

the Water Column



A Publication of the Maine Volunteer Lake Monitoring Program

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Provided free of charge to our monitors and affiliates

Winter 2010

Inside

Reflections on 2009 • Page 2

Welcome New Monitors! • Page 8

Thank You Supporters • Page 10

Algal Toxins • Page 13

NATIONAL LAKES ASSESSMENT

2 Boats, 2 Motors, 2 Men Paddling
See story inside...

What's Inside

President's Message	2
Lakeside Notes	3
Scaling Back the Spring Packet . . .	4
National Lake Assessment	4
Littorally Speaking	6
New Volunteers	8
Thank You!	10
Algae Toxics	13
Passings	15



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President's Message

Now's Not the Time to Blink

I don't know about you, but for me the first decade of the new millennium sure did seem to go by in a flash. It seems like only yesterday that we were being barraged with predictions of a Y2K techno-meltdown, watching nervously as the ball was dropped in Times Square that New Year's Eve. In some ways, it doesn't seem like a whole lot has changed during the past decade, but in other ways it does. I've been privileged to serve on the VLMP Board of Directors for most of the '0's' decade, and on one hand, that time has flown by in a blink of an eye—but on the other hand, when I reflect on the degree to which the VLMP has changed and progressed during that time, it seems like, well, eons.



Bill Monagle
VLMP President

The advances I've witnessed at the VLMP have been driven by the need to keep pace with the increasing and expanding threats to Maine's lakes and ponds, be they invasive aquatic species or nonpoint source pollution. New programs, such as the Invasive Plant Patrol (IPP), a state-of-the-art web site that enables the VLMP to provide better outreach and access to lake and watershed related information, a real home base in the Bracket Center, and an expanded corps of volunteer monitors to collect increasingly diverse data from more Maine lakes and ponds than ever before. None of these would have been possible without the tremendous support of those who volunteer their time and effort to the VLMP's cause, and of those providing financial support. But regardless of all that has been accomplished, we cannot drop our guard now. This past year, the VLMP Board of Directors, Executive Director Scott Williams, and the staff concluded that the current level of services provided by the VLMP cannot be scaled back, eliminated or sacrificed in any way if we are to continue to provide the necessary support to address the myriad threats to Maine lakes. On behalf of the VLMP Board of Directors, I'd like to express our deep appreciation to all of you who regularly contribute, or have contributed, to the VLMP programs and to the organization in general. I would also like to thank you in advance for your continued and much needed support as we train and support the good—and essential—work of volunteer lake monitors throughout Maine.

Lakeside Notes

Looking Forward, Looking Back, and Counting Our Blessings

Our expectations for 2010 began to take shape over a period of several weeks last summer. Like so many other nonprofit organizations throughout the country, ever since the economy started to go south about eighteen months ago we have been bracing ourselves for lean economic times. Accordingly, in early 2009, we developed and began to carry out a plan to reduce program costs wherever possible – which was not particularly easy to do on an already “bare bones” budget. But it had to be done, and we’re continuing to make changes to ensure that the VLMP will have the resources necessary to continue to carry out its mission.

Prior to the onset of the volunteer training workshops last spring, we found ourselves pondering the potential implications of a faltering economy on people’s interest in monitoring lakes. Given the many ways in which so many people’s lives have been affected would volunteers continue to be willing and able to take the time to become trained, and to monitor their lakes several times during the summer? And, of course, we were concerned about how hard times could affect donations to support the work of the VLMP.

Frankly, we were surprised and very pleased with the answers to both questions, which became apparent as the lake monitoring season progressed last summer. *In short—*



By Scott Williams
VLMP Executive Director

more volunteer lake monitors were trained and certified last summer than in any other year in the 38 year history of the program! Record numbers of volunteers signed up for and attended VLMP water quality and invasive plant patrol training workshops throughout the summer.

Private donations to support the work of the VLMP also exceeded all previous records last year. Individuals and lake associations came forward in record numbers with donations to show their support for monitoring and protecting the health of Maine’s lakes. This generosity could not have come at a better time, because as the number of volunteer lake monitors increases, so do the costs involved in training, equipping, and supporting both new and existing volunteers.

Last year at this time we were concerned about the future of the program. But our spirits were buoyed by the continued passion that volunteers throughout Maine showed for monitoring their lakes and for financially supporting the community of which we are all members. That community has persevered for nearly four decades, having withstood the periodic ravages of hard economic times.

And so, thanks to all of you, our outlook for the New Year is pretty darned positive! Your message has been clear: We must continue to do what has been done for all of these years, in order to ensure that volunteer lake monitors have the resources that they need to accomplish their good work. To all of you in Maine’s volunteer lake monitor community who are working to help make this possible, we offer our deepest thanks.

On the Cover

Photo & Caption by volunteer IPP Sibyl French



The last day of our trip with VLMP to Moosehead Lake we were going out to do surveying, the destination was Tomhegan Cove, which was quite a distance from the base camp. In order to get there quickly, Bob (with the more powerful motor) was going to tow Keith's boat (with the slower, smaller

motor). (Note the tow rope between the two boats.) Please note the large buoy in the background. This buoy marked the outside edge of the very shallow, very dangerous shoals. The motors were not able to be used until they reached deeper water outside of that marker. So, the motors were raised and they were paddling out to reach that deeper water. Once there, they lowered Bob's motor (the front boat), started his motor and Bob towed Keith to the destination. Keith rode in the front boat with Bob until they got to Tomhegan.

EPA's National Lakes Assessment Study

By Scott Williams

The EPA has published the draft findings of the first-ever baseline study of the nation's lakes. The National Lakes Assessment (NLA) provides estimates of the condition of both natural and man-made lakes, ponds and reservoirs greater than 10 acres in surface area and at least one meter deep. The draft study rated 56% of the lakes in the United States as good, and the remainder as fair or poor. This study marks the first time that EPA and its partners have used a nationally consistent approach to survey the ecological water quality of lakes. A total of 1,028 lakes were selected at random for the study, which took place during the summer of 2007. Ten Maine lakes

were included in the study, as the map below shows.

A wide range of indicators of lake health were assessed in the study, including water quality (nutrients, dissolved oxygen and algal density); biological indicators (algae and zooplankton); recreational indicators (pathogens and toxins from algae), and physical habitat (lakeshore and shallow water habitat cover). Peter Silva, Assistant Administrator for EPA's Office of Water, indicated that the NLA is a first step in evaluating how successful efforts have been to protect and restore the quality of lakes throughout the country. Silva also stated that

future surveys of this type will help to advance our understanding of important regional and national patterns in lake water quality.

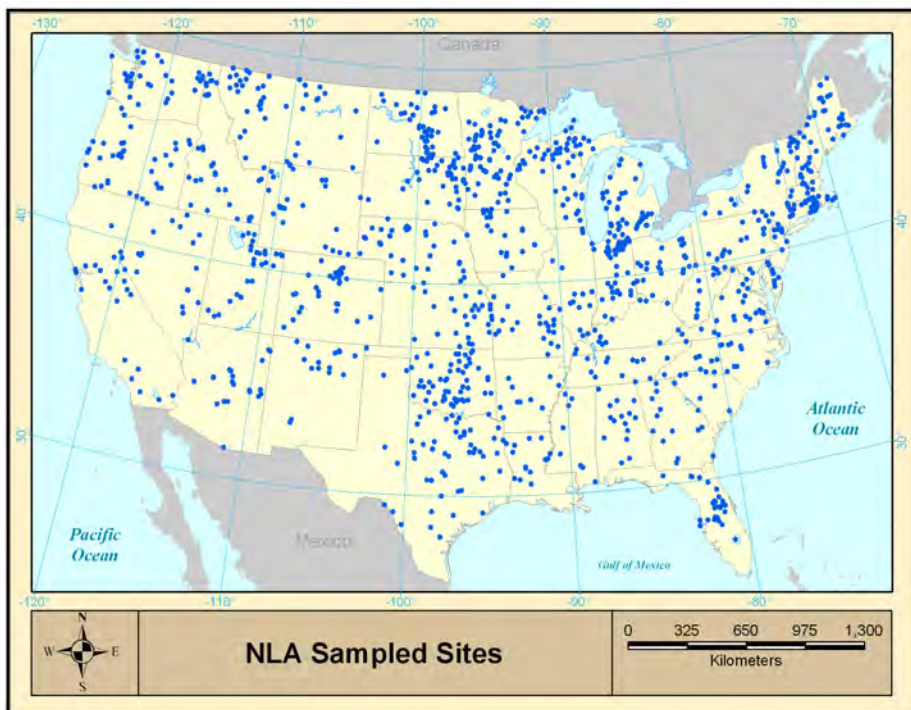
Findings and Implications for the Nation's Lakes

While it is certainly good news that 56% of the lakes in the U.S. are in relatively good condition, the fact that the remaining 44% are in fair or poor condition is a dramatic and troubling finding. Why are so many of our lakes in trouble?

Degraded lakeshore habitat, which was rated "poor" in 36% of the lakes in the study, was the most significant of the problems that were assessed. The removal of critical buffer vegetation, including trees and shrubs along shoreline and riparian areas, and the construction of docks, marinas, homes and other structures along lake shores contributed to the findings. The study concluded that: "Poor biological health is three times more likely in lakes with poor shoreline habitat."

The second biggest problem for U.S. lakes is high nutrient levels, with about 20% of the lakes in the study having high levels of phosphorus and nitrogen. Lakes with excess nutrients are two and a half times more likely to have poor biological health, and are likely to experience algae blooms, excess weed growth, reduced water clarity and other problems, such as adverse impacts on a

NLA continued on page 15



Customize Your Spring Monitoring Packet

3 Options to Choose From

Each spring Certified Invasive Plant Patrol and Water Quality Monitors receive an individualized packet with virtually everything they will need to monitor their lake for the year. In 2010, we plan to scale back the mailing and cut out some of the instructions that monitors had received previously at training workshops, or in last year's packet. All those materials have been moved online in a new one stop page for monitors found at the Volunteer Links on the left of our website.

This is not a step that we take lightly as our past surveys of internet use show mixed opinions among volunteers. But initial discussions with volunteers (who will remain anonymous) have revealed that—brace yourself—not every page in the spring mailing is read because some of the info in the packets is repeated from year to year. As budgets tighten and the number of volunteers has grown to over 800, we are re-thinking the necessity of mailing everyone a 14 page packet.

The good news for studious volunteers that do not have internet access is that you can request a full Comprehensive Packet be mailed to you.

We are walking the fine line of ensuring QA/QC by encouraging monitors to review instructions, guidelines and any other information that monitors need, while reducing paper consumption and improving efficiency. Please consider the options below and let us know which packet fits your needs.

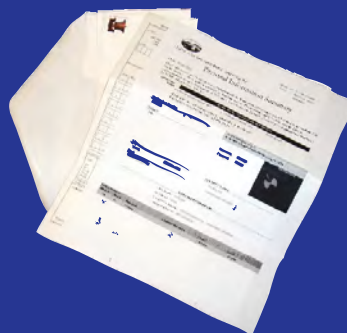
Let us know your preference by March 15, otherwise by default we will send you the Standard Packet. At any time, monitors seeking additional information and instruction forms can either call us at 207-783-7733 and we will gladly mail you a set, or you can go online to www.MaineVolunteerLakeMonitors.org and click on Volunteer Links.

Let us know your preference by March 15! Comprehensive or Standard or E-Packet



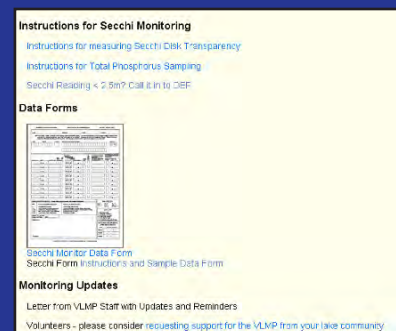
Comprehensive Packet

Complete set of instructions, updates, data forms, and reports with return envelopes.



Standard Packet

Essential data forms, return envelopes and personal info only



E-Packet

Online & Email only. Everything that you need can be downloaded and printed from the VLMP website

Call 207-783-7733

or

email vlmp@mainevlmp.org

Littorally Speaking

VLMP's Invasive Plant Patrol: 2009 Training and Field Season in Review (WOW!)

We have now heard the State of the State, and the State of the Union addresses... both quite sobering to say the least. Ready for some good news? Please read on! The State of Maine's Invasive Aquatic Plant Early Detection System has never been better!



By Roberta Hill
Program Director
VLMP's Center for
Invasive Aquatic Plants

Invasive Plant Patrol (IPP) Workshops

Despite the unrelenting persistence of the cool rainy weather, and widespread economic uncertainty that challenged most Mainers during the summer of 2009, the VLMP's Invasive Plant Patrol program has just experienced one of the most exciting and productive seasons in the history of the IPP program.

Though the number of workshops was down a bit from previous years (two were utterly rained out), the number—and level of commitment—of attendees and was way up. Of the 307 individuals who attended one or more regular workshops in 2009, 107 became certified plant patrollers (roughly double the annual average), and 10 became certified members of Maine's rapid response team. An additional 73 individuals (including 23 Maine teachers) participated in abbreviated IPP training sessions, bringing the total of number trained this year to 380. To date, the VLMP has trained over 2,000 individuals through the IPP program! Maine now has 361 active certified invasive plant patrollers, committed to annually surveying 152 lakes, and 62 individuals, primarily SCUBA divers, certified in rapid response.

The workshops once again spanned the state, from York to Aroostook County. We conducted 15 Invasive Plant Patrol (IPP) workshops in 2009, including 11 introductory workshops, 1 survey methods workshop, and 2 abbreviated training sessions. Two distinct manual control workshops were also offered, one covering invasive aquatic plant con-

trol background and fundamentals, and providing instruction and practice in the use of manual removal and benthic barriers, the other providing training and practice in the use of the diver assisted suction harvester.

In September, hydrilla (*hydrilla verticillata*) was confirmed in Damariscotta Lake. Hydrilla, often referred to as the "worst of the worst" invasive aquatic plant threatening aquatic ecosystems worldwide, was discovered in a small cove along the western shore of Damariscotta Lake, by VLMP Invasive Plant Patroller, Dick Butterfield. (Dick had been trained by the VLMP only weeks before.) VLMP assisted the DEP with the initial assessment of the infestation and also helped the Damariscotta Lake Watershed Association (DLWA) organize an "emergency first responder" survey team. Twenty-seven trained invasive plant patrollers (many traveling from distant corners of the state) participated in the intense search that followed Dick's discovery. Though the survey season ended before the team could cover the entire littoral zone of Damariscotta Lake, survey results to date provide hope that Mr. Butterfield may have indeed detected the pioneer colony.



VLMP Invasive Plant Patroller
Dick Butterfield with a sample of
hydrilla taken from what is be-
lieved to be the pioneer colony
in Damariscotta Lake

The efforts of Dick Butterfield, DLWA, and the exceptional team of IPP "first responders" who dropped what they were doing to join the hunt for additional signs of the invader, present us with the most concrete evidence to date of the critical and invaluable role that IPP volunteers can (and do!) play in protecting the waters of Maine from the threat of aquatic invaders. A

single early detection—a single lake saved from ecological catastrophe—provides the people of Maine with an enormous rate of return on any and all investments of time and resources that may have been put into this effort to date.



IPP First Responder Dennis Roberge surveys the shallows of Damariscotta Lake from dockside, while taking a well deserved break from the numbing fall water temperatures.

Invasive Aquatic Plant Screening Surveys

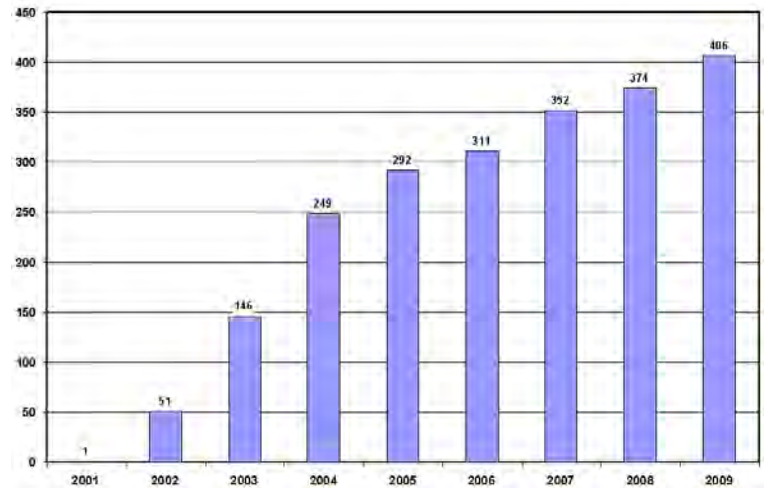
Not only are more and more individuals becoming trained to recognize an aquatic invader when they see it, more and more are becoming active IPPs in their communities, conducting, leading and organizing invasive aquatic plant (IAP) screening surveys on their local lakes, ponds and streams. The bulk of the 2009 IAP screening survey data has now been checked for quality assurance recorded and tabulated, and the results are quite astounding. Three-hundred-eighty-five IAP screening surveys were reported in 2009. Up from 252 surveys in 2008, this dramatic increase in reported survey activity over the course on one year is the greatest leap by far since the first IAP survey was reported in 2001. Twenty-seven new waterbodies were added to the list of “waterbodies reporting survey activity in 2009,” bringing the total number of Maine waterbodies with reported IAP survey activity to 406. (Fig. 1)

Again, the critical role played by volunteers here, cannot be overstated. In 2009 a whopping 92% of all reported IAP survey activity can be directly

attributed to IPP volunteers!

No matter how you slice the data, the message is undeniable... together we are making a huge difference! We have stepped up to the challenge, and have made great progress toward the goal protecting Maine waters from the threat of aquatic invaders. But our work is clearly not done; in fact we still have a very long road ahead of us. Maine is home to roughly 6000 lakes and ponds and thousands of miles of stream habitat. The number of infested lakes continues to grow; two more lakes were added to the list of infested lakes in 2009: Damariscotta Lake in Jefferson (hydrilla), and Legion Pond in Kittery (European naiad). If we are to succeed in establishing a highly effective prevention and early detection system in Maine, one that encompasses *all*

Figure 1 Maine Waterbodies With Reported IAP Survey Activity (Cumulative)



vulnerable waters of the State, we have to train many, many more eyes to be on the lookout. With this (yes, I suppose somewhat sobering) thought in mind, we here at the VLMP have already started planning next season’s workshop schedule. It looks like we are going to be very busy once again, traveling from one end of this beautiful state to the other, and joining forces with some of its very finest citizens! We look forward to seeing all of you in 2010!



Amazing stuff! Come see for yourself when you attend an IPP workshop in 2010!

Welcome Aboard New Monitors!

New Certified Water Quality Monitors in 2009

Lee Bernazzani on Pequawket Lake
 Glen Bridges on Sandy Pond
 David Bridges on Sandy Pond
 Joe Bukata on Holbrook Pond
 Jack Butler on Holland Pond
 Sam Campbell on Watchic Pond
 Richard Cayer on Long Lake
 Wade Colby on Eil Pond
 Brendan Curran on Davis Pond, Six
 Ponds #4 & Wassataquoik Lake

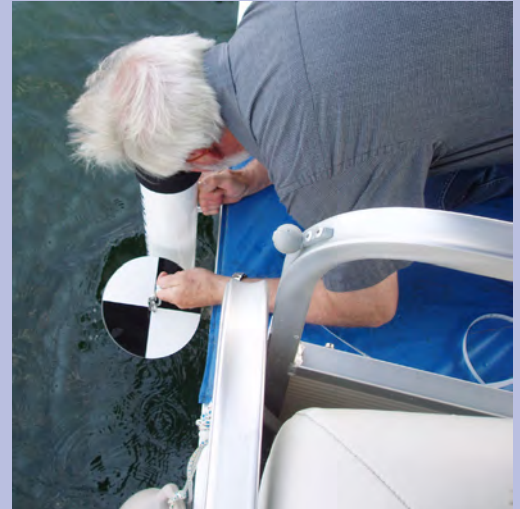


Nick Davidson on Great Pond
 George Derby on Stanley Pond
 Richard Dodge on Alamoosook Lake
 Kyle Emery on Pitcher Pond
 Chris Everett on Embden Pond



Edward Farwell on Green Lake
 Bob Folsom on Umbagog Lake
 Ed Gelina on Piper Pond
 Dick Greenan on Long Pond
 Thomas Greene on Whetstone Pond
 Charlie Hudson on Stevens Pond
 Norman Kalloch on West Carry Pond
 Levi Ladd on Big Indian Pond
 Christina Lahaye on Ward Pond
 Vernita Leins on Chemo Pond
 Robert Leins on Chemo Pond
 David Lind on French Hill Pond
 Connie Mahaffey on Donnell Pond
 Dennis Mancine on Brettun's Pond
 Shawn McLane on Lower Hadlock &
 Jordan Ponds

Joseph P. McMenimen on Lower Kimball
 Pond
 Steve Mendrzychowski on Harlow Pond
 Carolyn Miller on Chemo Pond
 Sara Paradise on Big Wood Pond
 Kathy Parlee on Upper Cold Stream
 Pond
 Renee Rawinski on Sebec Lake
 Julie Rumrill on Somes Pond
 Lyndsey Smith on Bryant Pond
 Nancy Staples on Halfmoon Pond
 John Stetson on Stevens Pond
 Crista Straub on Walker Pond
 Elwood Trask on Taylor Pond
 Gloria Wheaton on Beech Hill Pond



HL Whitney on Little Pond
 Willy Wilmoth on Little Pond
 Michele Windsor on Keys Pond
 Mike Wisher on First Roach Pond
 Dot Young on Brettun'S Pond



Welcome Aboard New Monitors!

New Certified Invasive Plant Patrol Monitors in 2009

Cheryl Abbott on Great Pond
Jeanne Achille on Wilson Lake
Dorothy 'Dot' Adams on Howard Pond
Charlie Anderson on Moosehead Lake
Gayle Aspinwall on Long Pond
Dwight Aspinwall on Long Pond
Roy Bagley on Holland Pond
Terry Bellman on Pushaw Lake
Lerryn Besancon on Thompson Lake
Daniel Bishop on Songo River
Barbara Boardman on Duckpuddle Pond
Leslie Bowe on Annabessacook Lake
Mike Bowe on Annabessacook Lake
Casey Bowie on Square Lake, Eagle,
Mud, Long Lake & Cross Lakes
Joan Boyce on Beech Hill Pond
Melissa Brandt on Alligator Lake
David Brown on Panther Pond
Dick Butterfield on Damariscotta Lake
Joe Callahan on Holland Pond
Louis Cloutier on Pushaw Lake
Dorothy Cloutier on Pushaw Lake
Maurice Collin on Long Lake
Rose Marie Collin on Long Lake
Marie Connolly on Panther Pond
Doug Crane on Wassookeag Lake
Neil Crane on Wassookeag Lake
Vernon Crane on Wassookeag Lake
Retha Crawford on Wassookeag Lake
John Cummings on Androscoggin Lake
Linda Daigle on Long Lake
Pamela Green on Androscoggin Lake
Mal Dawson on Salmon Lake
Richard DiBiase on Alamoosook Lake
Brenda Dickey on Center Pond
Ray Dickey on Center Pond
Mickey Dipesa on Unity Pond
Amy Dodge on Branch Lake
Sandi Duchesne on Pushaw Lake
Rob Eaton on Flanders Pond
Betsy Enright on Salmon Lake
Cindy Fahey on Long Pond
Mark Fahey on Long Pond
Eric Falconer on Maranacook Lake
Linda Fish on Minnehonk Lake
Kim Gass on Crescent Lake
Sal Gebbia on Kennebunk Pond
Austin Georgiades on Lake Terramungus,
CT
Thomas Greene on Whetstone Pond
Pamela Griffith on Little Pushaw Pond
Roger Griffith on Little Pushaw Pond
Gisele Hall on Long Lake
Glenda Hargreaves on Porter Lake
Kyle Hargreaves on Porter Lake



Phyllis Heineman on Little Pushaw Pond
Ellie Hopkins on Locke Pond
Joanne Howard on Beech Hill Pond
Dan Hutchins on Wassookeag Lake
Carolyn Johnston on Beech Hill Pond
Larry Johnston on Beech Hill Pond
Peter Kallin on Long Pond
Dee Kasprzak on Great East Lake
Peggy Kaufman on Wassookeag Lake
Tom 'Rusty' Knight on Anasagunticook
Lake
Tom LaCrosse on Long Lake
Jon Lawton on Brewer Lake
Charlotte Lawton on Brewer Lake
Vernita Leins on Chemo Pond
Robert Leins on Chemo Pond
Fred Leisentritt on Up. Cold Stream Pond
Marsha Letourneau on Square Pond
David Lind on French Hill Pond
Kathleen Lukas on Pushaw Lake
Dick Martin on Salmon Lake
Lloyd Mason on Great East Lake

Richard McKeen on Echo Lake Rich
Melanson on Horn Pond
Robert Meyer on Mcgrath Pond
Cathy Meyer on Mcgrath Pond
Carolyn Miller on Chemo Pond
Christian Oren on Songo River
Tyler Oren on Songo River
Cheryl Parziale on Multiple Ponds
Laura Peakes on Wassookeag Lake
Gerard Plourde on Long Lake
Susan Poole on Moosehead Lake
Jean Proach on Great East Lake
Laurie Rich on Kidney Pond
Laurie Rich on Daicey Pond
Julie Rumrill on Long Pond & Somes Pond
Susan Sebestyen on Crystal Lake
Nancy Smith on Great East Lake
Brian Smith on Mcgrath Pond
Diane Smith on Mcgrath Pond
James Smith on Clearwater & Wilson
Ponds
Beverly Smith on Ponds in Casco
Pam Stephens on Embden Pond
Jack Stephens on Embden Pond
Christine Stevens on Little Pushaw Pond
Adrienne Strout on Wassookeag Lake
Pat Theisen on Great East Lake
Rob True on Salmon Lake
Martin Velishka on Beaver Mountain Lake,
Dodge, Quimby & Round Ponds
Anthony Violette on Moosehead Lake
Thomas Warren on Center Pond
Bill Watson on Damariscotta Lake
Priscilla Watson on Damariscotta Lake
John Welch on Crystal Lake
Gloria Wheaton on Beech Hill Pond
Matt Whitegiver on Beech Hill Pond
Bill Williamson on Damariscotta Lake
Jana Wood on Wassookeag Lake



Thanks to Supporters for 2009 Successes

On behalf of the VLMP Development Committee and Board, heartfelt thanks to all who contributed to the VLMP in 2009. This thank you comes with the recognition that these are hard times and contributions, at all levels, are generous.

The Spring and Fall Appeals totaled approximately 25% of VLMP income for 2009. This is substantial. Your support has allowed the VLMP to complete one of the most productive and successful seasons in the history of the organization. A record number of new volunteers and new lakes have been brought into the program, including the volunteer who discovered the hydrilla infestation in Damariscotta Lake.

This year the VLMP will be facing similar economic challenges of reduced state and federal funding support. The VLMP Development Committee and Board look forward to your continued and thoughtful support in 2010.



Tamara Lee Pinard
Chair, VLMP Development Committee

2009 Lake & Watershed Appeal

Abrams Pond Association
Alford Lake/Lermond Pond Assoc.
Allen Pond Improvement Association
Bear Pond Improvement Association
Belgrade Lakes Association and Belgrade Regional Lakes Alliance
Belgrade Regional Conservation Alliance
Brettuns Pond Association
Cathance Lake Association
Citizens Association of Liberty Lakes
Clearwater Lake Improvement Assoc.
Clemons Pond Association
Craig Pond Association
Crystal Lake Association
Dexter Lakes Association
Embden Pond Association
Five Kezars Watershed Association
Friends of the Cobbossee Watershed
Great East Lake Improvement Assoc.
Green & Mirror Pond Association
Hancock & Sand Ponds Association
Hebron Water Company
Howard Pond Preservation Assoc.
Kennebunk Pond Association
Keoka Lake Association
Lake Auburn Watershed Protection Commission
Lake Moxie Campowners Association
Lake Wesserunnett Association
Lakeville Camp Owners Association
Little Ossipee Lake Association
Little Wilson Pond Improvement Assoc.
Long Pond Association
Loon Lake Association
Madison Water District
Megunticook Watershed Association
Muscongus Pond Association
Nickerson Lake Wilderness Preservation
Parker Pond Association, Inc.
Pemaquid Watershed Association
Pequawket Lake Preservation Association
Pickerel Pond Association
Pitcher Pond Improvement Assoc.
Pleasant Pond Protective Association
Portland Water District
Sabbathday Lake Association
Sebasticook Lake Association
Summer Haven Lakes Association
Taylor Pond Association
Thompson Lake Environmental Assoc.
Wilson Lake Association
Webb Lake Association

2009 General Donations

Belgrade Regional Conservation Alliance
Community Credit Union
Hancock County Soil & Water Conservation District
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Bill Bausch
Susan & Douglas Boyd
Kyle Emery
David Lind
Scott Lowell
Richard & Lauré McKeen
Tamara Lee Pinard
Lea & Ken Stabinski
Clyde D. Walton
Virginia & Paul Warren

2009 In Kind Donations

Beaver Cove Marina
Clark Marine
Dunkin' Donuts of Auburn
Heidi's Brooklyn Deli
Maine Bucket Company
Portland Water District
Reggie's Kawasaki Ski-Doo
Roopers Redemption & Beverage Center
Symantec Corporation
Water Monitoring Equipment & Supply
Ross & Bunny Wescott
Lew Wetzel
Stan Wood

Thanks to Supporters for 2009 Successes

2009 Fall Appeal as of Jan 31, 2010

Portage Lake Association	Sandra & Donald Dumont	Joe Longtin	Rudolph & Marguerite Stanzel
Damariscotta Lake Watershed Association	Cynthia & Bob Dunlap	Mary Griffith Lynch	Norman & Deborah Stiles
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We met, and exceeded the \$7,000 Spring Appeal matching challenge!

Thank you, Thank you! — To our 2009 Spring Appeal donors. A record number of new volunteers joined the VLMP last summer, and your generous support was essential to our being able to provide them with high-quality training and equipment.

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Algal Toxins in Maine Lakes?

Volunteer Lake Monitors Assist DEP in Two Year Study S.W.

You may be surprised to learn that, although algae are vital to virtually all forms of life in lakes and ponds, under certain circumstances they can be very toxic. Documented toxic blue-green algal blooms (aka: cyanobacteria) have been reported in North America for many years, and toxic algae, in general, have actually been documented dating back to ancient Rome.

But recently, perhaps due to a number of circumstances, which may include the effects of climate change (milder winter temperatures, reduced ice cover and warmer summers), algal blooms in the United States and Canada have been on the increase, as have poisonings of wildlife and domestic animals, fish, and aquatic biota from toxic blooms.

Cyanotoxins, the toxic compounds that are formed by cyanobacteria, have also been implicated in human illness, and even death. Toxic blooms probably have negative economic impacts on water uses—certainly drinking water—and property values, as well. In a position paper on toxic cyanobacteria blooms, the North American Lake Management Society states: "The human health, ecological, and economic impacts of cyanobacteria blooms can be very high." (see NALMS Position Statement 8: www.nalms.org/nalmsnew/userfiles/file/nalms_position_8_cyanobacteria.pdf)

Cyanobacteria blooms occur in all freshwater systems, including lakes and ponds. However, the intensity and duration of an algal bloom very likely determines the extent to which compounds associated with the algae reach unhealthful toxic levels. Because the degree to which algal blooms occur is related to the availability of nutrients, like phosphorus, in the water, the large majority of Maine's clear, low nutrient lakes may be at somewhat lower risk of experiencing algal toxins than bodies of water in the southern part of the U.S. Although the algae/bacteria that form blooms most often accumulate in "scums" that are visible on the water surface, in a wide range of colors from bright blue to brown, some of the bacteria that produce toxins do not form surface scums.

There is still much to be learned about why some blooms produce more toxins than others. In an effort to determine potential levels of cyanotoxins in Maine lakes that have a history of significant algal blooms, the Maine DEP sampled 31 lakes during the summers of 2008 and 2009. VLMP volunteers who monitored lakes on the list assisted DEP staff with this project.

The following summary of the algae toxins monitoring project was prepared late in 2009 by DEP Biologist Roy Bouchard.

Monitoring Maine Lakes for Algae Toxins



By Roy Bouchard
Maine DEP, Lakes
Assessment Biologist

During the summers of 2008 and 2009, Maine DEP monitored a total of 31 lakes, 10 of them multiple times and all at least once in August for a total of more than 80 open water samples. All of them have a history of supporting dense cyanophyte ("blue-green" algae) blooms in the recent past.

Typically, samples were composited from 2-3 stations within 1/4 mile of our standard open water monitoring stations at the deepest part of the lake. Our standard protocol calls for an integrated epilimnetic (composite surface layer) sample which is filtered and frozen to preserve toxins present in plankton. Additionally, surface scums were sampled when encountered (seven samples). Toxin analyses were performed at ESF-Syracuse by Dr. Greg Boyer's lab, which used PPIA analysis to detect total algal toxin microcystin (MC) LR-equivalents (all activity of microcystin congeners and nodularins combined). Above a response of 0.5 ppb, these samples were also run on HPLC-MS to differentiate major microcystin congeners and 7 variants of nodularins. Algal toxins anatoxin-a and cylindrospermopsin were run by high performance liquid chromatography and mass spectrometry (HPLC-MS: chromatography physically separates the molecules by size, shape and electric charge, and MS gets signals about how each piece of the mix responds to a signal.. Certain chemical groups show up as separate peaks as they react in a magnetic field). 2009 results for PSP and BMAA are pending. In addition to toxin analysis we analyzed water samples for Total Phosphorus, Nitrogen (TKN and NO₂-NO₃), and Chlorophyll_a.



Algal surface scum in a lake experiencing a "bloom"

What We Found in 2008

No samples tested positive for less common toxins (Anatoxins or Cylindrospermopsin). Saxitoxin was not analyzed in this year's samples, but is highly unlikely. However, we did find microcystins in 13 of the 41 core (epilimnetic) samples from open water. The detected concentrations ranged from 0.27 ug/L to 1.05 ug/L. (micrograms per liter—or ug/L is equivalent to parts per billion—or ppb) These low levels were a bit unexpected, since we had a number of days when the Secchi readings were below 1.5 meters and some lakes were below 1 meter the day we sampled. Other states report similar levels in their better quality waters. However, they often report much higher microcystin levels compared with our "worst case" situations since their total phosphorus can be an order of magnitude higher and many bloom conditions sampled are far worse than ours.

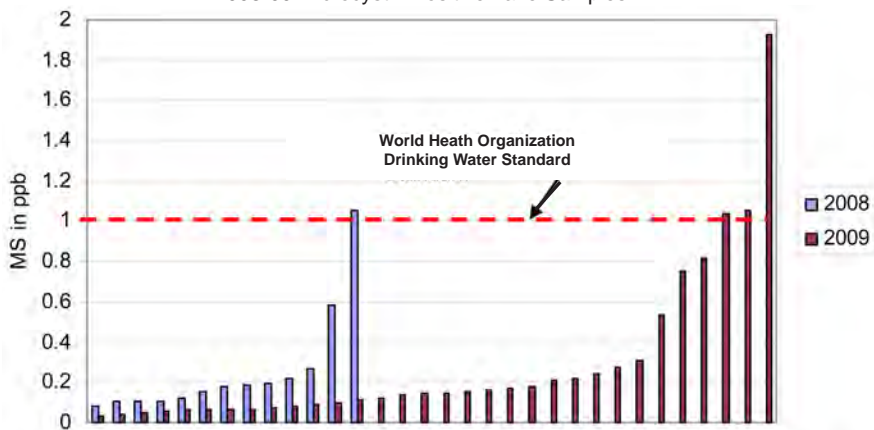
The lab noted that in a number of cases, the detection limit for MC was at or above 0.1 ppb, due to the relatively low concentration and limited amount of material presented on each filter. With higher sensitivity, it is probable that more detects would have been reported.

As expected, four of the six surface scums (sampled by volunteers or our staff) had moderate to high concentrations of microcystins (324-21,476 ppb dry weight). These values are in line with what is reported from studies all around the world. Unfortunately, these are usually expressed in terms of % microcystins by weight of dried material and thus can't easily be related to open water numbers referenced above.

What We Found in 2009

This year our samples were submitted as paired filters for analysis, increasing the sensitivity and lowering the report-

2008-09 Microcystin Positive Lake Samples



The graph shows the concentration of algal toxin microcystin for the samples taken from Maine lakes in 2008 and 2009. Only a few of the samples exceeded the World Health Organization (WHO) standard for drinking water. Most of the samples were well below that level.

ing limit. Results for microcystins show MC above detection limit on detect on 32 of 43 open water samples ranging from 0.029 to 1.93 ug/L. Three were above the World Health Organization (WHO) drinking water advisory standard of 1 ug/L.

The six surface scum samples contained high levels of microcystins and ranged from 11 to almost 12,000 ug/L on a wet weight basis and 1.7 to 451 ug/g dry wt.

All of the toxicity in samples run by LCMS was attributed to microcystin-LR and no nodularin was identified. No samples were positive for Anatoxin -a or Cylindrospermopsin. The laboratory report notes that in their experience "...less than 4% of all samples analyzed test positive for anatoxin-a, homo-anatoxin or its metabolites. Even fewer test positive for cylindrospermopsin, which is extremely rare in northern latitudes."

Open water sample microcystin concentrations for both years are shown below. When complete, a project summary will be posted at www.maine.gov/dep/blwq/docmonitoring/lake



Conference highlights from 2009 including volunteer awards and presentation slides are on the VLMP website

www.MaineVolunteerLakeMonitors.org/conference

wide range of aquatic life, drinking water and recreation.

The NLA also looked at how lakes that were impacted by wastewater in the 1970's (particularly direct discharges to lakes, which are now virtually nonexistent) were affected by treatment systems and other pollution control activities. It found that 75% of that group of lakes had either improved, or showed no change since that time, suggesting that investments in systems to treat wastewater discharges to lakes since that time appear to be working, even as lakes and their watersheds have become more populated.

The survey findings suggest that our lakes are vulnerable to excess human disturbances, and it supports reports from state lake management programs throughout the country which increasingly report that development pressures on lakes are steadily growing.

The survey also suggests that degraded shoreline habitat causes significant stress to lake systems, which in turn makes the case for a need for stronger management of lakeshore development. The NLA looked at lakes and their shorelines, including the effects of shoreline development on lakeshore habitat. It did not directly assess the effect of watershed development, which also has a strong influence on the health of lake ecosystems. However, it is reasonable to assume that the water quality findings of the survey reflect conditions in lake watersheds, as well.

The conclusions reached in the National Lakes Assessment do not come as a great surprise! In fact, they vindicate efforts used in Maine for four decades by the Maine DEP and VLMP volunteers to monitor, assess and protect the State's lakes and ponds.

It is important to note that the NLA survey describes the target group of lakes that were sampled, and makes general conclusions about the nation's lakes. Information for this article was extracted from EPA summaries of the NLA survey, and from an overview of the study prepared by EPA Scientist, Neil Kamman.

The draft NLA study is available online at:

www.epa.gov/lakessurvey

Passings

Bertrum A. Mason

Bertrum "Bert" Mason, Jr. a long-standing steward of Little Wilson Pond passed away on December 10, 2009. Bert touched many lives during his vibrant 84 year life and the members of the Little Wilson Pond community consider themselves fortunate to have known him and to have benefited from his efforts to protect their cherished pond. Bert was a pioneer in water quality management.



He was actively involved with the Little Wilson Pond Improvement Association since its inception in 1962 and for numerous years Bert served as president and director of the pond association. Bert was a straight talker who respected the need to balance recreational opportunities around the pond with responsible water quality protection. Bert set an example for future watershed protectors to follow and he will be fondly remembered.

In tribute to Bert the Little Wilson Pond Improvement Association has made a donation to the Volunteer Lake Monitoring Program.

Jay H. Vreeland

Jay Vreeland was a water quality monitor on Crystal Lake in Gray. We first met Jay a few years ago at a training workshop, at which time it became clear that he knew more about the dynamics of light attenuation in the process of measuring lake transparency than all the rest of us combined. Jay was a physical chemist by profession, but we soon learned that he had a wide range of skills and knowledge that greatly enhanced his work as a volunteer lake monitor. He was affable and generous with his expansive knowledge of science.

William L. Daniels

"Doc" Daniels was a water quality monitor on Pleasant Lake in Island Falls. He was a most unforgettable individual, from his warm personality to his insatiable curiosity about the natural world. A physician with many accomplishments, he was recognized by the Maine Osteopathic association as General Practitioner of the year in 1957. He cross country skied to the age of 86, and was widely recognized for his remarkable bird carvings. A trip to Island Falls for a workshop always included an engaging conversation with Doc. We will all miss him.



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Receive our monthly e-news updates by email,
including workshop schedules, news & events.

In 2010, all monitoring info will be available online
including newsletters, the *Maine Lakes Report*, indi-
vidual lake reports, and monitoring forms.

See page 5 for more info.

