies in the Casco/Otisfield area were added to the survey program in 2003.
- Screens to capture plant fragments were installed at both ends of Lily Brook, to prevent spread of the infestation to Pleasant Lake and Parker Pond. The screens are made of ¼" galvanized wire mesh 24" and 36" wide mounted on pipes driven into the bottom about 6' apart. The screens have a bottom clearance of at least 12" to allow fish and wildlife to pass.
- All propeller driven watercraft have been banned from Lily Brook, but the screens protecting Pleasant Lake were staggered to allow the canoes and kayaks through. The inlet from Parker Pond does not lend itself to staggered screens so a passageway was cleared of milfoil approximately seven yards from the north end of Parker Pond, and a carry-on access was established in this area for canoes and kayaks. In 2006, two docks were installed to facilitate the portage from Lily Brook to Parker Pond.
- Starting in 2002, and working from north to south in Lily Brook, benthic barriers have strategically placed over the most densely infested areas. A number of 10' X 12' mats are installed at the beginning of the season, left in place for 45-60 days, and then moved one by one to the next designated location. Manual harvesting is used around the barrier edges to "mop up" any stragglers. Barriers have also been used to treat the population in the outlet cove of Pleasant Lake. Over four years, the PLPPA control team

has placed a total of eighty-two barriers. Underwater photographs are taken to track progress and help determine where additional control is needed.

- The Lily Brook control effort has been enhanced by a strong local prevention effort. Courtesy Boat Inspectors (CBIs) are hired each season to staff three nearby launch sites. Custom signs have been designed and installed at three launch sites to inform boaters about threat of invasive aquatic plants, Maine's IAP laws, and ways to prevent the spread of lake invaders.

PLPPA has not only risen to the challenge of controlling an insidious invader in their midst, they have made great progress toward their ambitious goal of complete eradication. Their energy and innovation of those actively involved in the control effort are impressive, and the growing list of success stories emanating from this project hold lessons for all of us who are concerned about the threat of invasive aquatic plants. Here is a sampling of some of PLPPA's successes to date:

- By the end of 2006, all of the large dense patches of variable milfoil in Lily Brook (about ½ acre in total) have been effectively controlled with benthic barriers. Native plants are now rebounding in these areas. The focus has shifted now to identifying the remnant milfoil plants and small patches, and controlling these with benthic mats and manual removal.

PLPPA President and Pleasant Lake resident, Joel Bloom, looks on as control team members Jim Chandler, Fred Cummings and Pixie Williams monitor the milfoil growth in Lily Brook

- A dedicated core group of association members have remained actively involved in the control project since the beginning. Other community members donate resources and services. The towns of Casco and Otisfield have become invested in the overall prevention and control effort, contributing significant support for the boat inspections, the IAP surveys, and control projects.

- In 2006, students from the Spurwink School were hired to help with important end-of-season tasks. Sixty seven benthic barriers from Lily Brook, were cleaned, repaired, dried and rolled up for storage. Seven Spurwink students and their teacher participated. The work was overseen by an experienced PLPPA volunteer. PLPPA has received grant funding to expand this program in 2007.

Making Good Use of Your Secchi Data

By Scott Williams

In addition to the many beneficial uses your data provides to the VLMP, the DEP and EPA, and many other agencies, organizations and institutions, there are a number of opportunities at the local level for you to help inform your lake community about what is known about the lake that you monitor.

There are several ways in which you can help to raise the local level of understanding and awareness about your lake. Most volunteer monitors belong to a local lake association. No audience is likely to be more eager to hear what you have to say about lake water quality than lake association members, whether at an annual summer meeting, or at a gathering of the association board of directors. Information about lake water quality is generally the cornerstone of lake protection efforts at the local level.

Other local groups that are likely to be receptive to your information include town conservation commissions, comprehensive planning committees, and planning boards. These groups rely on objective information about lakes and ponds, in order for them to provide appropriate and consistent protection of these valuable community resources. Although the State of Maine makes a great deal of information concerning lakes and ponds available to towns, lake data provided by a member of the community generally carries a great deal of weight.

Don't miss the opportunity to become the local spokesperson for the lake that you monitor. If you need assistance in interpreting data, or any other information concerning lake protection, please feel free to contact the VLMP. When you become a certified volunteer lake monitor, part of our commitment to you is ongoing, technical support. The extent to which you take advantage of this support is up to you. During the course of the year, we respond to inquiries from hundreds of VLMP volunteers on a wide range of lake-related topics. Of course, we don't have *all* of the answers. But between *your* local knowledge and *our* willingness to help you put your lake data in perspective we create a powerful team for ensuring the health of your lake.

Reminder to Volunteers:

If you are a member of a lake association, please ask them to support your efforts as a Water Quality Monitor or Invasive Plant Patroller, by making an annual contribution to MVLMP. We thank you for spreading the word and helping us to reach our goal of monitoring more lakes in Maine!

Lakeshore Habitat Measures

By: Dave Halliwell, Biologist
Maine DEP, Lakes
Assessment Section

The shallow area around a lake where water meets land is called the *littoral zone*, in direct contrast to the deeper, offshore *limnetic zone* of a lake. The relative condition of this watered shore land area, in terms of the presence or absence of human alterations, is a critical component of overall lake habitat for resident fish and associated aquatic organisms.

In the last (Winter) issue of the VLMP Newsletter, we presented an introductory article which spoke of natural conditions observed in remote lakes with minimal human perturbations. This second article will report on recent and past developed lake shore investigations in New England and elsewhere, while the third article (Fall 2007) will address the question posed by lake managers and researchers (Kirsten Ness 2006): "Are shoreline protection regulations enough?"

The presence of high quality water in the littoral zone is important for maintaining lake biointegrity, as is the complex presence of natural structure, in terms of woody debris, rocks, and plants, above and below the lake water level. Historically, developers and lakeshore residents have typically modified both shoreline and inlake littoral zones for perceived recreational and aesthetic purposes. The human tendency to create and maintain uncluttered or 'clean' manicured lakeshores is not necessarily the best way to manage our aquatic natural resources. As we have seen, lakes with minimal shoreline development are generally characterized by large accumulations of large and small woody debris originating from fallen (dead) trees along the lake shore (see Photo's 1 and 2). This natural woody structure serves as a nutrient source and provides valuable overhead and inlake habitat cover for a very diverse community of resident aquatic organisms, from invertebrates (insects, mollusks, crayfish) to minnows to trout (see Photo 3).

Relationships between the degree of development, in terms of shoreline disturbance and the number of shoreland residences, and the biointegrity or health of the aquatic community have been investigated in several recent published and unpublished studies - as reviewed and results summarized below:

Aaron Jubar (M.S. 2004, Michigan State University) "quantified the effects of residential lakeshore development (LSD) on littoral fishes and habitat" in south-eastern Michigan. He found that "extensive alterations to north temperate lakes due to LSD and associated activities have the potential to negatively affect habitat features in the littoral zone of lakes." He also recognized "the vulnerability of littoral fish species to effects of habitat loss given their use of near-shore habitat for nesting, foraging, and as refuge sites." Undeveloped lake sites had significantly greater abundance of coarse woody material and submersed macrophyte (rooted aquatic plants) cover compared to developed sites. According to Jabar, "littoral fish populations, though somewhat variable in their response, may also respond to LSD, demonstrating the importance of investigating the cumulative effects of LSD on lake ecosystems."

photo by Ryan Burton, Maine DEP

Photo 1: Large Woody Debris such as fallen trees are an important feature along natural lake shorelines.

Kirsten Ness (M.S. 2006, University of Maine) has studied "the effects of shoreline development on lake littoral and riparian habitats" in north-central Maine. Her primary objective was "to determine the effects of shoreline development on the structural complexity of lake littoral and riparian habitats." Both riparian and littoral habitat complexity was simplified (at the site scale), with lower densities of trees and shrubs, aquatic macrophytes, and coarse woody (in-lake) habitat." She found that "shoreline development affected lakes at the whole lake and site scales, with the greatest effects occurring directly in front of a (shoreland) structure. According to Ness, "measured detrimental effects of development, in terms of coarse woody habitat and shoreline vegetation, also extended to sites away from structures, indicative of whole lake scale effects."

Ongoing lake studies in Vermont are being carried out through the efforts of the *Department of Environmental Conservation* under the direction of Susan Warren, Kellie Merrell, Eric Howe, and Leslie Matthews. A recent presentation (NEAEB 2007) depicted the "effect of lakeshore development on oligotrophic lakes in northeastern Vermont. Land use changes included historical logging (1880's) to the prevalence of seasonal camps (1920's), to the transition to permanent homes (1980's). Given that past studies in Wisconsin (Jennings and Emmons et al. 1999 and 2003) "found significant effects of shoreline development on macrophytes, woody debris, fishes, birds and frogs" - their primary study objective was "to measure the affect of shoreland development on (lake) littoral systems." Similar to the Wisconsin and Maine studies, data was collected at three scales: lake-level, site-level, and plot-level. *Lake level* parameters include water quality measures, % shoreline development, lake class, surface area and fetch. *Site-level* parameters include measures of riparian vegetation, littoral shading, coarse woody debris, and lakeshore slope. *Plot-level* parameters include measures of sediment structure (% embeddedness), fine to medium woody debris, leaf litter, and abundance measures of aquatic plants, fishes, crayfish, mussels, and snails.

Developed and undeveloped sites on both small (<50 ha) and large (> 200 ha) oligotrophic (clear and relatively deep) lakes were initially studied. Conclusions are as follows: (1) *Lake-level* – shoreline development increases with lake size and shoreline access for wildlife becomes limited; (2) *Site-level* – switch from tree to lawn dominated shoreline with decreased shading in littoral zone, leading to higher water temperatures (productivity). Decrease in coarse woody debris leading to loss of habitat for fish, wildlife, and macroinvertebrates (bugs); (3) *Plot-level* – decreases in fine and medium woody debris and deciduous leaf litter, more sand/gravel and sediment embeddedness. Less organic matter available in benthos (bottom – or the animal community associated with the bottom) leading to less food/habitat available for fish, wildlife, and macroinvertebrates.

photo by Ryan Burton, Maine DEP

Photo 2: Fallen trees provide valuable shelter and habitat. The minnow trap above was used by Maine DEP staff to asses minnow populations at Deboullie Ecoreserve.

Vermont DEC plans on expanding this project to include studies of mesotrophic and eutrophic lakes (2007-08) in association with littoral zone fish assemblage surveys.

The consequence of human lakeshore development on the abundance of emergent and floating-leaf vegetation was studied by Radomski and Goeman (Minnesota) as reported in 2001. They found a 66% reduction in (aquatic) vegetation coverage within a gradient of development, with less abundant plant growth in littoral areas adjacent to developed shores – in contrast to undeveloped shorelines. They note that current shoreline regulatory policies and landowner education programs may need to be changed to address the cumulative impacts to North American lakes.

Jennings and others (Wisconsin) originally studied the *cumulative effects of incremental shoreline habitat modification on fish assemblages in north temperate lakes*, as reported in 1999. They found that fish species richness was positively correlated with local habitat complexity and fish species tolerance shifted in response to the cumulative effects of shoreline development. In more recent Wisconsin studies (2003 and 2004), this group found that the "quantity of woody debris, emergent and floating vegetation decreased at developed sites in lakes with greater cumulative lakeshore development." They concluded that "habitat management programs, such as shore land zoning/permitting, should consider the cumulative effects of small habitat modifications in addition to local effects." Stay tuned for more on this latter issue in the fall edition of the Maine VLMP newsletter.

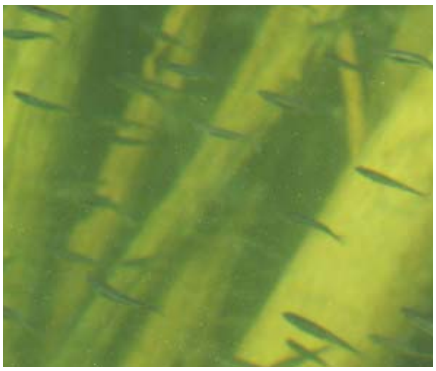


photo by Ryan Burton, Maine DEP

Recent research has begun to identify the relationships between human development along lake shorelines and the impacts on a variety of aquatic life.

Selected Published Literature on Shoreline Habitats

Hatzenbeler, G.R., J.M. Kampa, M.J. Jennings, and E.E. Emmons. 2004. A comparison of fish and aquatic plant assemblages to assess ecological health of small Wisconsin lakes. *Lake and Reservoir Management* 20:211-218.

Jennings, M.J., M.A. Bozek, G.R. Hatzenbeler, E.E. Emmons, and M.D. Staggs. 1999. Cumulative effects of incremental shoreline habitat modification on fish assemblages in north temperate lakes. *North American Journal of Fisheries Management* 19:18-27.

Jennings, M.J., E.E. Emmons, G.R. Hatzenbeler, C. Edwards, and M.A. Bozek. 2003. Is littoral habitat affected by residential development and land use in watersheds of Wisconsin lakes? *Lake and Reservoir Management* 19:272-279.

Radomski, P. and T.J. Goeman. 2001. Consequences of human lakeshore development on emergent and floating-leaf vegetation abundance. *North American Journal of Fisheries Management* 21:41-46.

New VLMP Staff

Tania Neuschafer *Development Coordinator*

Greetings! I am so thrilled to be part of the MVLMP team and look forward to meeting many of you this spring. I first began working in the environmental field in 1994 as a trip leader at a wonderful nature camp in Monkton, Maryland. Since then, I have spent numerous years working both in the field and behind the scenes, helping to protect Maine's most precious resources.

My own passion for the outdoors is an essential component to my life, and has been for as long as I can remember. I am a native of Vermont, and growing up being so close to the land developed in me a deep sense of appreciation and commitment to helping protect the integrity of our land and water- and that passion is always with me.

Today, with the world as crazy as it seems to be, it brings me such pleasure to provide opportunities to people where they can contribute to something they believe in.

MVLMP is impressive because of its numerous committed volunteers around the state, because of the level of quality in their training and support, and because it matters what we do. I believe that there is no more beautiful place to be and no better use of our time and money, than to support that which we love.

Each day, I ask- how can I help this group today have the funds they need to help facilitate the mission of the VLMP, and protect Maine's lakes and ponds? This genuinely makes me happy and I look forward to meeting all of you and hearing about the joy your gifts bring to you.

Happy spring, and I look forward to meeting you soon!

John MacKenzie *Summer Intern*

Greetings to all volunteers, coordinators, and others involved with the VLMP. I am glad to have this opportunity to introduce myself and share a little bit of background information in this edition of the newsletter. My name is John MacKenzie and I am a sophomore at Bates College. I have had the privilege of working as a special intern for the past month of May as a requirement for my Environmental Studies major at Bates.

My interest in protecting and conserving our beautiful Maine lakes is rooted in many factors. As a native of Gorham, Maine, I have always been interested in the outdoors and therefore I have spent as much time as possible enjoying it. My love for hiking, fishing, and boating on or around the lakes of Maine has always been a passion of mine whether it be with my family, my friends, or even by myself. Academically, my interest for the environment broadened in high school through the study of sciences such as chemistry and biology. These subjects had always been fascinating to me because I believe an understanding of those fields is essential for broadening ones awareness of the constantly altering environment and the effects of the growing human occupation. During my first two years at Bates College, I decided an Environmental Studies major fit perfectly into my academic interests of science and my love for the outdoors. Working with the VLMP has only added to that enthusiasm. Life after College seems so far away, but I would continue on to graduate school and possibly pursue a career in environmental consulting.

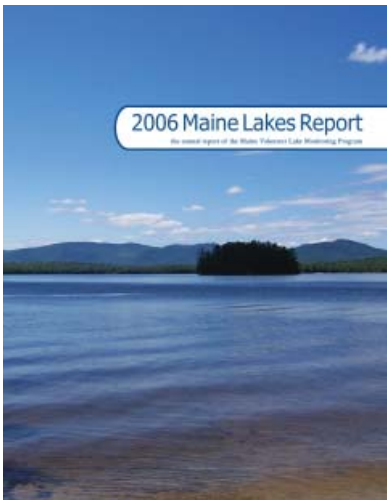
The internship has allowed me to gain valuable real-life experience in gathering and interpreting data collected by the volunteers of the program. I am pleased to be able to help an organization such as the VLMP because not only is the program responsible for keeping a watchful eye on our wonderful Maine lakes that we have come to love, but the hardworking volunteers of the program are the key to maintaining our valuable resources so they can be enjoyed for generations to come. I encourage all volunteers to continue to stay involved as you are in the forefront Maine's conservation efforts. I would like to thank the VLMP for this internship opportunity and look forward to the program's future.

VLMP Program Updates

Now Available Online and in Print:

2006 Maine Lakes Report

the annual report of the Maine Volunteer Lake Monitoring Program



VLMP's 2006 Maine Lakes Report is now available on the website of the Maine Volunteer Lake Monitoring Program: www.MaineVolunteerLakeMonitors.org

The report is a culmination of data collected by our 700 active citizen scientists during the 2006 field season. It includes summaries of the VLMP's water quality and invasive aquatic plant (IAP) programs, analysis of 2006 data, lists of lakes with water quality and IAP data, and a listing of all certified volunteers. The data collected in the report represents the outstanding commitment and effort by our volunteers in monitoring and protecting Maine's lakes.

To view the report online follow the "2006 Maine Lakes Report" link on our website: www.MaineVolunteerLakeMonitors.org

The VLMP Photo Contest is on!

There are three categories for submissions:

- Volunteers at Work
- Lake Scenery
- Fun on the Water

Submitters will have the photos featured on the VLMP website and publications. The winner will have their photo appear on the **cover the 2007 Maine Lakes Report**. The deadline for photo submissions is September 30.

Please include your contact information and a description of the photo. Photos should be sent to:
vlmp@mainevlmp.org or VLMP, 24 Maple Hill Rd., Auburn, Maine.

Volunteer for the VLMP Booth at Common Ground Fair

Sept. 21-23

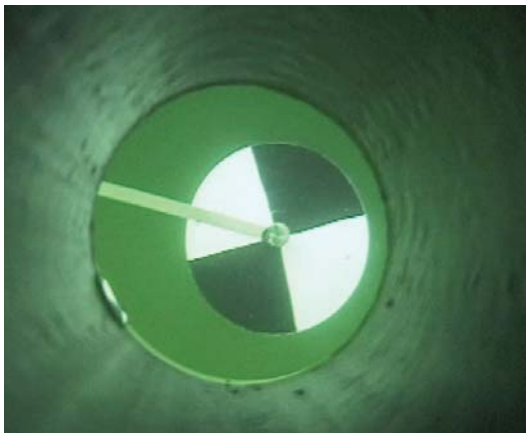
The Volunteer Lake Monitoring Program will be at the Common Ground Fair this year and we need volunteers to help man our display booth in the Environmental Concerns tent. Volunteers who sign up for a 3 hour session at the VLMP booth will get free admission to the fair for the rest of that day.

Manning the booth will include talking with people about what you do as a volunteer water quality and/or invasive plant patrol monitor and referring people to our display board and handouts for more information.

If you are interested in representing the VLMP at the Common Ground Fair please contact Jim Entwood at 783-7733 or vlmp@mainevlmp.org.

Time slots available:
Friday, Saturday & Sunday
9AM-Noon
Noon-3PM
3PM-6PM

Virtual Workshop For Secchi Re-certification Planned for this Summer



Starting this summer, Water Quality Monitors will be able to meet their Secchi re-certification requirements by taking a virtual workshop on the VLMP's website. Using their computer, volunteers will be guided through an online test, including taking a virtual Secchi disk reading, and questions regarding procedures.

Charlie Turner is Regional Coodinator for Cumberland County Water Quality Monitors and has been a monitor for 31 years on Panther Pond. This is a reprint of a letter sent by Charlie to his volunteer's in April 2007.

April 2007

Hi again,

Well, off to yet another season of monitoring. I thought it might be a good idea to re-stress the importance of our work, especially in the light of this global warming awareness.

If scientists are pretty much in agreement that this global warming thing is upon us (and they are) then what is or will be the impact on our lakes? Some say good and some say bad. Are O_2 levels expected to rise or fall? What about fish populations? What about algae production and other aquatic life? Rainfall? Lake turnovers, etc.? A host of other factors must be monitored and evaluated. As of now, we really don't know for sure what will be happening to our beloved lakes. How will we find out? Who will be testing our waters for answers?

Why, you, of course. And me. We stand at the forefront in gathering the valuable info that will be so necessary in mapping our lakes' future. So, next time you head out to wet your Secchi disc or DO probe, be confident in the knowledge that you are doing something beneficial to assist in maintaining the health of our beautiful lakes.

My very best to all,

Charlie

Maine Volunteer
Lake Monitoring Program
24 Maple Hill Rd
Auburn, Maine 04210

VLMP 2007 Annual Meeting: July 28, Hallowell

July 28, 2007
Maple Hill Farm Inn, Hallowell

Cost: **Free to certified monitors, certified plant patrollers, coordinators, and directors.**

All others $29.00

To register, please call or email:
207-783-7733 ~ vlmp@mainevlmp.org
or mail this form to:
VLMP, 24 Maple Hill Rd.
Auburn, ME 04210

Name(s): _____

_____

_____

_____

Number Attending: _____

Cost per Attendee: $29
(certified monitors are free)

Total Enclosed: _____