

## ***Invasive Plant Control***

The old adage is still true: "Prevention is the best medicine." We have an opportunity to stop these invasive plants from ever being introduced to new lakes, ponds and rivers.

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## ***A Blueprint for Troubled Lakes***

Regardless of whether a lake is experiencing anoxia or not, the road map that emerges from "Management Overview for the Belgrade Lakes" is highly relevant.

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## ***New Testing Initiatives***

The new strings of in-lake temperature sensors we've installed across the region, gloeotrichia monitoring and the fully automated buoy on Highland Lake are all initiatives aimed at filling in gaps and reducing the time span needed for assessment.

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*Summer 2015*

*Free*

# LEA Lake News

## **Lakes at a Tipping Point – Solving the Puzzle**

*by Peter Lowell*

There is an uneasy feeling among Maine's lake communities as the evidence mounts that once pristine waters appear to be facing decline. Water clarity, the simplest of all tests, is on a general downward trend and more and more lakes are experiencing loss of oxygen in their deepest waters. That being said, we realize that there are many more elements in play and they must be brought together to understand what is going on in complex ecosystems and to develop a strategy before it is too late.

LEA is attempting to solve the puzzle of water quality by taking a multi-disciplinary approach combining traditional and cutting-edge techniques and sciences. The pieces are beginning to come together. For decades, Maine's lakes had been evaluated using basic tests like clarity, oxygen concentrations and occasional measurements for phosphorus and chlorophyll. In the 1980s, LEA expanded its testing to look at phosphorus profiles so we could learn what the concentrations of this algae-growing fertilizer were.

When we compared oxygen and phosphorus concentrations at various depths, an interesting pattern emerged. If bottom waters were low in oxygen, there were often high readings for phosphorus.

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## **Year Two for the Buoy**



After a couple early season setbacks, conditions and equipment finally were lined up on May 18th to launch LEA's fully automated monitoring buoy on Highland Lake. To help avoid the brunt of the wind, Assistant Director Colin Holme, researcher Amanda Pratt and volunteer Butch Auger began gathering and setting up the needed equipment early at the Highland boat launch. After a couple of hours, everything was ready to go and the wind was still light but steady from the northwest.

Because the buoy has two stainless steel cages underneath to support equipment such as oxygen and temperature sensors that hang down to the bottom, much of the setup had to be done at the deepest part of the lake where it is deployed. To bring the buoy out to the site LEA once again used a custom platform built especially for this purpose by Great Northern Docks in Naples.

After hauling the main body of the buoy on the platform, which has a triangular-shaped superstructure to hold it out of the water, the first thing that needed to be done was to set the mooring buoys. To ensure the chain of sensors that hang from the buoy don't get tangled or spin, the whole unit is not directly anchored to the bottom of the lake. Instead, it is strung tightly between two adjacent mooring buoys.

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## **The New Maine Lake Science Center**

*by Peter Lowell*

This summer marks the opening of LEA's new Maine Lake Science Center, dedicated to advancing and supporting lake research on Maine's lakes. The center offers a fifty-seat conference room, three researcher housing units, an education center, lab and offices.

The setting is close to downtown Bridgton, on 17 wooded acres adjoining the 66-acre Pondicherry Park, which LEA initiated and then partnered with Loon Echo Land Trust to develop and gift to the Town of Bridgton. Trails on LEA property will link with the park's trail system using a new boardwalk built by local Boy Scouts. The new land has great ecosystem diversity, making it an ideal outdoor classroom and there will be native plant gardens and model erosion control systems.

Although the center is new, work on the concept has been underway for seven years, starting when LEA became concerned that Maine's lakes were not benefitting from advances in water quality testing and research. Staff visited several lake programs around the country and began to develop relationships and partnerships with Maine's academic community.

Two years ago, we formed the Lake Science Advisory Board, made up of lake researchers and experts from Maine to California. The board is a collaborative effort among researchers who are working together to identify research needs and priorities and to pursue research grants.

As we learned about new technologies and new tests, we began to expand our lake monitoring program to include temperature sensors, sediment analysis, algae research and even the high-tech

remote sensing buoy. This year, we have added a fluorometer to take field measurements of chlorophyll at various depths.

The move to establish the Maine Lake Science Center led to a revamping of LEA's whole testing regime, bolstered and supported by our work with regional lake associations and professors from Bates College, Colby College, the University of Southern Maine and the University of Maine at Farmington and Orono.

The center will be operated by three part-time staff. Bridie McGreavy has accepted the position of executive director. Dr. McGreavy is one of the first graduates of the University of Maine Sustainability Solutions Initiative.

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## Year Two for the Buoy

After placing both moorings and attaching to one, Butch and Colin began putting the pieces together standing on the floats while Amanda sent the different parts over from LEA's small aluminum testing boat. Getting all the parts and cables sorted and assembled on a small platform in the wind is a tricky operation but everything went smoothly and by 11am the buoy was properly installed and taking readings.

### Light sensor

During initial testing at LEA, readings from the two light sensors on the buoy were not matching up well with each other. These two sensors, one on top of the buoy in the open air and one installed about six feet below the surface, are there to help continuously monitor water clarity. The difference between the two readings can tell how much algae or particulate matter are affecting light penetration into the water. After doing multiple tests at LEA, it was sent off to Ohio to be analyzed further by Fondriest Environmental. The sensor in question seemed to function properly during the second round of testing so it was thought that interference from power lines or LEA wiring may be causing the erratic readings. Even though this sensor was on the dry side of the buoy, replacing it out on the water would still be quite difficult so this problem was a big concern before launching. To everyone's relief, once the buoy was deployed, all the sensors were shown to be working properly.

### Next steps

This year LEA will take numerous Secchi disk (clarity) readings on Highland Lake to develop a curve for translating the two light sensor readings into an accurate live Secchi estimation. Last year, LEA began acquiring additional Secchi data to develop this



*Hauling the buoy out to the deepest part of Highland*

translation, but after reviewing the initial results, we saw that more field data needed to be collected to get better precision. Once the gaps in this curve have been filled in, LEA will use this data to immediately monitor the effects of storm events and algae growth on clarity.

With a much earlier launch date this year, a more complete picture of the oxygen and temperature structure of the lake will come together. A spring launch such as this one will allow the buoy to catch the formation of Highland's stratification and its affect on deep water oxygen concentrations. At installation, oxygen depletion had just begun in the very deepest meter of the lake, with in-lake oxygen

concentrations at approximately 80% saturation (100% saturation is typically found throughout the lake right after turnover).

The earlier start date will also allow the fluorometer, which measures algae growth and is attached to the cage underneath the buoy, to monitor spring algae concentrations that coincide with typically increased precipitation during this time period.

Finally, LEA has also been working with Colby Chemistry Professor, Dr. Whitney King, on a website that not only displays current data from the buoy but also puts it in a format that is practical and easily understandable for all viewers. Look for a link to that page soon on our website at [mainelakes.org](http://mainelakes.org)

## The Savior of Holt Pond

University of New Hampshire forestry student Ryan Curtis is single-handedly bringing the Holt Pond Preserve back to its original condition. Ryan stepped forward this spring to offer his services for trail clearing, boardwalk repair, bridge building and brush trimming. LEA staff has been overextended for the past ten years and has been unable to give the preserve and its trails the attention they deserve and need. It will be a while before the project is complete, but Ryan's generosity and dedication will assure that visitors to this magical area will have a safe and enjoyable time.

## Burlap Barriers on the Songo River

In the summer of 2013 the milfoil crew laid two bottom barriers made of burlap followed by another in 2014. The idea behind this experiment was to find a material durable enough to cover and kill the milfoil that could decompose in place, thus eliminating the need for recovery. The burlap laid in 2013 killed over seventy-five percent of the milfoil under it, giving the DASH harvester crew an opportunity to easily remove the survivors that grew through the burlap or new plants that re-colonized the top. After the success of our initial trial, the crew decided to place an additional burlap barrier over the last patch of milfoil in the Songo Bayou. By September of 2014, the 2013 barriers were beginning to break apart underneath the sediment that had settled over them. This summer, the team will have the opportunity to further assess the efficacy of burlap as a control method.



## Maine Lakes Society Comes to Sebago Lake

Mark your calendar now and tell all your friends to save August 22nd for the Maine Lakes Society Conference and Celebration at Camp Skylemar on Trickey Pond.

A host of family-friendly events like paddleboard yoga, kayaking for kids, tours on our 30-foot floating classroom and a Maine Art Show and Sale complement talks by a nationally-known expert on Conserving Lakes in a time of Global Change, plus Predicting Your Lake's Tipping Point, Next Gen Monitoring with 2nd Grade Science, and a preview of LEA's new Maine Lakes Science Center . . . and much, much more! For information, contact Maggie Shannon ([msshannon@mainelakessociety.org](mailto:msshannon@mainelakessociety.org)) or Cheryl Daigle ([cpdaigle@mainelakessociety.org](mailto:cpdaigle@mainelakessociety.org)) or call 207 495-2301.

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# The New Maine Lake Science Center

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As a tenure-track professor at the University of Maine, she gives us a strong university affiliation. She will be able to channel researchers, assist with grant writing and will identify collaborators and research candidates.

The day-to-day affairs will be the responsibility of a center and program manager. This person will act as host to researchers in residence, will recruit center users and will work with LEA education staff to develop multi-faceted education programs.

A research director will be responsible for working with the executive director to identify and recruit researchers, write grants and conduct priority research.

As resources allow and circumstances dictate, some of these positions may be expanded in scope to meet the challenge of protecting Maine's lakes from deterioration.

An important aspect of our strategy is the emphasis on the relationship between social sciences and traditional lake sciences. Robust scientific research is needed to define and achieve changes in policy and behavior. Unless our knowledge generates action, the data gathering will be simply academic.

The Maine Lake Science Center will have its grand opening in August, but the initiative has already had a significant impact by bringing together those working on lake protection and by putting LEA's water quality monitoring program on the cutting edge of technology and science. As we work with a growing list of partners, even more progress will be made toward enhancing our knowledge of lakes and watersheds and in bringing policy and practice into alignment with protection needs.

## "A New Beginning for LEA"

A healthy organization is always changing, learning and growing. During the past five years as president of the LEA Board of Directors, it has been my pleasure to work with a talented and supportive Board, a truly impressive and educated membership base, and the passionate and visionary staff. During my tenure on the Board, and under the leadership of Peter Lowell and his entire staff, LEA has grown immensely in both membership and in expertise.

LEA's mission has been first and foremost in the minds of our members for 45 years, and with our new Maine Lake Science Center becoming a reality, LEA is poised to do world-class research to meet that mission in the coming years. The Lake Science Center is more than a building or a place, it is an essential element for us to answer questions about impacts to our lakes and make data-driven policy and legislative changes at the State and local levels. The center will allow LEA to expand our educational outreach from grade school all the way to post-doctoral works and engage our members and the public in numerous citizen science initiatives.

On a personal note, our staff, board, membership, and executive director have been a model of collaboration I shall hope to replicate again in my lifetime. With all of LEA's stakeholders pulling together, much has been achieved and our lakes will be the beneficiaries. Though my tenure as President is over, I will remain active in LEA and I'm very optimistic about its future. Thank you, our members and supporters, for all you do for Maine's lakes.

-Sean Dundon, President,  
LEA Board of Directors (2011-2015)

# Deep Sediment Coring Results

By Amanda Pratt and Colin Holme

In September of last year, LEA collected lake-bottom sediment going down several feet from Highland and Long Lakes. The purpose of this study was to learn more about the historical water quality of these lakes so that we can better understand their current susceptibility to algae blooms. Recently, we received the results from this sediment work from the University of Maine's Climate Change Institute, where the samples were processed.

Once collected, the sediment cores were sectioned off and dated using lead-210, which works well for dating relatively recent events but can only go back approximately 150 years. On Highland Lake, new sediments accumulate on the bottom at a rate of around 0.06 centimeter per year. On Long Lake, sediment builds up by around 0.09 centimeters per year. This means that material from the bottom of the 22cm-deep sample retrieved from Highland Lake was from the mid-1600s and the 24 cm Long Lake sample went back to the mid-1700s. These accumulation rates are for the deepest part of the lake, where the samples were taken.

After dating, the researchers at the Climate Change Institute were able to infer water quality changes by looking at diatoms preserved in the sediment. Diatoms are a type of algae with hard, silica-based shells, whose preferred environmental conditions differ depending on their species. For this study, the relative number of each species of diatoms was counted from each section of the sediment core.

Amanda Pratt and Kelsey Boeff  
preparing Long Lake's sediment core



Changes in the amount of diatoms indicate a shift in the water conditions over time.

In Highland Lake, changes in the relative numbers of diatoms occurred around 1950. The amount of diatoms associated with earlier ice-out and longer, more stable periods of lake stratification (layering) increased around this time, while the amount of other types of diatoms that were previously abundant began to decline. These traits suggest that the environment began to get warmer around this time. Other research from the University of Maine has shown the same pattern in diatom abundance in many lakes throughout Maine. The researchers believe this may be related to lower wind strength across the state beginning around 1950. The nutrient level in the lake did not change significantly according to the diatom record.

A similar change in diatom abundance (to those favoring early ice-out and strong stratification) occurred on Long Lake, but this change appeared to begin around 1900 rather than 1950. The sediment record also showed that diatoms favoring higher nutrient levels were seen more often starting around the 1950s, indicating that the nutrient levels in the lake increased around this time. This increase is slight – only around 2% or 0.5 parts per billion.

Overall, the results suggest that Highland and Long Lakes are experiencing longer periods of stratification than what was occurring 50 to 100 years ago. Long Lake has also seen a slight increase in nutrient levels. The reasons for these changes may be caused by lower wind strength or warmer seasonal temperatures.

# Invasive Plant Control - Work and Money

By Mary Jewett

Inspecting boats for aquatic plants is the first line of defense against the spread of invasive species. For over a decade, LEA has employed inspectors at boat launches around the Lakes Region to check boats and educate boaters about the importance of prevention.

Within this newsletter, Adam Perron talks about the hard and successful work of LEA's DASH crews combating the invasive species that plague water bodies in our area. The crews have done an amazing job controlling and nearly eradicating infestations in Brandy Pond and the Songo River, but it was done at a cost.

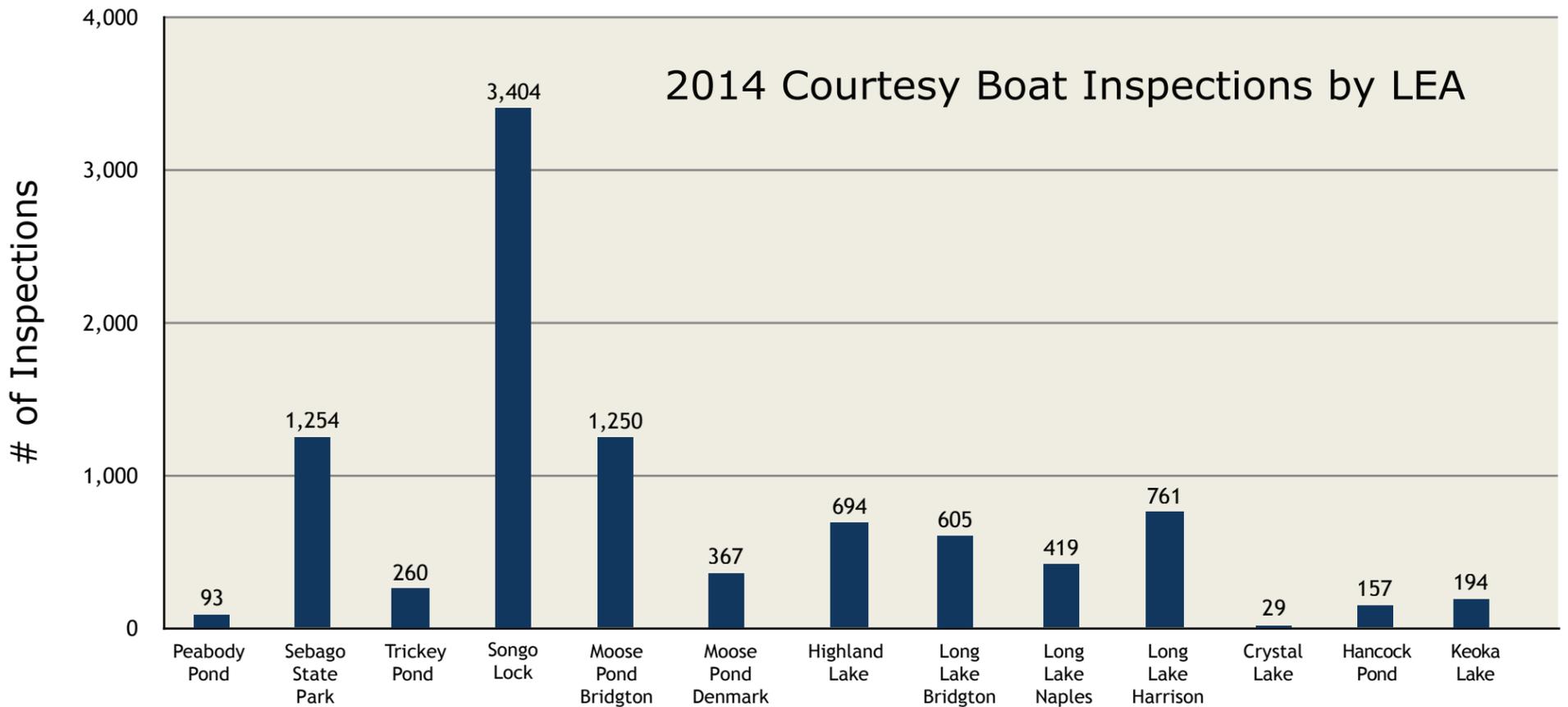
Fighting invasive species costs money and considerable time. Once an infestation takes hold, there are many options for removal but none of them are easy. In other states, there are cases where lakes are closed to the public because the plants have grown so thick that recreation is difficult or impossible.

The old adage is still true: "Prevention is the best medicine." We have an opportunity to stop these invasive plants from ever being introduced to new

lakes, ponds and rivers. The Courtesy Boat Inspector (CBI) program was piloted right here at LEA in 2000. Fifteen years later, there are hundreds of CBIs around the state conducting over 80,000 boat inspections a year.

LEA employs approximately 30 people each summer as boat inspectors. They work at fourteen boat launches on 11 different lakes. Last summer, our CBIs inspected 9,487 boats and found 232 plant fragments. Of those plant fragments, only one was found to be invasive. A small piece of Variable-Leaf Milfoil was found floating in the Songo Lock. In 2013, LEA inspectors found eighteen invasive plant fragments.

What does this mean for LEA? In part, it means that we are winning the battle against invasive species. But we know that there will always be the threat of plants coming from outside our area, which is why we will continue to have a strong CBI program. This summer, we have added an inspector to the Woods Pond boat launch in Bridgton. With the help of the Woods Pond Association, this addition will protect the pond from invasive plants and will educate more boaters about this threat to our lakes.



## New Plant Control Funding

Those working to control Maine's invasive aquatic plants are the beneficiaries of legislation that provided an additional \$180,000 in 2015. LEA and other lake advocates pushed for this legislation and were successful with unanimous support in the House and Senate.

The result for this summer is a total war chest of \$212,456 to conduct actual plant control work. The

funds are being distributed among twenty-one organizations, which are also contributing tens of thousands of their own dollars and countless hours of volunteer time to restore these public resources.

LEA has been engaged in a long-standing campaign to get more resources for control groups. It has been our feeling that they are carrying the brunt of the responsibility for keeping the invasive plants in

check and contributing the most local match for state funds in dollars and time.

The challenge now is to build capacity among groups doing work on the ground so the funding can be justified and maintained. Our hope is that LEA is in the enviable position of scaling back its plant control work. The Songo River and Brandy Pond infestations seem to be under control, requiring fewer resources each year. We are carefully monitoring groups working on Sebago Lake to determine how best to help them.

### *The "Tipping Points Campaign" and its Goal*

Throughout 2015, the "Tipping Points Campaign" for the establishment and operation of the Maine Lake Science Center will be underway. The \$1,200,000 goal will fund purchase of the 17-acre property, fully renovate the building, construct roads and parking areas, construct a new septic system, and support staff and operations through 2020. By that time, it is expected that the center will be self-sufficient through revenues from grants, contracts and user fees.

Tipping points refers to the concern that many Maine lakes are dangerously close to rapid deterioration and research is essential in order to develop appropriate policy changes and to encourage voluntary action on the part of landowners and lake users.

As of June, half of the goal was raised in gifts and pledges from eight foundations and forty donors, with a lead gift from an anonymous family foundation. Foundation support had come from the anonymous family foundation, the Davis

Conservation Foundation, the Fields Pond Foundation, the Kendall and Anna Ham Charitable Foundation, the Margaret Burnham Charitable Trust, the Morton Kelly Foundation, the Norcross Wildlife Foundation and the Stephen and Tabitha King Foundation. Other foundation proposals are pending. The balance of the year will be devoted to completing the campaign through outreach to major donors, LEA's membership base and the public. If you are interested in helping with the project, contact LEA Executive Director, Peter Lowell, by phone (647-8580) or e-mail (lakes@leamaine.org).

# The Final Stages of the Songo River Project

By Adam Perron

The Songo River has changed dramatically since LEA's first season with the diver-assisted suction harvester, or DASH boat, nine years ago. Where a boater or diver would once see an impenetrable mat of variable-leaf milfoil they will find native aquatic grasses, elodea, varieties of pondweeds and spatterdock. Last season, LEA's Milfoil Control Team laid bottom barriers over the last remaining patch of milfoil in the project area. While there will be sporadic regrowth to address over the next few seasons, a boater can now boat through the Songo Bayou, Songo River and Brandy Pond with little chance of seeing milfoil.

In light of this new reality, the Department of Environmental Protection, the Bureau of Parks and Lands, and LEA have decided to remove the milfoil signs and buoys marking the former patches in the Songo River. The State will also remove the additional navigational channel markers that were placed to keep boaters away from the milfoil and our team.

With no milfoil to alert boaters about, the once useful markers became sign pollution dotting the undeveloped banks through the state park. Their

removal signals the beginning of our end phase. Barriers and DASH harvesting have given way to ongoing surveys and hand removal of increasingly rare regrowth. Boaters carrying milfoil fragments from another infestation in Sebago Lake may spread milfoil back into the river, but our survey work should expose those new infestations in time for an effective rapid response.

With a broad area to cover and milfoil plants growing few and far between, identification skills and thorough plant removal are more important than ever. Thankfully, LEA has a veteran crew consisting of Program Coordinator Adam Perron, Crew Leader Christian Oren, and crew members Tyler Oren, Tommy Chagrasulis and Derek Douglass with a combined thirty years of milfoil management experience. The crew will be joined by former crew members and current office interns, Lucien Sulloway and Sullivan Tidd, on a weekly basis to help cover the secondary sites in the main river channel.

This season, the bulk of the day-to-day work is shaping up to be very different from what the crew has been accustomed to in the past. With no front line for this

season's control effort, there is no single focal point leading into the summer. It will not be until late June when the milfoil reaches its summer growth that the worst places will become evident.

With less strategic planning required to manage the Songo River, LEA is expanding our role in the regional control effort. This summer, LEA will offer consultation to the Porter Conservation Commission in their work to begin a manual control program in the Ossipee River. Adam led the DASH portion of the state-wide Invasive Aquatic Plant Manual Control Training workshop coordinated by DEP and the Volunteer Lake Monitoring Program. The two day workshop is required for the divers of organizations who are awarded grant funding through the DEP cost share manual control grants. This is the second year LEA has participated in the workshop.

As the Songo River requires less and less management to keep the infestation under control, LEA will continue to work to keep infestations from spreading throughout our region and seek new opportunities to guide burgeoning control programs.



Former LEA intern Amy Tragert with milfoil on the Songo River in July 2010. Scenes like this can no longer be seen on the river.

## Lakes with sensors:

Waterbody	Description
Back Pond	string of sensors
Hancock Pond	string of sensors
Island Pond	string of sensors
Keoka Lake	string of sensors
Keyes Pond	string of sensors
Long Lake	3 strings of sensors
McWain Pond	string of sensors
Moose Pond	3 strings of sensors
Peabody Pond	individual
Sand Pond	string of sensors
Stearns Pond	individual
Trickey Pond	string of sensors
Woods Pond	string of sensors

## Digital Temperature Sensors

By Amanda Pratt

LEA's automated temperature monitoring program is going ahead this year with the help of individual lake associations, who have provided maintenance funds for the upkeep of the buoys and sensors that allow us to take thousands of temperature readings in each lake over the spring, summer, and fall. Each of the fifteen basins involved in this program is outfitted with a regulatory-style buoy, anchor and rope that has a number of small, digital temperature sensors (called HOBO sensors) attached at regular intervals from the top of the water to the bottom.

The data from the sensors allows us to see a "temperature profile" of the lake: essentially a cross-section of the temperature at various depths in the lake at any given time. Collectively, we can see how the temperature fluctuates over time in response to weather and other events. This data provides an array of information, most importantly about stratification, which is when the lake settles into layers with distinct temperature differences.

In March, Colin Holme and Amanda Pratt presented some of last year's temperature monitoring results at the Maine Sustainability and Water Conference in Augusta. Through the use of these sensors, we now know more about temperature patterns in our lakes than was previously possible.

In 2014, most of the lakes reached their maximum temperature on July 23rd. While surface temperature patterns were similar across all basins, the date of complete lake mixing (when the stratified layers break down and the temperature becomes uniform throughout the lake) varied considerably. Shallower lakes, such as Woods Pond and the north basin of Moose Pond, mixed in September, while many others were not fully mixed until early November. A comparison with our manual water testing data confirmed the accuracy of the HOBO sensors throughout the season.

Additionally, a month-by-month comparison of temperature profiles in each lake showed the strongest stratification around the time of maximum temperature, in late July. Shallow sensors in Peabody Pond and Stearns Pond showed similar average temperatures between 2013 and 2014. Additional results from the 2014 sampling season can be found on the Current Water Testing Reports section of our website:

[www.mainerlakes.org/?page\\_id=299](http://www.mainerlakes.org/?page_id=299).

This year, we were able to launch all of the temperature buoys by May 11th, the earliest we have deployed them in the three seasons since we started this program. This early start date means we will



have more information about the set up of lake stratification and how this differs between lakes, and it will allow us to quantify exactly how long each basin stays stratified. The length of stratification has important consequences for water quality and climate change. In addition, we have expanded the program by adding new buoys this year on Keyes Pond and the south basin of Long Lake.

Look out for our buoys on a lake near you this summer!

# Sediment Coring for Aluminum and Iron: Results

By Amanda Pratt

In the summer of 2013, LEA collected shallow sediment cores from 20 lakes and ponds in order to learn more about the aluminum, iron, and phosphorus content in our lakes. Ratios of aluminum to iron can predict whether or not a lake will experience elevated phosphorus levels. This ratio is useful for determining the relative level of phosphorus present in the sediment.

The sediment cores were taken at the deepest point in the lake or basin tested using a gravity corer, which collected the top one inch of sediment from the bottom of the lake. The samples were analyzed for LEA at the University of Maine in Orono by Dr. Jasmine Saros and her lab.

We care about the levels of phosphorus in lakes because small amounts of this nutrient can lead to huge amounts of algae growth. This is bad for the lake ecosystem, bad for recreation and bad for property values. There are two ways for phosphorus to get into lakes: from outside sources like runoff and erosion, and from inside the lake via the sediments. It is this “inside” source (also called internal loading) that we are studying by looking at the sediment cores. Most of the time, a lake has plenty of dissolved oxygen contained within its water. Most of it comes from the air through mixing at the lake’s surface.

When there is oxygen in the water, much of the lake’s phosphorus is bonded to iron molecules on the bottom of the lake. This can change in the summertime, when many lakes are stratified, or layered. The bottom layer often does not have contact with the upper waters and is effectively cut off from renewing its oxygen levels. The lake’s oxygen stores are used up over the summer and when the oxygen is gone, the bond between phosphorus and iron is broken. This allows the phosphorus to be released into the water. This, in a nutshell, is how internal loading works. The released phosphorus becomes available for algae to use, and they are better able to reproduce, causing a population surge and green, murky water.

There is more, however, to the story of phosphorus in our lakes. In acidic lakes, like those in the Lakes Region, there are often naturally occurring aluminum compounds in the sediments in addition to iron. Phosphorus has the ability to bind with both aluminum and iron, but with aluminum the bond is permanent and can’t be broken when there is no oxygen. This means that lakes with high levels of natural aluminum have a built-in buffer for internal loading. When there is no oxygen at the bottom of the lake, the phosphorus that is held by iron is released, but quickly bonds with aluminum instead.

Because of this, lakes with high aluminum levels are less at risk of phosphorus loading from internal sources. How much aluminum is enough to prevent internal loading? Research suggests that a ratio of greater than 3:1 aluminum to iron in the sediment means a lake is at lower risk of sediment phosphorus release.

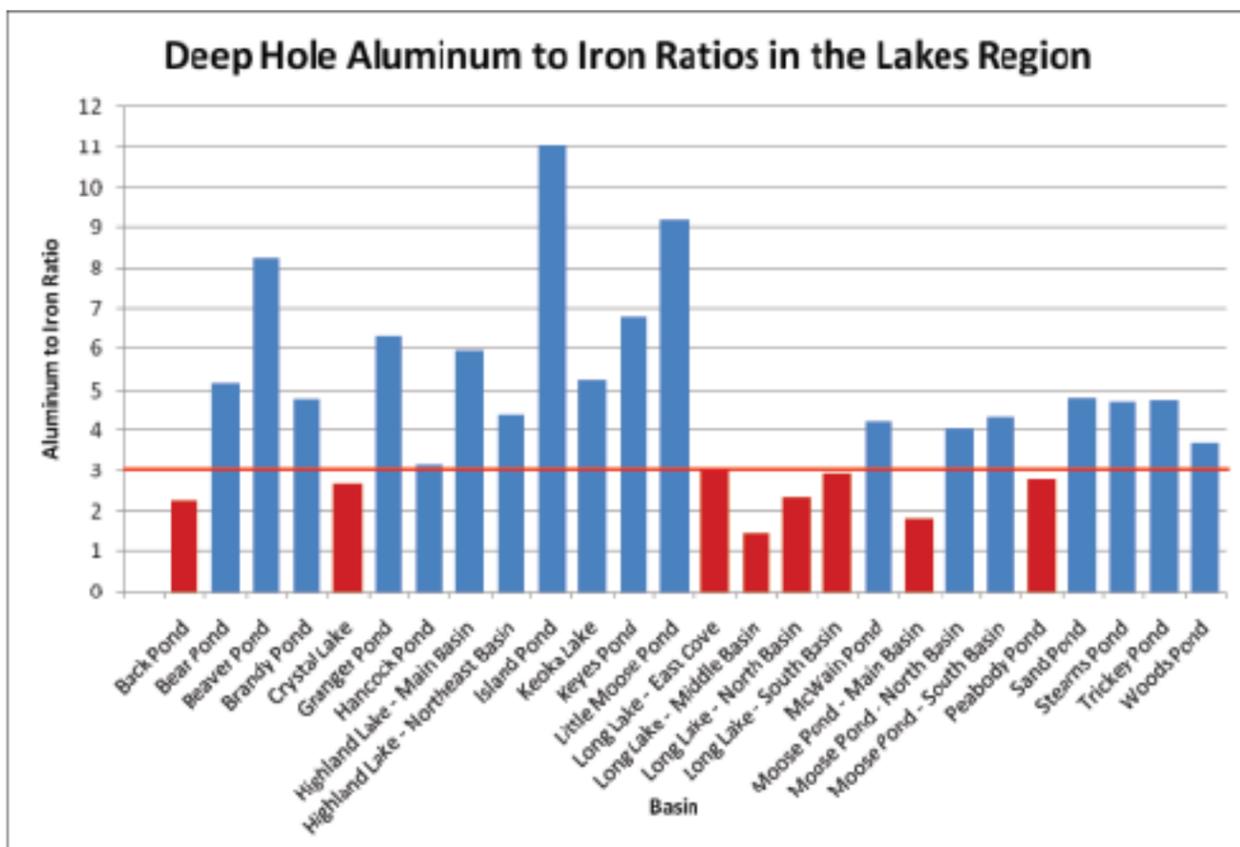
According to our sediment coring data, there were five lakes and ponds that had low aluminum to iron ratios (under 3:1), meaning that they are more at risk of internal loading. These include Long Lake (all 3 three basins and northeast cove sampling site), Moose Pond (main basin), Peabody Pond, Crystal Lake, and Back Pond. The lakes and ponds with high ratios (above 3:1), and therefore less at risk, are the following: Highland Lake, Stearns Pond, Hancock Pond, Bear Pond, Brandy Pond, Keoka Lake, Trickey Pond, Sand Pond, McWain Pond, the North and South basins of Moose Pond, Beaver Pond, Little Moose Pond, Granger Pond, Island Pond, Keyes Pond, and Woods Pond.

Another ratio, this time of aluminum to phosphorus, also has important implications for lakes. When the aluminum to phosphorus ratio is below 25:1, it means the sediments are either low in aluminum or high in phosphorus, both of which increase the risk of excess phosphorus release from sediments. Happily, all of the lakes we tested had high aluminum to phosphorus ratios (all greater than 40:1), suggesting that phosphorus levels within these systems are low and/or there is enough aluminum to absorb excess phosphorus in the system. This result is backed up by LEA’s water monitoring data.

In general, the results show that our lakes are in good shape. All of them have relatively low stores of phosphorus, and most have plenty of aluminum to bind excess phosphorus. In those lakes with low levels of aluminum – Long Lake, Moose Pond, Peabody Pond, Crystal Lake, and Back Pond – special care should be taken to prevent any extra phosphorus from entering the water. Excess phosphorus would likely end up fueling algae growth in these lakes, especially if they experience low oxygen conditions in the summer. Luckily, Peabody Pond, Crystal Lake, Back Pond, and Moose Pond do not have severe oxygen depletion problems. Long Lake does experience pronounced low oxygen in the summer, which makes it especially vulnerable.

Individual one-page reports for each lake tested are available on our website.

Visit [http://mainelakes.org/?page\\_id=457](http://mainelakes.org/?page_id=457) for more information on your lake.



Bar graph showing the ratios of aluminum to iron at 26 sample sites. The red line shows the threshold ratio of 3:1, under which a lake is at increased risk of internal phosphorus loading. Basins with ratios of under 3:1 are colored red.

## Update on Gloeotrichia

*Gloeotrichia echinulata*, or “Gloeo” (glee-oh) are a type of free-floating, colonial algae. They appear as tiny, yellow-green floating specks suspended in the water for a short time during the summer. They belong to a group of algae called cyanobacteria, known for producing toxins and causing water quality impairment. LEA monitors Gloeo to make sure that their numbers stay relatively low and so that we can better understand them as a species. Specifically, we are interested in learning why they occur in certain lakes but not in others, and what makes their populations fluctuate from year to year.

The results of 2014 Gloeo sampling were reported in the winter 2014-2015 LEA Newsletter. To summarize, Keoka Lake had the highest levels out of 24 lakes tested, and seven lakes – Long Lake, Keoka

Lake, Moose Pond, Crystal Lake, McWain Pond, Peabody Pond, and Brandy Pond – had elevated levels of Gloeo measured at least once during the summer season. The remaining lakes had little or no Gloeo both in 2014 and in 2013, the first year of sampling.

In 2015, we will collect four samples from each of the lakes that contained elevated concentrations of Gloeo in 2014. The sampling will occur over about six weeks in late July and August, when the population tends to peak. We will also take baseline samples in the remaining lakes once during this time period. We are grateful for the support of area lake associations, who have offset some of the costs of Gloeo sampling on their lakes.

For more results and information about Gloeo, visit <http://mainelakes.org/?p=5970>.



Gloeo colonies under the microscope

# Bridgton Library Rain Garden By Colin Holme

Thanks to the foresight of the library's board of directors, additional spaces are not the only benefit to the community of the newly installed parking lot behind the Bridgton Library. With help of funds from the Long Lake stormwater compensation program, which is administered by LEA, the redesigned and enhanced lot now drains to one of the first engineered rain gardens in a publicly-owned space in the region.

The rain garden, also called a bio-infiltration bed, is designed to take stormwater from the parking lot and remove the nutrients and sediment before allowing it to drain off site. The nutrients are taken up by the plants in the system and absorbed into a filter media, which is a special mix of organic material and coarse sands and gravels.

While water will pool in the site during rain events, it quickly percolates down through the soil and the plants in the garden are usually more tolerant of dry conditions than wet ones. Beneath the plants and soil, there is an under-drain, which is a series of perforated pipes. By the time the stormwater makes its way down to these pipes, it has been cleaned by the plants and soil above. The pipes connect to the town's rainwater collection sewer that flows to Stevens Brook. Before this rain garden was in place, all stormwater from the lot went directly into the brook without any treatment, which is typical of almost all the buildings and parking lots along Bridgton's Main Street.



This new rain garden is actually the second innovative stormwater treatment that was installed at the library. The pavers that were used on the new patio put in two years ago are permeable. In other words, when rain falls on this flat hard surface, it actually percolates straight into the ground instead of running off like it would with most pavers, concrete or asphalt.

There are many different types of permeable pavers now commercially available and the cost is virtually the same as traditional pavers.

These two systems have turned the Bridgton Library into a model for ecologically friendly redevelopment. Next time you are checking out a book, take a peek around and see how good green infrastructure can look.

## A Blueprint for Troubled Lakes By Peter Lowell

Concern about water quality in the Belgrade Lakes Region of central Maine prompted the Belgrade Lakes Association to reach out to Ken Wagner, a well-respected lake expert, for his perspective. The Belgrade Regional Conservation Alliance and Colby College soon joined the initiative. LEA had hired Dr. Wagner to assess the Milfoil infestation in the Songo River when we first began our control efforts and we have been familiar with his excellent work for many years.

Ken Wagner's assessment of management needs and options for the Belgrade Lakes is an important document for those working to provide long-term protection for Maine's lakes. His recommendations align remarkably well with the trajectory of the Maine Lake Science Center and should serve as a blueprint for all lake advocates.

Although this is a preliminary work, Wagner highlights significant gaps in current monitoring programs and details essential research needs. His discussion of mechanical management options like air injection for anoxic, or oxygen-starved lakes, is particularly interesting for those dealing with these fragile water bodies.

Regardless of whether a lake is experiencing anoxia or not, the road map that emerges from his "Management Overview for the Belgrade Lakes" is highly relevant. Several basic messages stand out. The first is the importance of expanded monitoring to include oxygen-temperature profiles, phosphorus profiles, Gloeotrichia monitoring and an analysis of sediment metals.

LEA has instituted all of these protocols and has shared "how to" information with the leaders of Maine's largest lake associations in an effort to build capacity within those regional organizations. Wagner points out that this type of detailed information is necessary to calibrate mechanical or

chemical control methods if and when they are needed. This information is also key to understanding a lake's water quality status. We need to know our lakes and be prepared to institute in-lake and watershed-based initiatives if faced with deteriorating water quality. Wagner's analysis also flags some important research needs like soft sediment phosphorus studies and baseline information such as detailed bathymetry (lake depth contours).

The Maine Lake Science Center has been working with its advisory board to identify research priorities and the Wagner paper has raised some interesting issues to consider. The Belgrade Lakes are to be commended for initiating this assessment and we can all benefit from the findings and recommendations.

### Trouble in the Azores

A couple of months after Dr. Wagner began his work in the Belgrade Region, LEA Executive Director Peter Lowell visited a lake research center on Furnas Lake on São Miguel Island in the Azores. The circumstances there were like an eerie glimpse into the future. The fabulous center was conducting world-class research on a lake that was severely degraded by decades of cattle grazing in its watershed. The impact was so dramatic that much of the lake had filled with sediment and lost its oxygen.

Researchers were studying the technique of killing algae with ultrasound while a massive pumping system pumped oxygen into the lake's deepest waters. It was a desperate effort that included buying up all of the pastures in the crater lake's watershed to restore them to a naturally-vegetated state.

Here was a remarkable example of the scenario we are trying to avoid in Maine and other northern climate regions. Restoration efforts are Herculean, costs are astronomical and success is partial at best.

This lake had reached its tipping point because land uses in its watershed had overpowered its resilience. Furnas provided a glimpse into an extreme but hauntingly possible scenario.

This could easily happen to us unless we research conditions and develop a proactive strategy to prevent a tragedy that will otherwise be inevitable. Ken Wagner and the example in the Azores send the same message – "Learn and take action before it is too late!" That is what the Maine Lake Science Center is all about.

*The Ultimate Demise of a Lake*



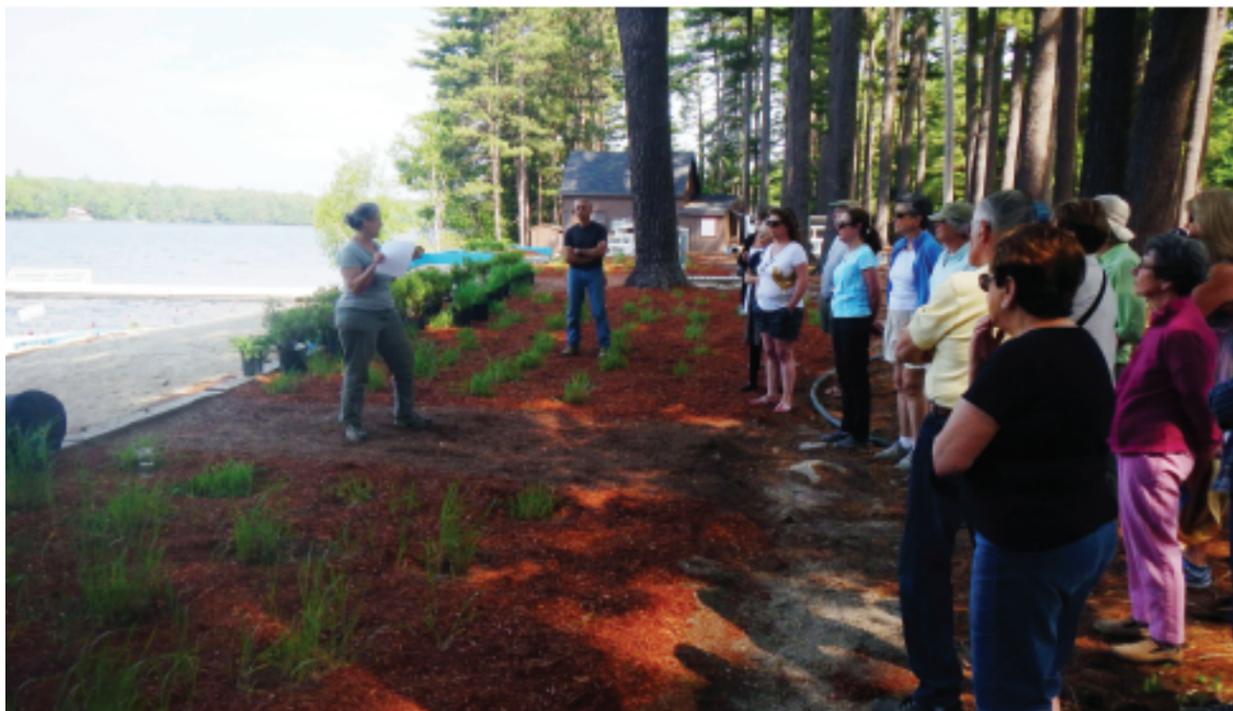
# Woods Pond Planting By Colin Holme

Oddly, one of the most beneficial activities for lake water quality is often one of the most overlooked. This easily accomplished activity can be done by most people, almost anywhere and without permits or special equipment. Still, there are some stumbling blocks that discourage its widespread use as a common conservation measure. A workshop this past spring on Woods Pond was aimed at changing this mindset and putting a well-deserved spotlight on plants.

It is well known that phosphorus is the nutrient that controls algae growth in lakes. Thus, as more phosphorus gets into the lake from watershed development and erosion, there will be more algae and the water will become less clear. But algae isn't alone in its need for phosphorus. All plants require this nutrient to grow. So, one really good way to keep phosphorus out of the water is to have it be absorbed by plants on the shore.

This concept is what brought twenty folks together on a hot and sunny day to plant above the beach at Camp Wildwood in Bridgton. This boys' camp has long had a large and steep beach on Woods Pond and last fall, as part of the Woods Pond Watershed Project, they installed a natural stone terrace to help prevent erosion. To further stabilize the area, the camp also had a plan to plant vegetation above the rocks. Because the site is dry, has poor soils, and is heavily exposed to the wind, any planting in the area has to be well thought out and properly installed. Thus, it made an ideal spot to hold a planting workshop.

To start with, local landscaper Lucia Terry from Perennial Point of View explained the key points of successful planting in difficult locations. Lucia had chosen almost all native shrubs and perennials that could withstand some of the harshest soils and conditions. She began by describing how to properly size a hole for a plant, what soil mixture works



*Lucia Terry of Perennial Point of View explains how to successfully plant in difficult locations*

best for long-term growth and the need for a crescent-shaped berm on the downhill side of the plant to help hold in water. She also stressed the importance of properly mulching around the plants, which was done at this site with a special type of finely ground erosion control mix called superhumus. To help keep these new bushes, shrubs and perennials moist and happy until they get established, the bottom of each hole was lined with a non-woven filter fabric that the plant roots will soon be able to punch through.

Because there is no better way to learn than to participate, the volunteers were then asked to get their hands dirty and dig some holes. Attendees were also given a list of the plant species that were used for their own reference. After all was said and done, a 25 by 70-foot rectangle of dry, barren soil was converted to a beautiful and functional planting.

Still, this planting is only the beginning. For real, long-term gains in water quality, others in the watershed need to plant and install conservation measures designed to attenuate phosphorus. With the Woods Pond Watershed project in its final year, there could not be a better time to address any water issues on your own property. Through this project, free technical assistance and small grants are available to anyone within the watershed interested in reducing their impact on the lake.

For more information about what you can do, please call Colin Holme at 207 647-8580.

The Woods Pond Project is partially funded by the U.S. Environmental Protection Agency, under Section 319 of the Clean Water Act and this funding is administered by the Maine Department of Environmental Protection.



# Lakes at a Tipping Point – Solving the Puzzle Continued from page 1

Phosphorus can be released from bottom sediments under low oxygen conditions in a process called phosphorus recycling. New shallow sediment analysis conducted last year for LEA by Professor Jasmine Saros from the University of Maine, identified lakes with sediments that are particularly prone to phosphorus release. This information is essential to solving the water quality puzzle.

Another important research topic is algae analysis, which we began three years ago by working with Professor Holly Ewing of Bates College to monitor Gloeotrichia populations. This year, LEA has purchased a new microscope that will be used to study presence and diversity of other species of algae.

The ultimate “data mine” is the remote-sensing buoy being piloted on Highland Lake for the second year. The buoy was purchased with funds donated by an anonymous family foundation and residents of Highland Lake. Colby College Professor Whitney King has been instrumental in establishing a buoy system on Great Pond in the Belgrade Lakes and in helping us to deploy ours. Every fifteen minutes, top to bottom readings are taken for oxygen and temperature. Also measured are clarity and chlorophyll, an indicator of algal growth.

A companion weather station will help us understand the impact of wind and air temperature

on such things as lake stratification that isolates oxygen-starved and phosphorus-rich bottom waters from the sun and warmth that could fuel an algae bloom. Weather and climate change are other key factors in the water quality puzzle. LEA has been providing temperature and ice-out data to Professor Dan

Buckley for his climate change research at the University of Maine at Farmington.

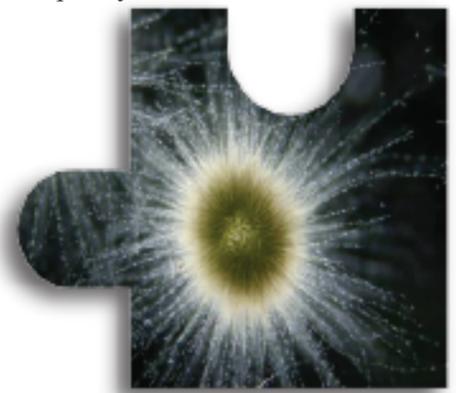
Deep sediment cores conducted last summer by Dr. Saros on several lakes offer additional clues to climate changes through hundreds of years – more key pieces.

All of this new research, new data and the new testing technologies are beginning to give us a better idea of each lake’s unique status in the water quality hierarchy and which lakes seem to be particularly close to their “Tipping Point.”

But, a better understanding of lake science must be harnessed to affect lake protection policy and behavior. Knowledge must translate into action or the research will be simply academic. Bridie McGreavy, PhD, former LEA educator, has been

appointed executive director of the Maine Lake Science Center. She holds an MS in environmental studies and conservation biology from Antioch University and a PhD in communications and sustainability science from the University of Maine. Dr. McGreavy is one of the first graduates of the University of Maine Sustainability Solutions Initiative. She is the ideal person to blend robust science with policy and social action.

To balance out the work of the Maine Lake Science Center, a center and program manager will begin work this August. In 2016, we will name a research director to conduct, oversee and recruit research projects. All staff will be part-time until resources can be raised to expand their hours. We are placing our hope in the new center, its staff and the many partners we have developed to solve the tipping point puzzle and thereby address the threat of water quality decline.



## 2015 New Testing Initiatives By Colin Holme

For years, LEA has been routinely and systematically collecting water quality data on this region’s waterbodies. Because lakes and ponds are such dynamic systems and they are heavily influenced by both weather and climate patterns, we need many samples and years worth of data to really understand them. Thanks to twenty to forty years worth of water testing on many of our ponds, we are just starting to pick up on current and ongoing trends. But to really protect our lakes, we need to be able to report on potential problems and encourage action before it is too late. Thus we are continually asking, how can we understand what’s going on more quickly and where are the gaps in our programs or methods?

The new strings of in-lake temperature sensors we’ve installed across the region, Gloeotrichia monitoring and the fully automated buoy on Highland Lake are all initiatives aimed at filling in these gaps and reducing the time span needed for assessment. Virtually continuous sampling that is occurring as a result of the temperature sensors and buoy allow LEA to accumulate much more data than ever before and continue sampling later into the year than was previously possible. This additional data will help us reduce the amount of time needed to pick out lake trends and allow for a better, more holistic assessment. Looking at the algae Gloeotrichia, we have started to take into account individual biological processes that are occurring in the water and the role they play in nutrient concentrations. Our involvement in these new studies has also helped pinpoint other work that needs to be done.

### Fluorometry: immediate chlorophyll assessment

One of the sensors installed on our automated buoy on Highland Lake is a fluorometer (pronounced floor-om-iter). For some time at LEA, we have wished for a fluorometer, which measures chlorophyll concentrations (the green pigment in plants) to give an assessment of the amount of total

algae in the water. In recent years, the price tag has come down on this high-tech piece of equipment and the accuracy has greatly improved. After seeing the chlorophyll data from the Highland buoy last year, we thought now is the time to get a handheld fluorometer to bring to all the other ponds we test.

Up until now, we have only tested chlorophyll concentrations twice a month from May through September and each sample cost \$25 to run. These samples are a mix of all the sunlit waters where we would typically expect to see the most algae. With this new handheld meter, we can see where peak algae concentrations are within the entire water column and also do horizontal (across-the-lake) sampling to see how algae populations change in different coves or areas. And, best of all, we will have the data immediately. While we are not expecting this to be able to replace traditional chlorophyll samples (although it may be able to in the future), this will give us a much more complete and timely picture of algae concentrations in our lakes.

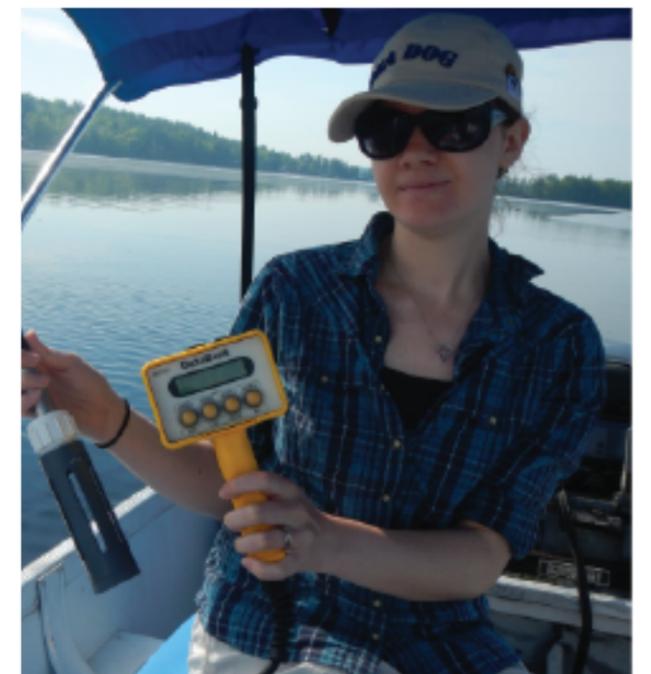
### Baseline algae monitoring

After a few years of studying the algae Gloeotrichia, which is thought to be linked to water quality deterioration, we became aware of how little we know about the other algae species present in our waterbodies. Because algae monitoring is detailed and time intensive, LEA has not previously incorporated this type of assessment into our water monitoring program.

After getting our feet wet with the Gloeotrichia study, we began to look at what other organizations are doing to monitor algae and slowly came up with a plan. Using the same procedures that Portland Water District uses, LEA will begin monitoring algae populations on several of the surrounding lakes this summer. With the help and funding of several lake associations, we will sample, count and identify algae throughout the summer.

Thanks to a grant from the Norcross Wildlife Foundation, which went towards purchasing a high-powered microscope, and Matthew Duplisea for the use of his digital projecting microscope, we will not only be able to count and categorize species accurately but also digitally display and photograph them.

In a letter to the Belgrade Lakes Association last fall, Dr. Ken Wagner, who is one of the leading lake scientists on the east coast, made a list of information needed to properly assess water quality conditions in the Belgrades. The list included nine items, many of which LEA has already done for our own lakes, but number seven was an assessment of the algae community. Without this information, our understanding of lakes is going to be incomplete. This fact became even more evident during the recent study of Gloeotrichia. If there had been some previous baseline algae assessments, our current Gloeotrichia work would have benefited greatly.



# New School Programs Make Big Strides *By Adam Perron*

This school year, LEA introduced a new program, Issues in Limnology, for seventh and eighth grade students at Lake Region Middle School. For the first time, LRMS combined the content of the two grade levels, alternating between physical science and life science yearly. The 2014-2015 school year focused on physical science. LEA met with more than 240 students in twelve classes during three four-day units.

The units were scheduled to align with the school's curriculum and compliment the current area of study and grading standards, giving the classroom teachers a tool to assess student learning. While the students were investigating the properties of matter, they looked at annual lake cycles, learning about the relationship between density and temperature, and the diffusion of oxygen into the lake water.

During the second trimester, students studied chemical reactions. We used this opportunity to visit the National Atmospheric Deposition Program acid precipitation monitoring site in Bridgton operated by LEA staff and analyzed thirty years of NADP data to investigate trends in acid precipitation. Student learned how acid rain forms, travels and affects the lakes. They also learned how environmental monitoring efforts may be used to influence technology and policy decisions.

In the final unit students learned about kinetic and potential energy. The lessons in the third unit investigated how changes on the land can increase the kinetic energy of storm water and thus its ability to create erosion issues that impact the lakes. Working with a stream table, students competed to design erosion controls that would limit the movement of the sand on the stream table and discussed real-world erosion control methods.

Last spring, when the education staff was putting



the first pieces of the new physical science program together, the advantages of running unit-based programs started to materialize. The units are aligned with the classes' current topics, allowing for more buy-in from students and teachers. Seeing students multiple days in a row allows them to connect to LEA's educators and gives our teachers a chance to understand the personalities and learning modalities of our students in a consistent way. Lastly, the unit structure allows our collaborating teachers to use the standards-based LEA material to assess their students and inform their grading.

At the end of the 2013-2014 school year, LEA met with our collaborating teachers at Lake Region High School to discuss transitioning the 9th grade LEA programs from a monthly lesson into three units to capitalize on the same benefits we see in the

new middle school physical science program. The teachers were receptive and planning began. The first unit covered the Lakes Region's paleoclimate and exposure to the effects of climate change, followed by units on shoreland zoning and Maine's waters as a natural resource.

LEA has long-standing relationships with the schools we serve. This improvement and its implementation is a testament to the collaborative nature of our partnership. Teachers trust us to lead their classes for a week, and the change of pace and personality gives the students a breath of fresh air. LEA's classroom-based lessons will always be dynamic and responsive. The experience of designing and teaching unit-based instruction gives us one more tool to create the best programs we can to suit students and teachers alike.

## *The Summer Caplan Series*

This summer the Caplan Family Educational Series will move all indoor presentations to the new Maine Lake Science Center. LEA is pleased with this development due to the larger meeting space and close proximity to the 17-acre Science Center forest and abutting Pondicherry Park.

LEA members are invited to attend all Caplan events for free and get early notification and sign-up opportunities. One week prior to an event, a reminder e-mail will be sent to everyone who registered. Space is limited for many events, so sign up early to reserve a spot. Non-members will be charged a \$5 fee.

On July 3, Ursula Dube will lead one of the most popular walks of the summer. Holt Pond is home to a select few species of wild orchids. When caught at the right moment these orchids will either dot the "bogscape" at Holt Pond or blanket it. Last year, participants were treated to the view of hundreds of pink blooms dressing up the razor grass and blueberry shrubs next to the boardwalks.

Loons and Great Blue Herons are two of the most iconic water birds gracing our waters in the summer. This summer, LEA is pleased to bring back two presentations dedicated to these animals. Danielle D'Auria, a biologist with Maine Inland Fisheries and Wildlife, will help everyone understand Great Blue Herons, both their life history and the threats they face. Susan Gallo, wildlife biologist at Maine Audubon, will share her extensive knowledge and beautiful photos of the Common Loon. This presentation includes life history facts and sounds, along with ways you can

help protect this important Maine bird.

The first two weeks in August are all about the kids! LEA encourages families to come to the Maine Lake Science Center to explore the new building and surrounding forest. The first week, we will host a half day of different programs. We will rotate through several different activities so no one misses any of the fun. Come hunt for frogs and salamanders, search Willett Brook for aquatic insects, play nature games and much more. This day is geared towards kids but will be fun for all ages. During the second week, LEA will offer a fun family activity called a Camouflage Walk. We will have several items set up along the trails of the Lake Science Center that are not a normal part of nature. Participants will be challenged to find all of the items. This activity can be modified for any age group and we will set up two different walks so participants can choose their difficulty, or try both! This will be a fun-filled hour long program for kids of all ages.

For our last program of the summer, we have invited Jesse Dubin back for his popular mushroom presentation and walk. This program usually fills up fast so please sign up early. Jesse has offered to lead two walks if there is enough interest. The programs work best if done together so people signed up for the talk will have the first opportunity to sign up for the walk. The talk will take place at the Maine Lake Science Center and the walk will be at the Holt Pond Preserve. Remember to sign up early to reserve your spot.

The Caplan Family Environmental Education Series at LEA is made possible through the

generous support of Hu and Ray Caplan and their family. Dr. and Mrs. Caplan have been members and directors of LEA since the mid-1970s. Dr. Caplan was the vice president of LEA's Board of Directors from 1978-1980 and president from 1982-1990. Mrs. Caplan was the secretary from 1992-2006. The Caplans recognize the vital importance of education in all aspects of LEA's work in protecting the Lake Region's most important resource and asset: its bodies of water and watersheds.



## The Caplan Family Environmental Education Series and LEA Events Calendar

**Registration in advance is required. LEA members are given priority.  
Please sign up early by contacting Mary Jewett at [mary@leamaine.org](mailto:mary@leamaine.org) or 647-8580**

A \$5 donation is requested from non-members.

Program	Date	Time	Location	Guide
Orchids - Step out onto the board walk spanning the quaking bog at Holt Pond and explore for yourself the pink orchids among the sphagnum moss. This walk will cover easy to moderate terrain over forested trails and boardwalks and will last approximately 2 hours. Comfortable walking shoes, water, a snack, and binoculars are recommended. Participants meet at the Holt Pond parking lot.	7/3/15	9:00AM	Holt Pond	Ursula Duve
Loons - Learn about a year in the life of Maine loons. Filled with beautiful photos, sounds and video, this slideshow will answer all the questions you had about Maine's Common Loon. The program will also cover the current conservation threats, why loons in Maine don't always succeed, and solutions that might help future loon conservation efforts. This event will last approximately 1 hour.	7/9/15	6:30PM	MLSC (Maine Lake Science Center)	Susan Gallo
Family BMIs - Bring the family down to the beautiful Holt Pond Preserve to explore the aquatic insect life crawling on the bottom of the Muddy River. Nets and microscopes will be provided. Participants will meet at Holt Pond and are encouraged to wear water shoes or boots. This event will last approximately 2 hours.	7/10/15	9:00AM	Holt Pond	Mary Jewett
Encore/Coda Benefit Concert - Enjoy an evening of beautiful chamber music while supporting LEA.	7/20/15	7:30PM	Deertrees Theatre	Mary Jewett
Hérons- The Great Blue Heron is often touted as one of the most widespread and adaptable birds in North America. Concerns over a population decline prompted the Maine Dept. of Inland Fisheries and Wildlife to conduct a comprehensive survey of breeding colonies in 2009, and to begin a statewide adopt-a-colony program called the Heron Observation Network. Join Danielle D'Auria, a wildlife biologist with MDIFW's Bird Group, to learn more about Maine's largest colonial wading bird as well its close relatives.	7/23/15	10:00AM	MLSC (Maine Lake Science Center)	Danielle D'Auria
Dragonflies - Dragonflies are a great indicator of water quality and Maine is home to dozens of different species. Come learn how to catch and hold these beautiful creatures without causing harm. Participants will be provided with a net and will meet at the Emerald Field at Holt Pond. Contact Mary Jewett for details.	7/24/15	1:00PM	MLSC (Maine Lake Science Center)	Mary Jewett
Kid's Fun Day! - Join LEA educators for a morning of fun kid-gear science activities. Children will rotate through three different fun activities led by enthusiastic teachers.	8/6/15	9:00AM	MLSC (Maine Lake Science Center)	Mary Jewett and Adam Perron
The Technology and Science behind LEA's water testing program. Come learn about the state of the art equipment LEA is using to evaluate and protect our freshwater resources.	8/6/15	TBD	MLSC (Maine Lake Science Center)	Colin Home and Amanda Pratt
Camo Hike for families - Join us at the Maine Lake Science Center for a fun filled walk for all ages. Participants will walk through the park looking for hidden objects on the trails. Test your powers of observation during this fun family activity!	8/13/15	9:00AM	Pondicherry Park	Mary Jewett
Geology Presentation - Learn about the geology of the Lakes Region	8/20/15	6:30PM	MLSC (Maine Lake Science Center)	Dr. Samuel Roy
Geology Walk - Join us on an exploration of different geologic features in the Lakes Region.	8/21/15	9:00AM	MLSC (Maine Lake Science Center)	Dr. Samuel Roy
Mushroom Talk - Plant Pathologist and Mycologist Jesse Dubin is back to teach us about the life history of mushrooms and the many varieties that call Maine home.	8/27/15	6:30PM	MLSC (Maine Lake Science Center)	Jesse Dubin
Mushroom Walk- Those who attended the Mushroom Talk will go out with Jesse and explore the different species of mushrooms at the Holt Pond Preserve. Space is very limited for this walk so participants must sign up early. People who attended the indoor presentation get priority.	8/28/15	9:00AM	Holt Pond	Jesse Dubin

Dates and times are subject to change. Contact Mary Jewett at 647-8580 or [mary@leamaine.org](mailto:mary@leamaine.org) to sign up for events.



# THANK YOU

*Butch Auger and Leah Howard* – water testing • *Rebecca Reddy* - Discovery Kids program help  
*Lucia Terry and Perennial Point of View* – LEA grounds and gardens  
*Hayes True Value* – donated hardware • *Don Moore, Bear Creek*– canoe donated for water testing  
*Matthew Duplisea* – digital microscope • *Jane Forde* – mailings and office help  
*Jim Allen / Naples Marina* – donated boat maintenance and storage  
*Sebago Lake State Park* – Milfoil equipment storage • *Betz and Dobson Families* – DASH host

## Hey You! Cruise volunteers:

*Kyle and Nancy Grigg, Anne Snodgrass, Bill Stockwell, Leigh Hayes, Julie McQueen, Carol Rothenberg, Matt Frank, Leah Howard, David Ehrman, Rosemary Wisner, Marguerite Wisner, Mike and Judy Tenzyk*

## Maine Lake Science Center donations of materials, services and labor:

*Bill Turner, Construction Consultants, Energy Management Consultants, Everlast Roofing, Grayson Carrier, H.B. Fleming Co., Hatch Excavation, Hayes True Value Hardware, Henry's Concrete, JMG Designs, Key Bank, Roger Lowell, Paris Farmer's Union, Q Team, Rex Rounds, R.A. Douglass, Inc., Warren Excavation, Gallinari Electric, Stacy's Burner Service and LEA board members Sean Dundon, Orrin Shane, Leigh Hayes, Julie McQueen, Steve Collins, Brian Cushing, David Ehrman, Matt Frank, Henry Hudson III, Nancy Kluck, Drew Sanborn, Tom Stockwell and Karla Swanson-Murphy.*

## Will Holt Remembered

The LEA community was saddened to learn about the passing of Will Holt, one of LEA's original board members and greatest supporters.

The world knew Will as a playwright, songwriter and actor. Most notably, he wrote the song "Lemon Tree." Will performed many benefit performances for LEA.

We will miss him, his wit and joy of life.



# Membership – LEA's Life Blood

It has never been more important to become an LEA member and to support our Annual Appeal. If your membership has lapsed, please consider renewing today. Our staff is working hard to usher in the Maine Lake Science Center, and to foster new programs and the connections that will come with them. But we need to maintain all the programs that you have come to know and love.

It has been our loyal membership that has provided the funding that makes what we do possible. We have set a very ambitious membership goal for 2015 and hope you will join us in making it a reality. Encourage your friends and neighbors to become an LEA member, give a gift membership to a lake lover, or consider increasing your own membership donation to LEA. We welcome gifts by check or credit card, by mail, phone or online.

Are you looking for more ways to give? Contributions of appreciated securities or stock, corporate matching gifts or planned gifts are also welcome. Contact Peter Lowell for more information. Your support is appreciated!

### Dock to Dock

This summer, LEA staff and volunteers will be going dock to dock again. Look for us on these lakes: Peabody Pond, Moose Pond, Highland Lake and Stearns Pond. Dates are TBA. If you are a land owner on one of these lakes, you will receive a postcard and/or email from LEA indicating dates and times. Wait on your dock and we will come answer your questions and hear your concerns.

### AmazonSmile

LEA is signed up with AmazonSmile. This is a generous program in which Amazon will donate .5% of eligible purchases to the charitable organizations selected by their customers. Go to <http://smile.amazon.com/> for details on how to

sign up and be sure to select Lakes Environmental Association as your charity. Tens of millions of products on AmazonSmile are eligible for donations. You will see eligible products marked "Eligible for AmazonSmile donation" on their product detail pages. This is a simple and automatic way for you to support LEA every time you shop, at no cost to you.

### TD Bank

If you have not already signed up for the TD Bank Affinity Program, be sure to do so. It is another great opportunity to support LEA at no cost to you. Anyone can participate from any TD Bank branch by simply giving the LEA code for the Affinity Program: Code AF307

If you have an existing checking account, TD Bank will donate \$10 to LEA. If you open a new checking account, TD Bank will donate \$50 to LEA. For new or existing savings accounts, the bank will donate a percentage of the annual average balance. The more Lakes Environmental Association supporters that bank with them, the more money we earn to support water quality on the lakes we love. Remember, this is at no cost to the participant!

# LEA Members Keep Us Going

*Are you an LEA member? Please join in the struggle to protect our lakes*

Name: \_\_\_\_\_ Email: \_\_\_\_\_

Winter Address: \_\_\_\_\_

Summer Address: \_\_\_\_\_

Check enclosed  Charge my credit card \$ \_\_\_\_\_

Visa  Master Card Exp. Date \_\_\_\_\_

Account #: \_\_\_\_\_

You can join LEA with a contribution of any amount. Just mail this form and a donation to LEA, 230 Main Street, Bridgton, ME 04009

You can also join or renew at:

[www.mainelakes.org](http://www.mainelakes.org)

<b>Gift Levels:</b> <input type="checkbox"/> \$1000 Benefactor <input type="checkbox"/> \$500 Patron <input type="checkbox"/> \$250 Sponsor <input type="checkbox"/> \$100 Lake Steward <input type="checkbox"/> \$75 Family <input type="checkbox"/> \$50 Individual <input type="checkbox"/> Any other amount \$ _____	I'd like to make an additional donation to the: <input type="checkbox"/> Intern Fund \$ _____ <input type="checkbox"/> Milfoil Fund \$ _____ <input type="checkbox"/> Environmental Education Fund \$ _____
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