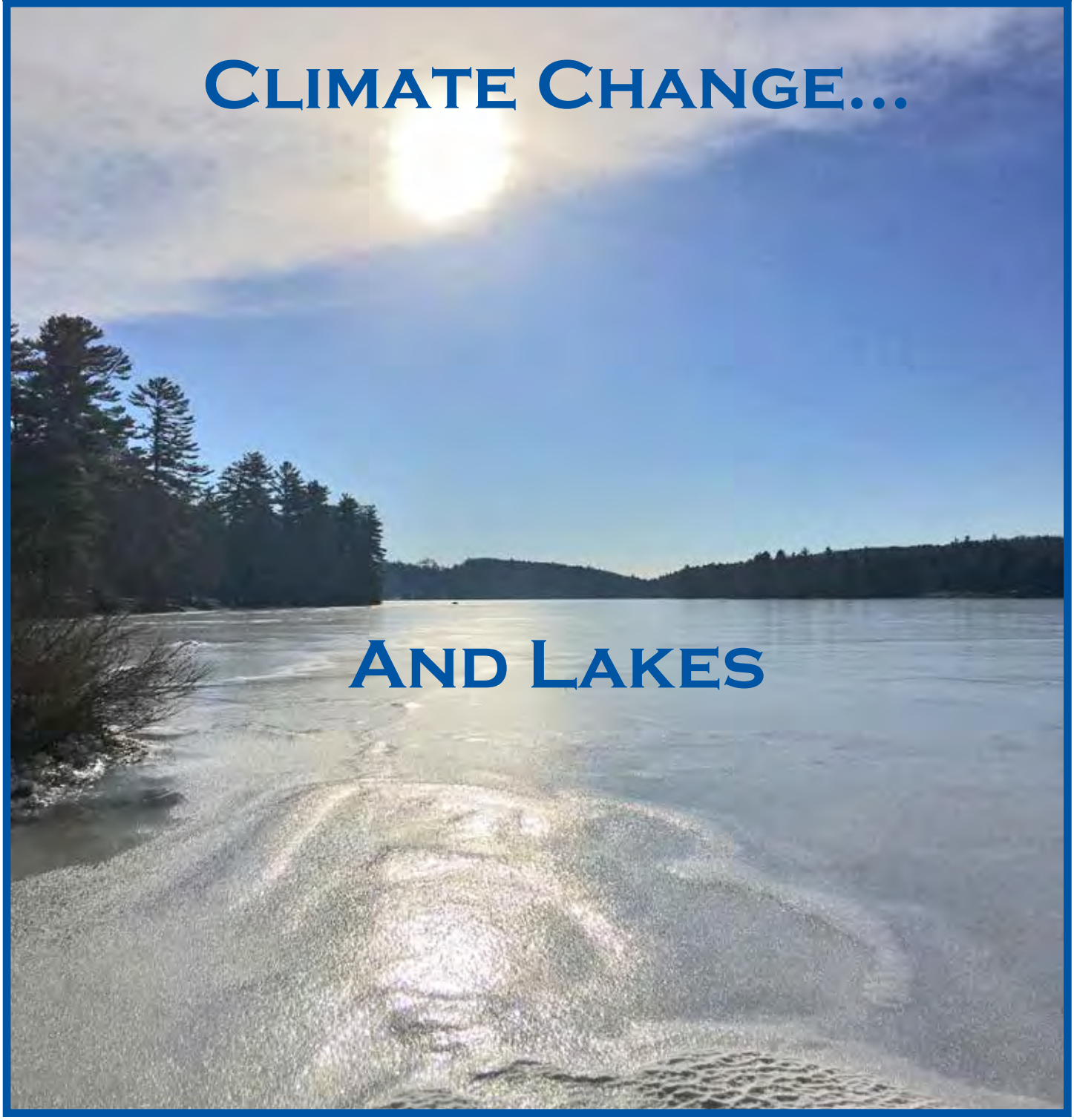
the Water Column

The Newsletter of Lake Stewards of Maine - Volunteer Lake Monitoring Program

Vol. 23, No. 1 Celebrating the Work of Maine's Citizen Lake Stewards Winter 2018-19



Climate Change...

And Lakes

What's Inside:

Cover Photo: Long Pond in Livermore, by Jonnie Maloney

Lake Stewards of Maine
Volunteer Lake Monitoring Program
Keeping a watchful eye on the health of Maine lakes since 1971

President's Message

Bill Monagle
President, LSM Board of Directors

Lake Stewards of Maine (LSM) is a fitting new name for our organization. It speaks directly to the awesome efforts of Maine's volunteer lake monitors. This name change is just one of several steps that we are taking to make the continued work of our organization as clear, compelling and robust as possible.

As the organization continues to grow, we are also focused on expanding our Board of Directors. Toward that end, we have created a "Board Optimization Committee", the primary focus of which is to solicit and vet potential board members. The committee is specifically seeking individuals who have a strong alignment with LSM's Mission, and are willing to commit the time and energy asa working board member. Typically, the full board meets 5 times/year, but the schedule for individual subcommittee meetings (in-person or virtually) may take place on an as-needed basis. Members of the board serve three-year terms, which can be renewed.

We are looking for potential Directors who will bring a range of experiences and knowledge to the LSM board, including general program development, social media marketing, strategic financial planning, volunteer and community engagement, website design and implementation, and more.

LSM's Board champions Maine's citizen lake scientists! If you're interested in learning more about becoming an LSM Director, please contact us. A member of our Board Optimization Committee will be in touch with you!

LSM Mission Statement

The Mission of Lake Stewards of Maine is to help protect Maine lakes through widespread citizen participation in the gathering and dissemination of credible scientific information pertaining to lake health. LSM trains, certifies and provides technical support to hundreds of volunteers who monitor a wide range of indicators of water quality, assess watershed health and function, and screen lakes for invasive aquatic plants and animals. In addition to being the primary source of lake data in the State of Maine, LSM volunteers benefit their local lakes by playing key stewardship and leadership roles in their communities.

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If you would like to go green and receive *the Water Column* in electronic format only, or if you would like to be removed from our mailing list, please contact LSM at (207) 783-7733 or stewards@lakestewardsme.org.

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Lakeside Notes

Winter 2018-19

By Scott Williams
LSM Executive Director

Over time, we have had many conversations about changing the name of this organization. Earlier this year, following discussions with many of you, written surveys provided by lake monitors, and a few trial balloons, the decision was made to change the Maine Volunteer Lake Monitoring Program (VLMP) to Lake Stewards of Maine (LSM). We anticipated a certain amount of confusion and pushback, but much to our relief, little to none occurred.

If you have been a Certified "Volunteer Lake Monitor" for multiple decades, you may know that this is the second time that the name has been changed or modified in nearly 50 years. From 1971 to when the organization became an independent nonprofit organization twenty-two years ago, the name was simply "Volunteer Monitoring Program" – a good start, but it lacked information about who we are and what we do. Adding Maine and Lakes to the name helped to address that shortcoming, but it created another one, which was a lengthy name that didn't exactly roll off the tongue. People mangled it in every conceivable manner. One of my favorite examples occurred when a four-decade lake monitoring veteran was being interviewed for a short video, in which he referred to us as "The voluntary monitoring organization for Maine's lake waters".

It also became obvious that "lake monitoring" isn't exactly a self-explanatory term. Most people outside of the organization who have known us only by our name have not had a clue about what we do. A number of alternatives were considered, including Citizen Lake Scientists of Maine, or some combination of this wording, none of which addressed all of the issues mentioned above.

Two years ago we learned from surveys completed by a diverse group of our constituents that many of you consider your good work on behalf of Maine's lakes to fall within the realm of "stewardship". Various definitions of stewardship include "the careful and responsible management of something entrusted to one's care", an example of which might be "the act of making wise use of the natural resources provided by the earth". Stewardship is broad-based, easily understood, and it has a positive connotation.

Lake Stewards of Maine is easy to remember. It's not a tongue twister, and the name broadly characterizes the great work that you all do, year after year. Maybe you're attached to "VLMP", and don't want to let go? Well, that's OK too. Full disclosure: we, too, were reluctant to let go of the old name completely, and "Maine VLMP" has been retained as part of the legal, but generally unspoken, name of the organization. Thanks to all of you who have taken the time to share your thoughts with us about making the change.

In honor of our new name and all that it represents, we are working to put together a multi-media compendium of lake stories, which we intend to share in a variety of ways. Stay tuned for more details.

There is no question that the exceptional commitment and dedication of LSM volunteers over the past 48 years has substantially added to our understanding of Maine lakes, and has greatly enhanced our ability to protect them for future generations. Many thanks for your continued exceptional commitment and dedication!

Onward!

Would You Consider Sponsoring an LSM Summer Intern?

You or your business can provide a college student with an unforgettable summer experience supporting volunteers who are working to monitor and protect Maine's lakes, while building on academic and career interests! Our internships offer opportunities to explore Maine lakes through real-life work experiences in lake and social science, public education, volunteer training, nonprofit organization operation, and social media marketing. Sparked your interest? Please contact LSM at (207) 783-7733.

Littorally Speaking

Climate Change is Changing Everything, Including the Threat of Invasive Species

by Roberta Hill
LSM Invasive Species Program Director

When it comes to invasive aquatic species (IAS), Maine is better off than most of the rest of the country. For starters, less than one percent of Maine's lakes and ponds are currently known to be infested with an invasive aquatic plant, (a remarkable record compared to the double-digit percentiles of most other states). Maine also has a comprehensive, robust and effective IAS action plan and a dedicated funding mechanism, both of which allow State agency staff to work in concert with lake associations, conservation groups (including LSM), municipalities, professionals, and a multitude of dedicated volunteers, to fend off a host of invaders seen as imminent threats to the waters of our State.

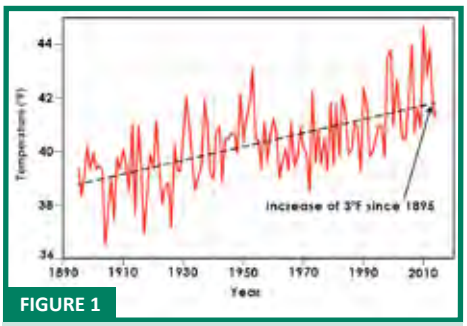


FIGURE 1

Maine is Getting Warmer – This graph shows mean annual temperatures (averaged across Maine) from 1895-2014. The dotted black trend-line indicates a temperature increase of 3°F over the record period. [1]

Given our well-established programs and capacity for action, with continued vigilance and concerted statewide effort, there is a very good chance indeed that Maine could keep the majority of high-risk aquatic invaders at bay for the foreseeable future. But unfortunately, all things are *not* remaining stable. Climate change is here, and its impacts upon vulnerable ecosystems such as lakes and ponds, are already being observed.

If we are to succeed in preventing the spread of aquatic invaders in Maine, we need not only to continue expanding and improving upon our current efforts with regard to prevention, early detection and rapid response- but we also need to be aware of--and responsive to--the ways a warming climate will change aquatic habitats and vectors for plant movement, and the new challenges these changes pose to our lakes.

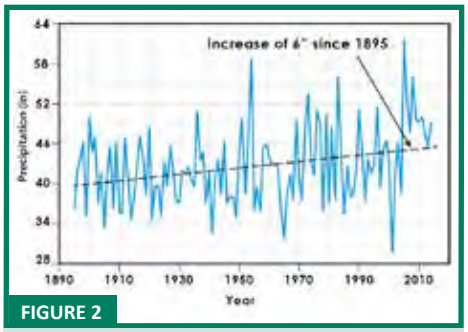


FIGURE 2

Maine is Getting Wetter – This graph shows total annual precipitation (averaged across Maine) from 1895-2014. The dotted black trend-line indicates that precipitation increased six inches, or about 13%, over the record period. [2]

Climate science is complex and still evolving; however, the basic facts are largely settled. We now have sufficient data to know with a high degree of certainty that, like much of the northeast, Maine is getting warmer, experiencing wetter winters and springs, drier summers, and more frequent extreme weather events (including floods and droughts). The shifting climate is causing our growing seasons in Maine to become longer, and the periods of ice cover on our lakes to become shorter.

All of the changes described above pose serious challenges for lakes. More precipitation in the winter and spring (when water uptake by the trees and other vegetation in the watershed is at a minimum) leads to increased runoff and a higher risk of eroded soils and nutrients being washed into lakes. These runoff challenges are only exacerbated by the

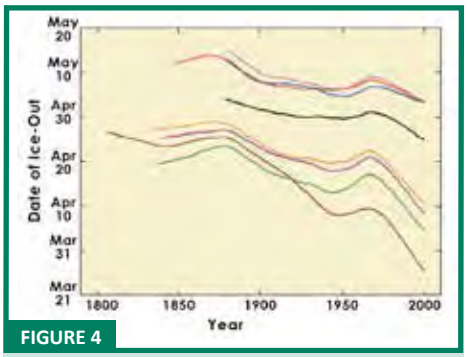


FIGURE 4

Period of Ice Cover on Maine Lakes is Getting Shorter - Smoothed lines show ice-out dates over time for the eight lakes in New England with the longest periods of record. The top four lines represent lakes in northern and western Maine and the bottom four lines represent lakes in southern Maine.

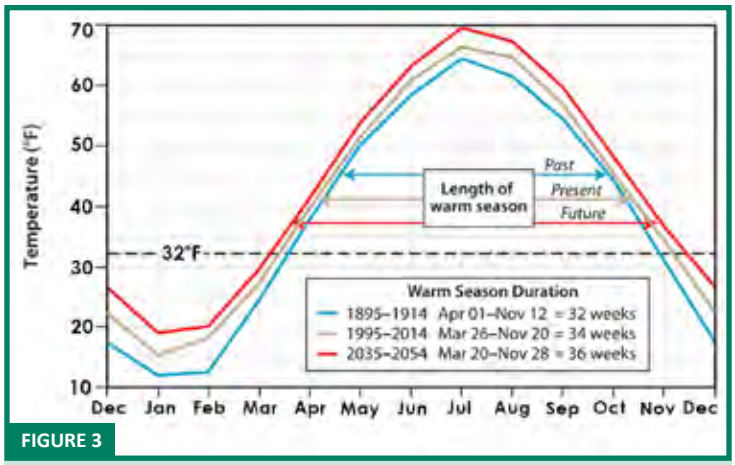


FIGURE 3

Maine's Growing Season is Getting Longer – This graph shows mean monthly temperatures (averaged across Maine) from 1895-2014, and future projected temperatures from 2035-2054.

increased frequency of extreme weather events--torrential rains, floods, and even periods of drought that can make some soils more impermeable (and less absorptive), and others less consolidated, setting loose the finer particles that are most likely to carry phosphorus and sediment to lakes. Phosphorus is the limiting factor for planktonic algal growth in most Maine lakes. With an increase in phosphorus, many of our lakes will soon be greener.

Maine loons are already feeling the impact of mercury contamination. Warmer water may exacerbate this threat. *Photo by Billy Helprin, courtesy of Somes-Meynell Wildlife Sanctuary.*

Longer periods of ice-off and higher average water temperatures also pose threats to lakes. Warmer water temps affect the solubility of gasses and the bioavailability of toxins. The warmer the water, the less oxygen it can hold, a condition which puts stress on many native lake inhabitants. Warmer water also, ultimately, increases the bioavailability of toxins such as lead and mercury, and increases the risk that these toxins (already causing harm to lake dwellers such as loons, and necessitating consumption warnings for those of us who like to fish) will be taken up in even greater quantities by aquatic life. (Please see Scott Williams' article on page 10 for much more on the relationship between climate change and lake water quality.)

It is expected that some organisms, especially those that are naturally adapted to a wide range of conditions (this includes most aquatic invaders), will be quite resilient to these changes, and even able to exploit them to their advantage. Others, including many of our more finicky native species, will not. Native cold-water species such as wild brook trout, for example, may become disadvantaged in a warming Maine. In marginal habitats especially, where temperatures are already less than ideal for brook trout, warmer-water species such as non-native smallmouth are well poised to displace them. Warmer average water temperatures will also strongly favor some aquatic plants over others.

According to climate scientists, the further north one is, the faster the annual minimum temperatures will warm. Here in Maine, these winter minimums are tremendously important biologically, providing natural protection for native plants and animals (including us!). As growing seasons shift and the climate warms, plants and animals, including invasive species, that were once prevented from becoming established here due to our severe winters, will no longer be constrained. This climate-driven range expansion is already happening-- think deer ticks and possums--and the implications for aquatic ecosystems are very serious. Invasive aquatic plant species such as water hyacinth (*Eichhornia crassipes*) and water primrose (*Ludwegia grandiflora*), once thought to pose minimal threats here due to their cold-intolerance, are expected to be able to thrive here within a few decades. Currently Maine has eleven invasive aquatic plant species on its list of 'most imminent' threats. But according to scientists at UMass Amherst and UNH[1] there are literally hundreds of new plant species (both terrestrial and aquatic) headed our way. Not all will pose serious risks to our native ecosystems and our economy, but as the climate shifts, we can certainly expect the list of plant species that do pose such risks, to grow significantly.

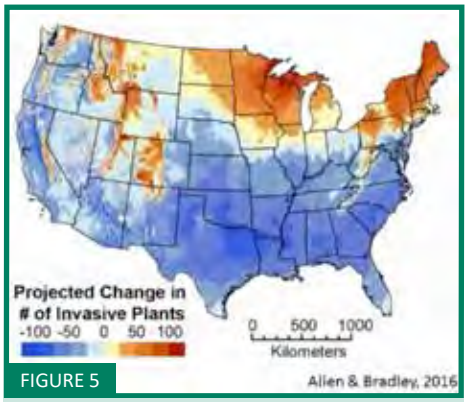


FIGURE 5

Scientists project that Maine will be a 'hot spot' for future invasive plant introductions. Plant species include both terrestrial and aquatic invaders.

Boats and related gear are a primary vector for new introductions. With a significantly longer boating season, the potential for new invasive introductions will also grow.

And, unfortunately, there is more. We all know that the exceptional water quality found in many of Maine's lakes and ponds is largely dependent upon the health of their heavily-forested watersheds. (Our forests are also magnificent carbon sinks, by the way, the woody bits storing carbon in biomass, the leafy bits drinking up greenhouse gasses through productivity.) But our forests too, are being threatened by the changing climate. Maine's native hemlock trees, for example, are now threatened by the invasive hemlock woolly adelgid (*Adelges tsugae*). This non-native insect would not have been able to survive here just a few short decades ago when our winters were more severe. Now, because of Maine's warming climate, not only is this cold-intolerant invader poised to decimate our hemlocks (and their carbon-capturing biomass), it will also further compromise native brook trout habitat. The shade that hemlocks provide during the spring along many of our streams, is critical to keeping waters cool during trout spawning season. And hemlock woolly adelgid is only one of the threats to our forests being aided by climate change. Warmer minimum temps and more frequent, more prolonged periods of drought will also benefit emerald ash borers, southern pine beetles, and other serious forest pests.

And finally, there are the 'sleeper species,' the non-native plants and animals that, due to the current environmental limitations upon their growth, do not behave in an invasive manner. Rather than being called 'invasive,' these less aggressive species are commonly referred to as 'naturalized.' Climate change may create new, more favorable growing

Littorally Speaking... continued on page 29

Quality Counts!

by Linda Bacon
LSM Quality Assurance Officer; Aquatic Biologist, Maine Department of Environmental Protection

Are You Measuring Lake Vital Signs Accurately?

Imagine… you're on the way to the doctor's office… you haven't felt well for a few days… it's not a cold… it could be the flu, or something that needs antibiotics. You are generally diligent when it comes to health care concerns. Your morning blood pressure is around 109/72 – quite good. And your weight is 160 pounds – also good for your age and height. But you've taken your temperature 6-7 times over the past 24 hours and you've gotten readings between 101.5 and 103.2! So you know you are not imagining symptoms.

At the doctor's office when they weigh you, the scale reads about 15 pounds more than yours. When they take your blood pressure, it is 153/93! Then they take your temperature; magically it appears to have fallen to 97.6 since you took it this morning. They send you home with instructions to reduce salt in your diet and to lose 30 pounds, with no mention of treatment for the flu-like symptoms.

As you are getting into your car, you shake your head thinking 'this doesn't add up…I still feel awful', and you begin to *wonder about the accuracy of your scale, blood pressure monitor and thermometer. You also wonder about those devices at the doctor's office. How often are they checked for accuracy? Would that make a difference? If their thermometer was reading low by 3 degrees, maybe their recommendations would have been different?'* You go home, have some chicken soup and rest, still puzzled. I don't believe this type of negligence happens at many medical facilities. But if it did, we'd all be in trouble! Quality assurance checks must be performed on such important equipment at a regular frequency.

As a volunteer water quality monitor, you are akin to a medical 'first responder'. The readings, measurements and samples you take are designed to provide the information needed to evaluate the health of your lake. Thus, it is incredibly important to obtain the highest quality data possible. *The Maine Department of Environmental Protection and Lake Stewards of Maine work closely with the federal Environmental Protection Agency to assure that lake data collected in Maine are so reliable that they would stand-up to scrutiny in a court of law!* This is necessary, otherwise neither federal nor state resources could be awarded through grants to partially fund the program. There is actually a law stating that all data used in environmental decision making must be collected under a Quality Assurance Program/Project Plan, or a QAPP!

Maine's first lake monitoring QAPP was submitted to EPA by DEP in 2005. At that time, DEP was given the option of creating an 'umbrella' QAPP or requiring each entity to submit its own QAPP. The latter choice was really not a good option giv en that more than 500 volunteers were collecting lake data. It would have been an onerous task for 500 individuals to submit 500 separate QAPPs, so the decision was made to take the 'umbrella' approach. This QAPP documents the training new volunteers receive, the frequency of parameter-specific re-certifications, frequency of obtaining duplicate readings and samples, who does what, and many other details. Re-certifications are particularly important. Eyesight changes need to be documented and procedures reviewed. Expensive meters need to be checked for accuracy. Sample collections must be done to assure no contamination of the sample. So when re-certification workshops are advertised next spring, proudly and willingly sign up, knowing that **you** are the **first responder for your lake** and your lake monitoring trainings are akin to First Aid and CPR for your lake! ◔

Save the Date!

2019 VLMP Annual Lake Monitoring Conference Will Be Held On Saturday, July 27th

Under the Hand Lens:

A new invader to the state of Maine, European frog-bit, was recently discovered in Cobbossee Lake. Floating at the surface, or stranded among the emergent vegetation, European frog-bit's clumps of small, heart-shaped leaves may not exactly 'jump out' to the untrained eye. It's time for a quick refresher on some of this plant's key characteristics!

This aquatic invader can be tricky to recognize. Here is a quick primer on some of the key characteristics to watch for.

1. European frog-bit is a small, free-floating aquatic plant. When afloat, it's small, rounded kidney- or heart-shaped leaves (1.5 to 6.5 cm long) are not anchored to the bottom sediments. Once established, the plants multiply rapidly, much like strawberry plants in your garden, each individual plant sending out multiple 'baby' plants on slender runners or stolons.

Inset photo courtesy of Jouko Lehmuskallio - NatureGate.

2. Leaves with unique vein pattern, (each on its own elongated, 4-6 cm long, stalk) occur in bouquet-like rosettes.

3. Small flowers, consisting of three white petals arrayed around a yellow center, may occur during the summer.

4. When stranded along the shore, the dangling tendrils may anchor into the mud, like roots. *Tip: Binoculars may come in handy if you wish to do a more careful visual inspection of hard-to-reach shoreline areas.*

Photo courtesy of Meghan Johnstone, Acadia Park Invasive Plant Patrol.

5. Root-like tendrils, resembling slender bottle brushes, dangle below the floating rosette.

When in doubt, always rule on the side of caution and treat the plant as a suspected invader, i.e., mark the location of the plant (ideally on a map and with a buoy), collect a specimen, and contact LSM for further instruction.

Connecting the Drops…

Cultivating Relationships and Building Community to Sustain LSM's Programs

by Alison Cooney
LSM Development Coordinator

Historical Funding

When Lake Stewards of Maine (LSM) started out as Maine Volunteer Lake Monitoring Program, it was a fully-funded state program. The program was conceived by a group of visionaries, including LSM Advisory Board member, Matt Scott, who oversaw volunteer lake monitoring when the Maine Department of Environmental Protection came into being in 1971. The program transitioned to non-profit status in 1996 when funding was reduced. Initially, LSM relied on government grants to cover the majority of the annual budget. Staff consisted of one person, Scott Williams, who was (and still is) not only the Executive Director, but also the organization's Limnologist (lake scientist). With limited time to devote to fundraising efforts, Scott discovered grant writing and was very successful with filling in budgetary gaps through awarded grants.

As the public interest in LSM's workshops continued, additional staff was hired to assist with the growing number of citizen lake scientists being added annually to LSM's programs. Over the course of two decades, staff increased to 4 full-time and 1 part-time employees. Grant writing, annual appeals, thank you letters, donor engagement, all duties generally assigned to Development staff, were shared responsibilities among LSM Board members and employees. Rising annual operating expenses combined with declining Government grant funds required a focused effort to diversify and broaden LSM's fundraising base. A designated Development staff person was much needed, however, financial support for a new position was not feasible at the time.

> *"Just as ripples spread out when a single pebble is dropped into water, the actions of individuals can have far-reaching effects."*
> **~ Dalai Lama**

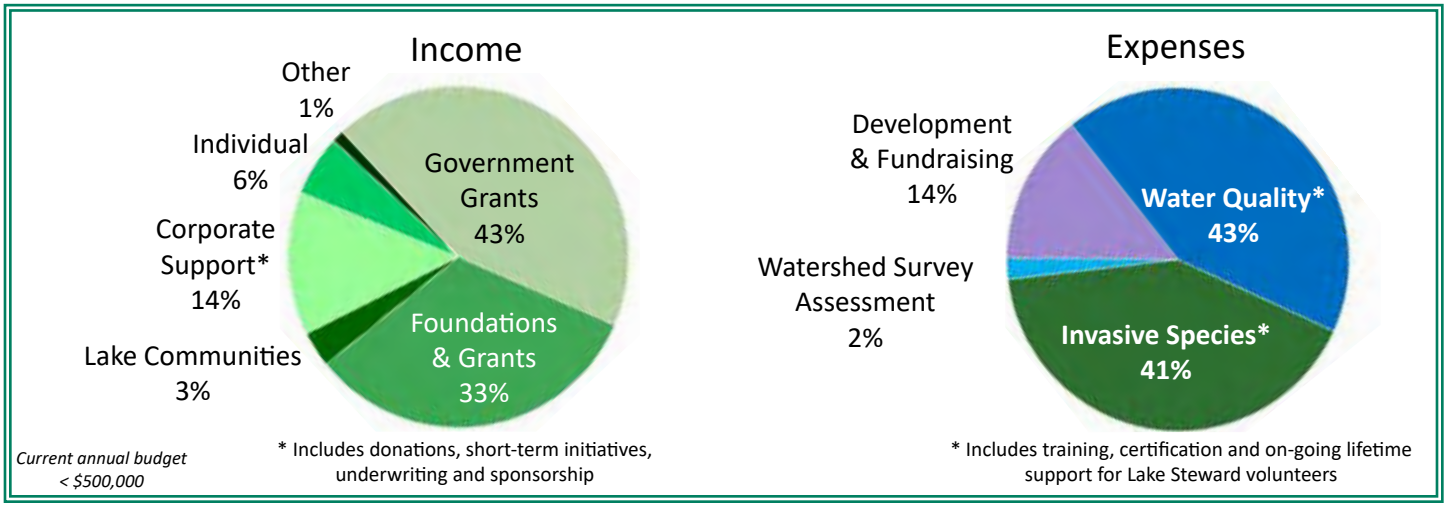
The *Guardian Angel Initiative,* aimed at seeking and leveraging several large donations, was a concept developed by LSM volunteer, John Wasileski. The purpose of the initiative is to ensure long-term growth and sustainability for Lake Stewards of Maine through the strengthening and expansion of LSM's development capacity, starting with the hiring of a new Development Coordinator. The *Guardian Angel Initiative* concept became a reality when **OceanView at Falmouth Retirement Community** committed to be LSM's first "Guardian Angel". OceanView's dedication to LSM's Mission helped secure additional Guardian Angels (please see next page). LSM's Board of Directors also pledged to fulfill a "Guardian Angel" commitment through a *Community* Guardian Angel. With a goal of $50,000, Board members, individuals and lake associations have already contributed over $33,000 to the Community Guardian Angel!

Future Development

We are pleased to announce that the Guardian Angel Initiative is moving forward as envisioned. With the help and commitment of our generous donors, we have achieved our initial fundraising goals, a Development Coordinator has been hired, and efforts are well underway to expand and increase LSM's development capacity.

The resulting changes within the organization are already quite profound. Having a designated Development Coordinator on staff has greatly enhanced our ability to: connect with new and existing donors, reach out to new stakeholders, strengthen ties with our many collaborators, research and prepare foundation grants, and to discover (and more fully benefit from) exciting new opportunities and collaborations. It has also resulted in the added benefit of freeing up other LSM staff, allowing them to devote more attention to the essential work of the organization: training and providing ongoing technical support to our volunteers!

Lake Stewards of Maine accomplishes an immense amount of work on a very tight



Current annual budget < $500,000

* Includes donations, short-term initiatives, underwriting and sponsorship

* Includes training, certification and on-going lifetime support for Lake Steward volunteers

budget, thanks to a small, but very dedicated staff and hundreds of volunteer lake stewards who play key leadership roles within the organization. We are proud of our ability to meet the growing demands and interests of the public. However, we are bursting with innovative ideas and approaches that will allow us to expand our programs even more; efforts that can only be achieved by jumping to the next level of financial security.

Although significantly growing LSM's annual budget is a daunting task, we are confident that we can meet the challenge. Our development expansion goals include increasing individual donors, major funders and business contributions, as well as launching an annual campaign. We *know* that we can accomplish all of this with a little help from our friends. THANK YOU for connecting us with potential resources, offering creative ideas and supporting us to the best of your ability! Keep the ripples going!

We are deeply grateful to LSM's Guardian Angel Initiative supporters:

OceanView AT · FALMOUTH
A 21st century retirement community ™

HG HIGHLAND GREEN™

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Since 1852

BAR HARBOR BANK & TRUST

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BATH SAVINGS TRUST COMPANY

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Full Service Home Builder
Serving Greater Portland Since 1986

Peter Fischer Joins Team

New LSM Development Team member, Peter Fischer, *(center)* accompanied by LSM Development Coordinator, Alison Cooney and E.D. Scott Williams. Peter is a long-time water quality monitor, and former President of the Board of Directors.

Coffee with Alison

If you are an individual or business who is interested in discovering opportunities for supporting *Lake Stewards of Maine*, please contact Alison. She is always looking for a good reason to go out for coffee!

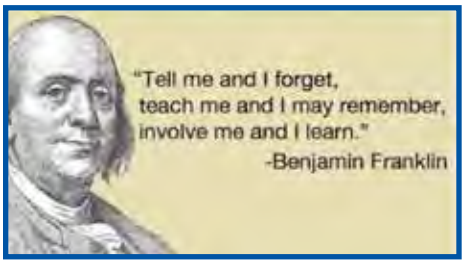
alison@LakeStewardsME.org
(207)783-7733

Did You Know?

- LSM's workshops, basic monitoring equipment and on-going technical support are provided free-of-charge to the public, giving everyone who is interested the opportunity to learn about lake science.
- The valuable data collected by LSM volunteers is scientifically credible. The historical body of data--gathered by volunteers who are intimately connected with, and passionate about, their lakes--serves as the baseline against which any significant changes in lake water quality may be measured. This robust data-set is critical to the statewide effort to preserve long-term health of Maine's pristine lakes.
- LSM volunteers benefit their local lakes by playing key stewardship and leadership roles in their communities.
- LSM citizen lake scientists play a vital role in maintaining and, in many cases, improving the health of Maine lakes. In several cases, Invasive Plant Patrollers, have been key 'early detectors' of new invasive species infestations. Once a new infestation has been confirmed, IPPers may also participate in the comprehensive lake-wide surveys needed to determine the extent of spread within the waterbody, and/or assist with efforts to control the new invaders.
- LSM is collaborative to its core, partnering with state and federal agencies, municipalities, educational and research institutions, foundations, Maine Indian tribes, and non-governmental conservation groups such as local and regional lake watershed associations. *We feel we are best achieving our own Mission when we are helping our many partners achieve theirs!*

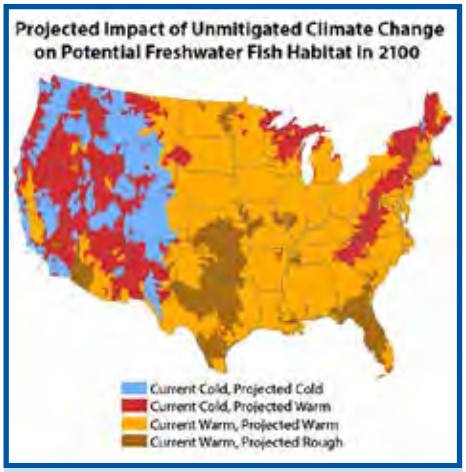
Citizen Lake Scientists:
Rising to the Growing Challenges Facing Maine's Lakes

by Scott Williams



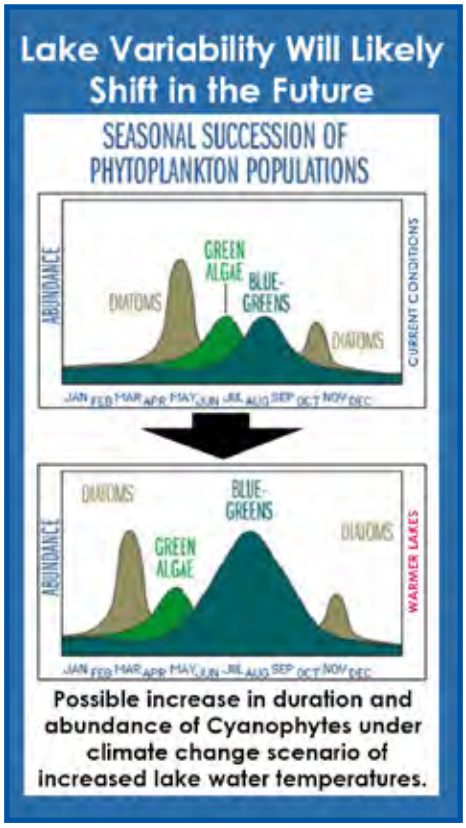
The Challenges

Maine's lakes face an increasing and unprecedented number of threats and challenges, ranging from the introduction and detection of invasive aquatic species, to nutrient enrichment (primarily phosphorus) in runoff from watershed development, and an increase in the occurrence of harmful algal blooms (HAB's). These, as well as more subtle changes, such as the gradual loss of coldwater fishery habitat that may occur in some lakes, caused by declining late summer dissolved oxygen levels, are all being exacerbated by the effects of a warming climate.



Change in distribution of areas where stream temperature supports different fisheries under the Reference scenario using IGSM-CAM climate model. Results are presented for the 8-digit hydrologic unit codes (HUCs) of the contiguous U.S. For more information, visit EPA's "Climate Change in the United States: Benefits of Global Action" at www.epa.gov/cira.

Water clarity is the most highly valued lake attribute in Maine. One likely effect of a warming climate on lakes will be an overall increase in the abundance of algae in lake water, resulting in declining clarity. *As lake water warms, the conditions for algal growth are generally enhanced.* Of particular concern is the potential for a shift in algal composition toward the Cyanobacteria (bluegreen algae), which proliferate in warmer water with higher concentrations of phosphorus. Longer annual growing seasons associated with a warming climate may result in a more complete breakdown, and solubility of organic matter, making it easier for this matter to be mobilized and transported in stormwater runoff, potentially significantly increasing the concentration of phosphorus and organic matter in lakes.



Extreme weather events associated with climate change typically produce higher volumes and velocity of stormwater runoff. These combined factors increase the likelihood that watershed sediment and nutrients (primarily phosphorus) will be transported to lakes. Such "perfect storm" conditions may cause a substantial increase in the concentration of algae in lake water over a relatively short period of time.

Photo of a tornado (waterspout) on Sebago Lake, taken by Bob Zimmerman in 2018.

Storms such as the one shown above (one of four such storms recorded in Maine on that day) are becoming increasingly common, and are often associated with heavy rain that can cause severe soil erosion in lake watersheds, washing sediment, phosphorus and other pollutants into Maine's lakes.

The Value of Widespread, Long-Term, High-Quality Scientific Information

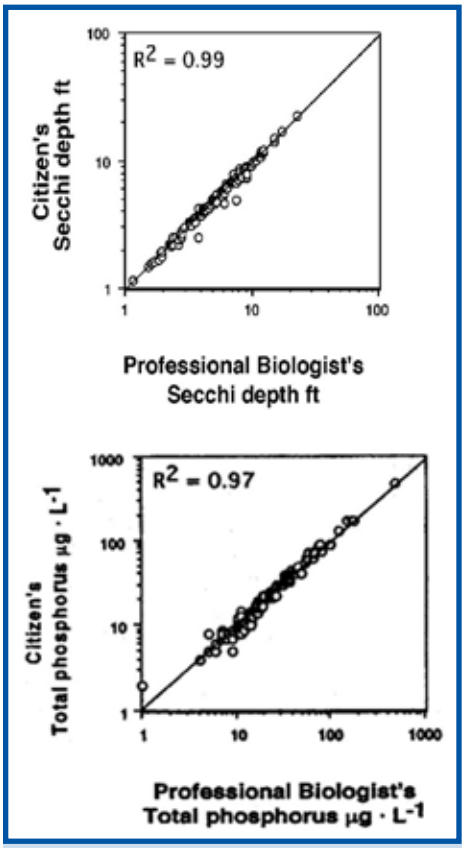
It has been said that *the first step in solving a problem is to recognize that there is one*. This is where Maine's lake stewards come in!

LSM volunteers have been at the national forefront of the citizen lake science movement since 1971! During the past half century, volunteer lake monitors have monitored the health of hundreds of lakes throughout the state of Maine, generating an enormous volume of scientifically-credible information annually. On some lakes, the collection of water quality data has been continuous over a period of multiple decades. This volunteer-generated information has added significantly to our understanding of lake ecosystems and their response to various threats.

Of similar, if not greater, importance as the extensive *quantity* of data gathered by LSM volunteers, is the *quality* of the information being obtained. Quality

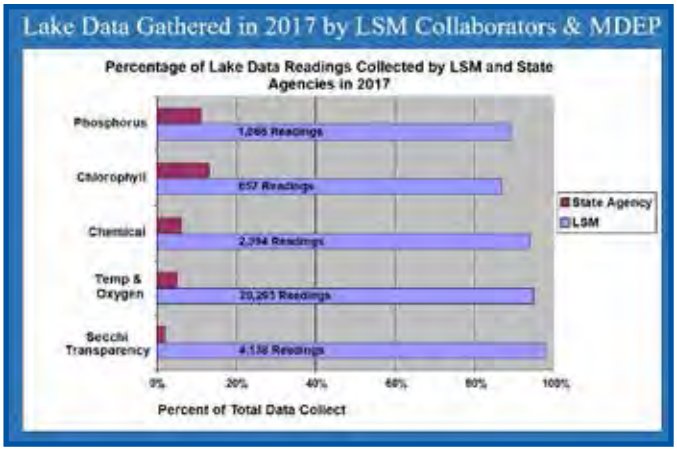
Assurance (QA) is achieved through a comprehensive, high-level process that assures all users of volunteer data that the information is credible, and is on-par with similar data gathered by professional lake scientists. (For more on LSMs Quality Assurance Project Plan, please see *Quality Counts* on page 6.)

A 2012 peer-reviewed study conducted by the University of Florida of side-by-side comparisons of data gathered by trained volunteer lake monitors in the Florida LakeWatch Program and professional lake scientists, demonstrated that the two were indistinguishable, as the graphics from the study illustrate *(see below)*. The image on the top shows comparisons of Secchi disk readings, and total phosphorus sampling results on the bottom. The training, support and QA oversight provided to Volunteers in the LakeWatch Program is very similar to LSM's training and quality assurance protocols.



Canfield, D; Brown, C; Bachmann, R; Hoyer, M; University of Florida: Volunteer Lake Monitoring: Testing the Reliability of Data Collected by the Florida LakeWatch Program.

With dwindling funds from government sources available to support the gathering of research data needed to better understand how lakes respond to a warming climate, the role of trained volunteer monitors is more valuable and essential than ever!



About the Data & What We Are Learning

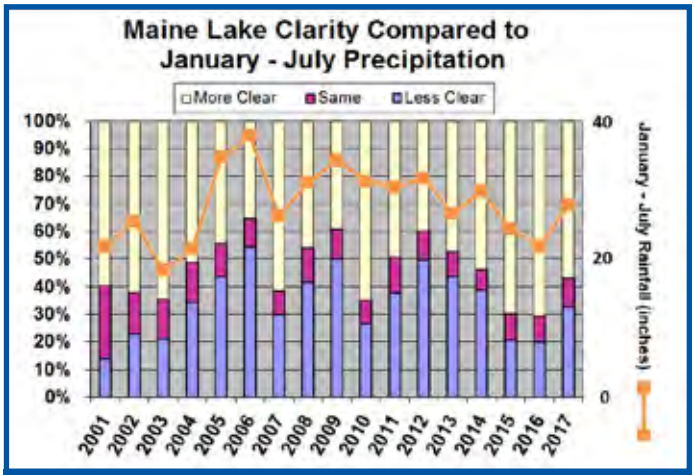
The venerable Secchi disk continues to be one of the most reliable, inexpensive, rapid and accurate devices for estimating planktonic algae growth in lakes. The device is used extensively by professional lake scientists, as well as volunteer monitors. Several hundred LSM lake monitors throughout Maine collectively obtain several thousand Secchi readings annually on hundreds of Maine lakes!

Secchi readings taken throughout the summer season (May through September, or longer) provide a very good overall picture of both seasonal and annual changes in lake water quality, and these readings will likely provide the first indication of climate-induced change for many lakes. The historical water quality data for many Maine lakes consists primarily of Secchi disk readings, periodically supplemented with comprehensive baseline sampling by DEP staff. Solid historical data provide an important reference point, compared to which future changes can be identified and documented.

When lake Secchi readings decline to a depth of 2.0 meters or less (the DEP standard), a severe algal bloom may be occurring. An algal bloom is typically a lakewide event, during which the water color may turn various shades of green leading up to, and during the bloom. A multi-colored sheen or scum may form on the surface, especially along downwind shoreline areas. The tiny organisms most often responsible for severe blooms during the heat of summer are the Cyanobacteria–bacteria that are capable of photosynthesis–referred to in the past as "bluegreen algae" or "cyanophytes".

The Secchi disk can be used to determine not only when a bloom is taking place, but also to track the intensity and duration of a bloom, and to determine the point at which the bloom subsides. While the Secchi disk is the quickest and

Citizen Lake Scientists... **continued on page 14**



Basic Response for Majority of Lakes:

Dryer years => less watershed runoff => less sediment and phosphorus loading to lakes => clearer lake water

Wetter years => greater watershed runoff => more sediment and phosphorus loading to lakes => reduced transparency

Timing of precipitation is a factor (January-July is likely most relevant)

However, this relationship does not apply to all lakes.....

Invasive Plant Patrol

Notes from the Front Lines

Here we shine the spotlight on some of the many ways LSM Invasive Plant Patrollers are working to protect Maine waters from the threat of aquatic invaders. What is your story? What is the status of early detection in your community? Your IPP experience may be invaluable to your fellow patrollers, as well as to those who may wish to become more involved. Please share your stories with us, so we can pass them along! Thank you all for helping to build one the most comprehensive invasive aquatic plant early detection programs in the nation!

Maine's Newest Invader - *Adapted from Maine DEP Press Release*

It was not long after the initial discovery of Eurasian water milfoil in Cobbosseecontee Lake in Manchester, that the Maine Department of Environmental Protection (DEP) confirmed the presence of a second state-prohibited invasive aquatic plant in the lake. The plant, European frog-bit (*Hydrocharis morsus-ranae*), is native to Europe and northern Asia, and is a popular water garden and aquarium plant. First intentionally introduced to a water garden in Canada in 1932, the plant was found in a New York river in 1974 and continues to expand its range.

The Cobbossee find is the first known occurance of this plant in Maine. European frog-bit grows best in shallow, slow-moving water and sheltered coves. The Cobbossee population was first spotted in a stream-outlet cove in the northeast corner of the lake. Subsequent surveys revealed that the plant was well established in patches throughout the lake, suggesting it has been present in Cobbossee for some time.

Cobbossee Yacht Club volunteers, removing European frog-bit from the northeastern inlet of Cobbossee Lake.

"Admittedly, this latest discovery is a tough one-two punch for Cobbossee Lake. We don't know how the plant arrived in the lake but we have already begun the challenge of managing it," said John McPhedran, DEP Biologist. "The plant was discovered August 10, 2018, surveyed August 13 and removal began August 14. I am confident that DEP's collaboration with Cobbossee Watershed District and Friends of Cobbossee Watershed will result in reducing this infestation. But we also need to be realistic: real control will require continued commitment and will occur over years, not days or months."

Please see page 7 for a closer look at Maine's newest invader.

Hancock County Notes - *by Catherine Fox & Mark Whiting*

The IPP effort continues to grow in Hancock county.

In 2018 we conducted a successful test run of our new "local emergency response team" (thanks Billy Helprin for organizing that!), and a group survey of Donnell Pond (special thanks Shari LaTulippe, Lucy Leaf and Billy Helprin). We also conducted Level-3 surveys (for the first time since 2004) of the hard-to-reach but very important wilderness lakes, Nicatous (thanks Keith Williams) and Spectacle (thanks Lucy Leaf). We're hoping to make the 2019 season even more comprehensive. Plans are being made to kick off the season with an informal "drop-in, bring-a-picnic, ask/discuss-anything, everyone-invited" event at a local shallow (wading depth) pond where aquatic plants are two weeks in advance of anywhere else in Hancock County. Please e-mail us at our new address of LSMHancockCounty@mail.com and let us know if you are interested in joining the effort, and/or if you have any thoughts or suggestions to share.

Regional Volunteer Coordinator for Hancock County, Mark Whiting, leads a group of volunteer Invasive Plant Patrollers on Alamoosook Lake.

(L-R) Alex Dowess & Billy Helprin of Somes-Meynell Wildlife Sanctuary, with Volunteer IPP Regional Hancock County Coordinators Mark Whiting and Catherine Fox.

Screening for Invasive Bivalves - *by Laurie Callahan, Director, York County Invasive Aquatic Species Project (YCIASP)*

Invasive freshwater clams and mussels have not yet been found in Maine lakes and rivers, but they have been found in waterbodies in adjacent states and provinces. (Zebra mussels and Asian clams are present in Quebec and in Massachusetts, and Asian clams have been found in several locations in New Hampshire.) Asian clams, once established, are difficult to control and practically impossible to eradicate. Preventing their introduction to waterbodies is the most effective approach. Identifying waterbodies where they occur is an important part of that strategy.

The most essential piece of equipment for the Asian clam screening protocol is a standard sieve with size 10 mesh (2 millimeters). Can you find the 3 Asian clams in this picture? *Photo courtesy of NH Department of Environmental Services.*

The best time to sample is in midsummer when water temperatures are optimal for this species. The sampling is done in about 2-3 feet of water, where the substrate is sandy or gravelly/sandy. The sieve is used to scoop into the substrate to a depth of about 3-inches. Using lake water to flush, as needed, the finer material is sifted through the mesh, leaving the larger bits which are then examined for the presence of Asian clams. *Photo courtesy of WAMC Midday Magazine.*

YCIASP is in the process of adapting existing protocols developed in New Hampshire and New York to create its own Asian clam screening survey protocol to start using in 2019. This past season, practice runs were performed at several public launches in York County. The sampling was done in late September and early October when water temperatures were cooler than optimal, so results (all negative for IAS) may not have been reliable. The procedure at each launch site took approximately 15 minutes, and the equipment and supplies needed were very simple and easy to obtain.

So, please stay tuned! YCIASP will have more information about its Asian clam screening protocol and surveys to share in 2019. And hopefully the surveys will also provide information about native mollusk species that are present!

The sampling method will detect young to mature Asian clams (several mm to 3.5 cm) Juveniles less than 2 mm in diameter will pass through the mesh of the sieve. For greatest assurance that these invaders are not present in the waterbody, sampling should be done annually. *Photo courtesy of NH Department of Environmental Services.*

Student Water Challenge Takes on Invasive Species - *Priscilla Carnaroli and Shaylee Davis*

Saint Joseph's College students Priscilla Carnaroli and Shaylee Davis delivered a presentation about invasive species at Maine Campus Compact's 2nd Annual Maine Student Water Challenge (December 2018).

Saint Joseph's College freshman, Priscilla Carnaroli, and sophomore Shaylee Davis, chose to focus their 2018 Maine Student Water Challenge project on developing curriculum to teach K-12 students about the threat of invasive aquatic plants (IAP). We were pleased to learn that their curriculum included **LSM's Friend or Foe Kit** (a nifty hands-on IAP lesson in a box). The Student Water Challenge—organized by EPSCoR (Established Program to Stimulate Competitive Research) and Maine Campus Compact—awards $350 stipends to meritorious higher-education students. All challenges are aimed at solving water-related problems in Maine.

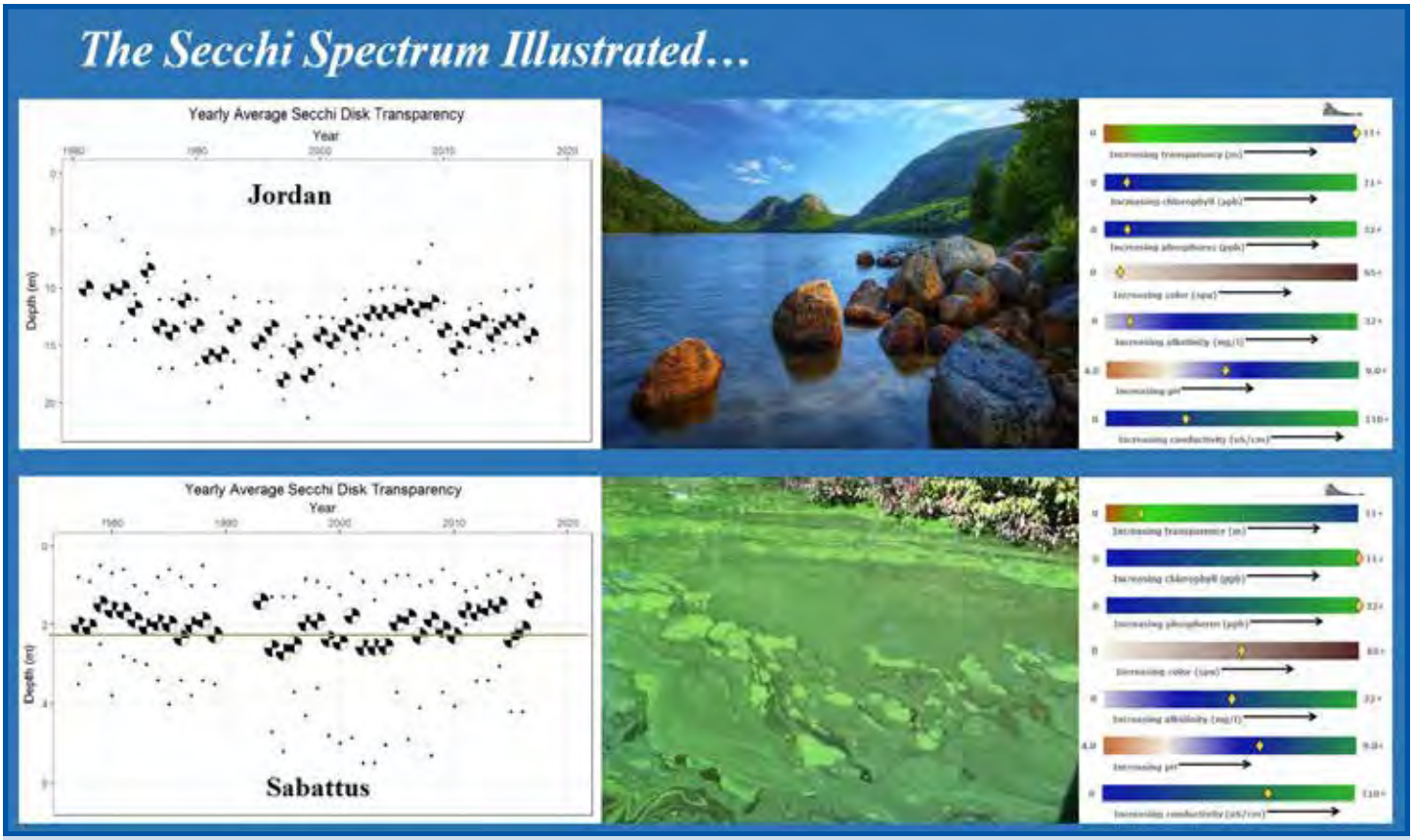
Priscilla is studying medical biology and minoring in sustainability; Shaylee is majoring in environmental science.

***Notes from the Front Lines...* continued on page 29**

Save the Date!

2019 LSM Annual Lake Monitoring Conference Will Take Place On Saturday, July 27th

Citizen Lake Scientists... continued from page 11



Jordan Pond is one of Maine's clearest lakes, with Secchi readings sometime reaching 20 meters depth. Sabattus Pond experiences annual severe algal blooms, indicated by the green horizontal line on the lower graph. The "Color Ramps" on the right show the range and historical average for additional indicators of lake water quality. To view these graphics for your lake, visit LSM's **www.LakesofMaine.org** website and click on the 'water quality' tab.

least costly way to determine the intensity of algae growth in lake water, additional sampling to measure the concentration of the nutrient phosphorus, and the photosynthetic pigment, chlorophyll *a,* typically provide a more complete picture of what is taking place in a lake. Microscopic determination of the dominant algae can also be helpful.

Being Ready for New Challenges

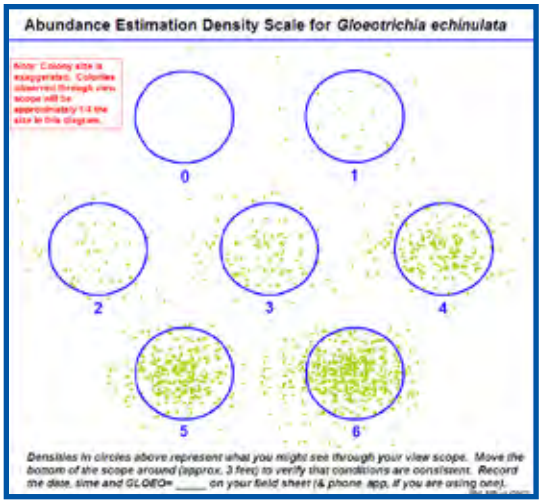
One thing that the historical data is now strongly suggesting, is that some lakes in Maine are already responding noticeably to the effects of climate change (please see page 22). Some lakes, for example, are now experiencing algal blooms for the first time ever, others are blooming for the first time in many years, and still others--chronic bloomers--are blooming for longer periods of time (blooms starting earlier in the season, and persisting later into the fall).

Below are some guidelines for Water Quality Monitors, to help ensure that any significant changes taking place in your lake will result in prompt attention:

1. Continue to monitor Secchi transparency readings twice monthly, from May through September; as the average open water season for lakes becomes longer, it may be feasible (and desirable) to begin earlier and continue later into the season
2. If Secchi readings in your lake are unusually low, or they decline rapidly during the monitoring season, contact LSM or the DEP; this is especially important if readings are at, or below 2.0 meters depth
3. If your lake experiences a rapid water clarity decline, you may be asked to increase the frequency of Secchi readings to weekly (if possible), in order to track the bloom and keep all interested parties informed of conditions in the lake
4. *If you are not already publishing your Secchi readings on LSM's "Near Real-Time Lake Data" website, please consider doing so; readings can be easily and instantly entered from your cell phone, and the information will become immediately available to all who have an interest in the information* (contact LSM to initiate your lake page; see page 15 for details)
5. Please note (and date) all significant weather events in the comments section of your field form, especially severe events, including prolonged high winds and heavy rainfall; intense weather events may follow a narrow geographic path, and this information can be very helpful in understanding the regional variability that occurs between lakes

Secchi readings can be dramatically reduced during an algae bloom.

6. Also note any unusual phenomena observed when taking Secchi readings, including heavy pine pollen (blotchy yellow spots in the water during the early summer); algae scums on the lake surface; Gloeotrichia density (only if you are able to identify Gloeo with confidence
7. If possible, determine the annual "ice-in" and "ice-out" dates for your lake, and send them to LSM. Studies of long-term historical ice-out data have documented a significant shortening of the period of ice cover for New England lakes *(Hodgkins, G.A. and James I.C. II, 2002, Historical ice-out dates for 29 lakes in New England)*. No single effect of climate change is likely to have a more profound effect on Maine lakes!



Thank you for making a significant contribution to the body of scientific information that is essential to fully understand and respond to the effects of climate change on Maine's lakes! Please keep up the great work! ◔

Near Real-Time Lake Data

Posting Your Secchi Readings Online

If you are an LSM certified lake monitor, and are taking Secchi readings for your lake, please consider sharing your data online with your lake community. All it takes is a cell phone or a PC, and your readings (and comments) can be displayed immediately on your personal lake page, which can be easily accessed on LSM's website.

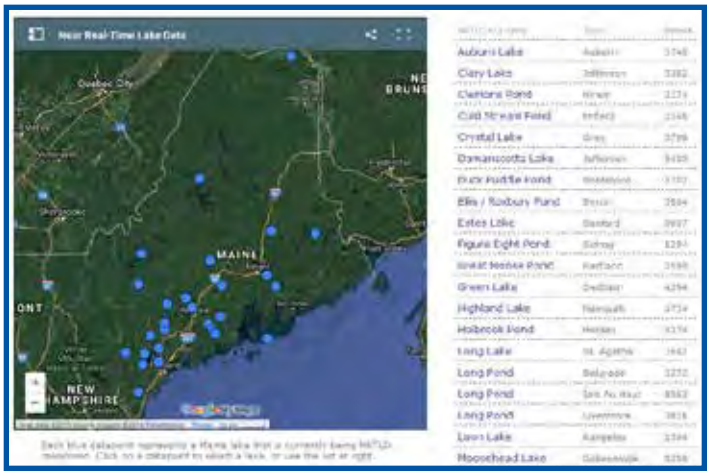
Sharing your data in real-time with your lake community, and beyond, has many benefits, including:

- Illustrating the good work that you are doing on behalf of your lake
- Allowing members of your lake community to observe changes that are taking place in their lake during the course of the summer season, and from year to year
- If your lake is experiencing an algal bloom, your real-time data can be used to help your community, as well as LSM and DEP staff to track the intensity and severity of the conditions. This is a critically important and valuable benefit when a lake is beginning to show signs of stress from excess algae growth
- Building community awareness about the importance of monitoring and protecting lake water quality

In addition to posting your Secchi readings, you can add comments about conditions that you observe while on the water. Your readings will automatically be displayed in graphic form for all to see. And – you can include a photo of yourself on your lake page. You could become famous!

Signing up is very simple. When you have taken your first reading of the season, contact Jonnie at the LSM office (phone or email) with your Secchi reading and a photo of yourself, and/or your lake. We will set up your account and provide you with a password. Anyone can observe your data, but only you will be able to enter the information on the website. Please note that you will still need to submit a formal field sheet for all your Secchi readings, because all of the "metadata" contained on that form are required to be entered, in order for your data to be certified.

Please consider participating in this important initiative in 2019! We look forward to seeing you and your Secchi readings on your own lake page! ◔



http://mainelakesdata.org/

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Tips For IPPers

Ideas, Innovations, and Inspirations from Maine's Dedicated Early Detectors

IPP Pontoon Boat - By Charles Crespi, President, GELIA

The placement of the side-by-side light wells.

With its popular public boat launch, and close proximity to highways and nearby infested lakes, Great East Lake in York County is at high risk for infestation. Great East Lake Improvement Association (GELIA) sees its Courtesy Boat Inspection program at the State boat launch as its primary line of defense against the introduction of invasive aquatic plants.

As a secondary line of defense, GELIA maintains an early detection program. Our IPP surveys are typically conducted by kayak or by snorkeling. With Great East Lake's 18-miles of shoreline, it has been a challenge to survey the entire lake by "muscle power." This got us thinking of possible alternatives.

Last summer, a resident donated a pontoon boat to GELIA for Invasive Plant Patrols. The 20-foot *Godfrey* was modified as follows:

- Two, two-foot-square holes were cut in the deck between the structural supports.
- Two removable light wells were constructed of half-inch marine plywood and quarter-inch Plexiglas®. All seams were sealed with silicone sealant.
- The light wells are two-feet-deep; when in place, they penetrate a few inches into the water. (The light wells may be removed and holes covered when they are not in use. A flange and handles on the top of the units facilitate insertion and removal.)
- The light wells were painted flat black and tarp canopy was added to reduce glare.

The boat modifications were finished in late summer, allowing us time to put the *Godfrey* to the test. Here is a quick summary of our experience:

Surveying the lake bottom.

- The light wells provide an excellent view of the lake bottom, making it easy to identify plants.
- When surveying, we could go no faster than idle speed (about 2-miles per hour). At higher speeds, bubbles get pulled under the Plexiglas.
- The field of view was excellent – about 10 feet wide in shallow water and much wider in deeper water.
- Small waves from light winds (about 5-knots or less) did not affect viewing.
- A crew of 3 (or more) people is best. One person to pilot the boat and the others to look down the light wells.
- The boat is efficient. We averaged about 2-miles of surveyed-shoreline per hour. This translates to about 3.5-acres of lake bottom per hour.
- Very shallow water, rocks, docks, moored boats and other near-shore obstacles prevent surveying right up to the shoreline. ***For a comprehensive lake survey, kayaks, canoes, and/or snorkelers are still needed.***
- With a half-dozen cruises totaling about 10-hours, we completed a single-pass survey of the perimeter of the main lake, first basin and second basin. No suspicious plants were found.

Flanges and handles allow for easy insertion and removal of the light wells.

For the 2019 season, we plan to perform a comprehensive survey of the littoral zone of Great East Lake. Please feel free to contact me at **pres@greateastlake.org** with any questions or comments you may have.

Solo Survey Rig - By Cheryl Welch

After several excursions onto Crystal Lake in my new survey rig, I am happy to report that it works quite well! It is comfortable to work from, and, even using the large trunk scope, I can easily go on my own. If I am surveying some distance from home, I lash the trunk scope to the net platform behind the seat for the commute. When I get to the survey area, I simply step ashore, and move the scope to the front of the boat, where it pressure-fits between the pontoons. Placing my feet in the trunk, I can hold it securely, and also keep it adjusted to the proper viewing angle.

Cheryl's clever new survey rig!

There are two large storage pockets on the pontoons; it also came with footrests which I did not install because of the scope placement. I ordered the boat (along with a separate patch kit) from Walmart for about $220. With the cost of the trunk scope, the total outfit comes to roughly $300.

The rig is not as fast in the water as a kayak, and I wouldn't want to use it in high wind, but overall, I am quite pleased with its performance!

Katie Greenman's Bucket Scope Cover

Almoosook Lake Steward, Katie Greenman, came up with a clever way to prevent light interference in her bucket scope. It's also a great way to recycle an old tee-shirt!

We think Katie's recycled-tee bucket scope cover is brilliant! MINOR ASSEMBLY NECESSARY. ;)

Lake Stewards of Maine Seeking Board Members

We are seeking to fill several positions on our Board of Directors. Ideal candidates will have some experience with nonprofit organizations, a basic understanding of the work of LSM and share our belief in the importance of LSM's mission. We are particularly interested in bringing on new board members who have knowledge and experience in the areas of marketing, fundraising and program development. These are volunteer positions.

The LSM Board of Directors meets 4-6 times annually at the LSM Lakes Center in Auburn, Maine. Meetings typically take place on weekday mornings, and may last until early afternoon. Committee meetings are often scheduled for the same day. Members of the Board of Directors agree to be active in at least one subcommittee.

Please contact Executive Director, Scott Williams, if you are interested in a position on the LSM Board, or if you have questions. Following an initial discussion, candidates will be screened and interviewed by the Board of Directors, who will act upon all applications.

WANTED:

Volunteer Water Quality Regional & Data Coordinators

Help with activities such as scheduling re-certification workshops, communicating with volunteers, and lake data entry. For more information, please contact us at stewards@lakestewardsme.org or 207-783-7733.

Reminder to all LSM Lake Stewards:

Help ensure the *Lakes of Maine* website will be complete by sending in any late data *today!*

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In Appreciation of our Recent Generous Donors ~

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Major funding for LSM is made possible through grants from the Maine Department of Environmental Protection, and the US Environmental Protection Agency.

In Kind

And for those of you who have donated your time, expertise, and dedication to the work of the LSM in the past year– many thanks!

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Great East Lake Improvement Association
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Gull Pond Association
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Kennebunk Pond Association
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Lakes Environmental Association
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Woods Pond Water Quality Association
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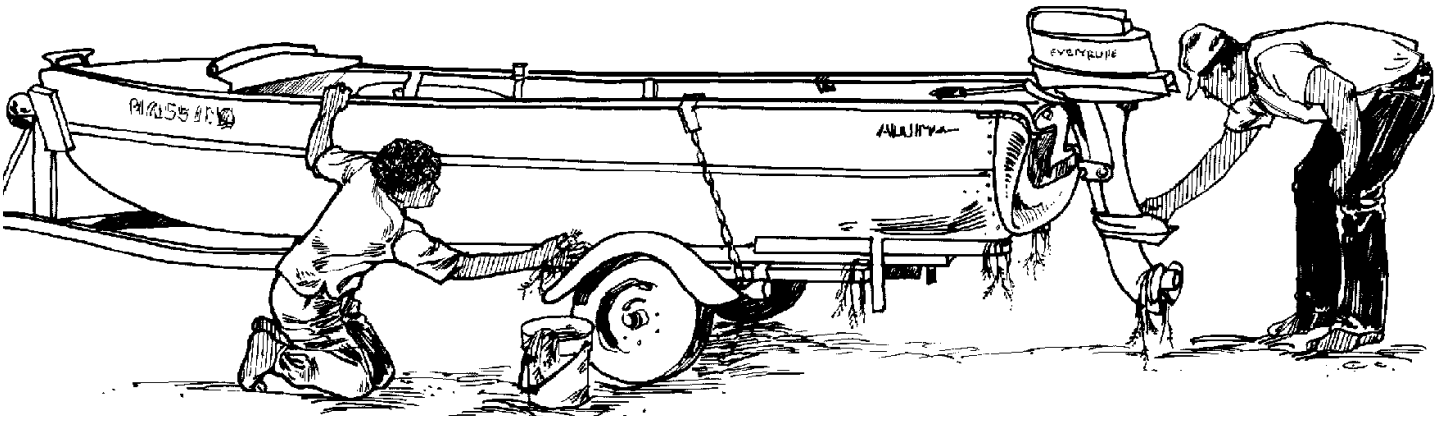
Other *Recent Generous Donors* may be found on pages 18-19.

BEYOND CLEAN, DRAIN & DRY:

ADVANCED DECONTAMINATION PROTOCOLS for boats, trailers, and gear

adapted from Wisconsin Department of Natural Resources



Are you a lake steward who participates (with your boat and survey gear) in 'away' workshops and/or screening survey projects? If yes, the last thing you will want to do is inadvertently become a vector for less-visible aquatic hitchhikers, such as young Chinese mystery snails. When your good work takes you and your boat away from home, we recommend the following advanced decontamination protocols.

In a location, distant from (and not draining directly to) a waterbody, please **CLEAN**, and **DRAIN** your boats, trailers, and all survey gear and **DRY** for at least 5 days in advance of launching into a new waterbody. If the 5-day drying period is not possible, please decontaminate your gear using the following three steps:

Step 1. Spray and/or wipe down all gear with freshly mixed chlorine solution; let stand at least 10 minutes

Create a 0.5% bleach solution by mixing of 2.5 tablespoons of fresh household bleach with one gallon of water. Chlorine solution in the form of household bleach (5.25% sodium hypochlorite) can be purchased from most grocery stores.

Bleach solutions begin to lose disinfecting properties after 24 hours, and the more diluted the chlorine solution, the quicker it will deteriorate. It is important to use 0.5% bleach solutions that are less than 24 hours old. Chlorine solutions also deteriorate with exposure to light, heat, contact with air, metals, metallic ions and organic materials. Bleach and bleach solutions are best stored out of heat and sun. If stored at a temperature between 50 and 70°F, household bleach retains its disinfection properties for about six months, after which, it begins to degrades. If bleach is stored in locations with higher temperatures, such as a garage or the back of a truck, it will lose its disinfection properties at a faster pace. Therefore, new bleach should be purchased for purposes of decontamination at the beginning of each field season. If using bleach year-round for decontamination, new bleach should be purchased every 6 months.

Label the container holding the diluted bleach solution with the words "Bleach Solution" and record the date and time of dilution on the label. The solution should be used within 2 months.

Small amounts of bleach solution may be disposed of in the sink, provided you follow with plenty of water.

Step 2. Rinse everything with fresh water

Caution must be taken to not mix chlorine bleach with other chemicals (e.g., vinegar). After using bleach, it is important to carefully rinse all contaminated gear with water.

Step 3. Spray and/or wipe down all gear with white vinegar

There have been no peer-reviewed studies investigating vinegar as a disinfectant for invasive species; therefore, it must be used in tandem with other disinfection, such as chlorine bleach.

While bleach is effective in killing most invasive species, it may not kill all of them, especially some mollusks. Vinegar will dissolve mollusk shells including those of zebra and quagga mussel veligers. Vinegar should definitely be used on nets or gear that are used to collect samples for zebra/quagga mussel analysis after sampling to prevent false positive detections in uninfected lakes.

Use white distilled vinegar without dilution. Apply by spraying, or use a sponge, so surface is thoroughly exposed to the vinegar. Contact time should be at least 10 minutes.

Store in a cool, dry area. Shelf life is indefinite if stored properly. Dispose of small amounts of unused vinegar in the sink; follow with plenty of water.

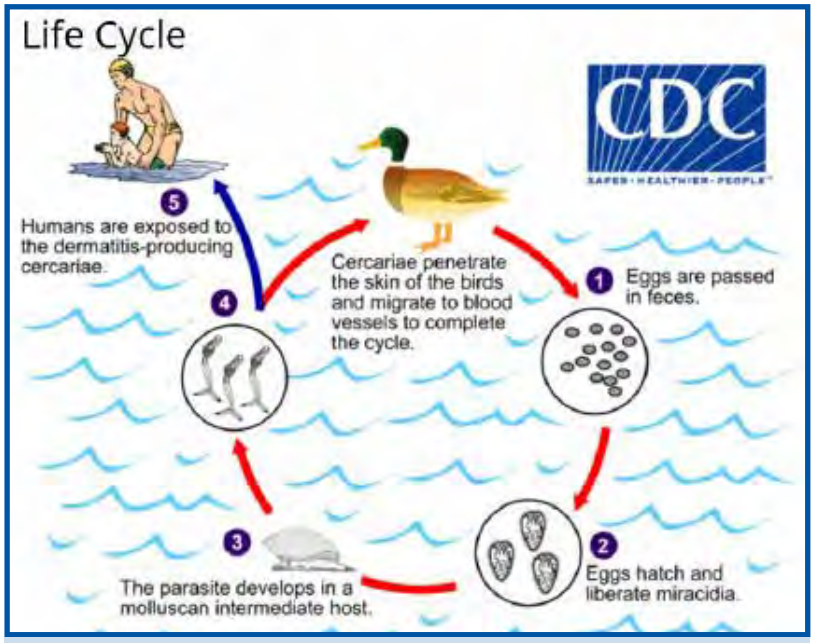
Maine Lakes Water Quality: The Year in Review

by Linda Bacon & Scott Williams

Clear water is the most highly valued, and most carefully observed, feature of Maine lakes. Last summer, many LSM water quality monitors reported that their lakes were unusually clear, possibly due to four consecutive dry summers, and the overall reduction in stormwater runoff from lake watersheds. A majority of Maine lakes tend to be clearer than their historical average during years when precipitation from January through July is below average. Although clear lake water is generally considered to be a positive indicator of lake water quality, prolonged drought, and resulting periods of clear lake water are not necessarily in the best interest of long-term lake health. Some studies have suggested that reduced precipitation and groundwater inputs to lakes may result in the reduced delivery of dissolved organic carbon, resulting in greater UV light penetration in lakes, which may be harmful to aquatic organisms.

Beyond water clarity (which nearly everyone notices when it deviates dramatically from the norm), weather and other localized variables may bring additional issues of concern to the fore. In 2018, the most salient topic on the minds of those who called the DEP lake assessment section was ***lake water levels***. This being the fourth year of Maine's drought was particularly hard on smaller lakes, and those with leaky dams. Evaporation likely played a role in shallower systems.

A close second, were calls associated with ***bacterial contamination*** of swimming areas. The Fourth of July week was unusually hot and calm, and masses of people flocked to nearby swimming holes seeking relief from the sweltering conditions. Unusually warm water temperatures created a perfect storm for bacterial growth. This type of contamination is almost entirely due to poor swimming hygiene practices. If you have a swimming pool, you take precautions to prevent this type of situation using a filtration system, pool shock and additions like chlorine. In lakes, where such sanitation systems are lacking, dirty diapers are of special concern: no one should be allowed in the water wearing a soiled diaper! Diapers should be changed away from the water and taken home for proper disposal. Also, as much as we love to take our pets to swim, it is important to collect any solids they need to eliminate and dispose of them properly at home. Bacteria will persist in warm water longer than in cooler water, so just one accident can have repercussions that last more than a week. Generally bacteria testing is done for *E. coli*. This organism is just one indicator of the many bacteria and viruses that can be present when poor hygiene practices exist; in other words, if *E. coli* is present, assume that many other contaminants are there as well! The actual testing for *E. coli* can be done by the state Health and Environmental Testing Lab as well as many local labs for a reasonable fee; the lab will provide bottles and instructions, but it is up to the customer to collect the sample properly and deliver the sample to the lab within a few hours. It is up to municipalities to conduct testing at public beaches and post signage when contamination is present.



How Swimmers Can Potentially be Exposed to "Swimmer's Itch"

And lastly, ***swimmers' itch*** calls were common. This parasite cycles between snails and ducks. Although their life cycle cannot be completed when they attach to a human, they can cause an itchy rash. The best defense against swimmers' itch is: DON'T feed the ducks! They are cute and are always looking for a handout, but it is safe to assume that if ducks are present, the parasite is also present.

Topics high on LSM-callers' minds last summer were: ***metaphyton***, a filamentous algae that has the appearance of clouds of green cotton candy in the water. Many observers believe this form of algae has increased dramatically in their lakes over the past decade. ***Gloeotrichia***, a cyanobacteria (blue-green algae) that has been increasingly documented in lakes throughout New England in recent years; and ***unusually warm water temperatures***.

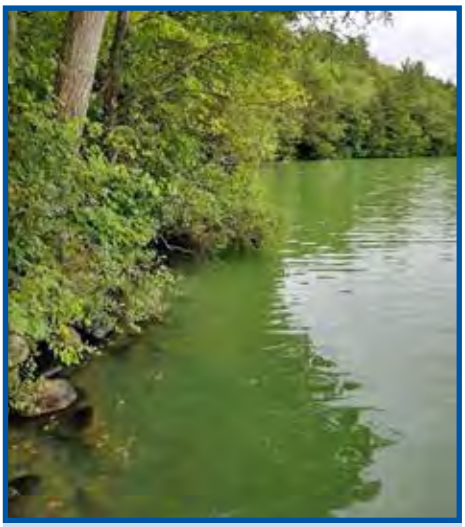
As for the perennially hot topic of water clarity, reports were varied. Many LSM lake water quality monitors reported ***unusually high (clear) Secchi disk readings*** for their lakes through the entire season. In

September, Ron Armontrout, LSM-certified monitor on Thompson Lake in Oxford, documented readings of nearly 12 meters! However, others reported ***declining water clarity***, especially as lake water temperatures approached record highs during an exceptionally hot period lasting most of July. Still others reported ***extreme weather events*** that have the potential to negatively impact water quality.

Across the state of Maine LSM lake monitors are playing a key role documenting and tracking such events. Communicating this important information to their lake associations and communities, they are also helping to raise general awareness of the threats to lakes, and of the ways to protect them. In many cases, early detection of problems provides the information and incentive needed for the lake community, LSM, and DEP to follow up in a timely manner with more intensive monitoring, analysis, and/or remediation.

Below is a summary of lakes that experienced (or were treated for) water quality problems in 2018:

Lake Auburn is the municipal water supply for Lewiston and Auburn. In 2012, it experienced reduced transparencies and a severe loss of dissolved oxygen in its deepest waters, which resulted in the death of >200 lake trout, and may have impacted the landlocked salmon fishery in following years. Lake Auburn is the public drinking water supply for the large Auburn/Lewiston communities. Historic Secchi transparencies have been deep, averaging 7- 8 meters. Following the 2012 bloom, the Water District received a permit to treat the lake with copper sulfate if bloom conditions re-developed. Last summer, Secchi transparencies decreased to a low of about 3 meters, turbidity tripped the "10-day criteria", and a limited area of the lake water was treated with the algaecide. The lake and watershed dynamics are complex for this lake and continue to be examined. Alternative methods of controlling phosphorus and algae are currently being discussed, including an alum treatment.



Long Pond in Parsonsfield; photo courtesy of Laurie Callahan.

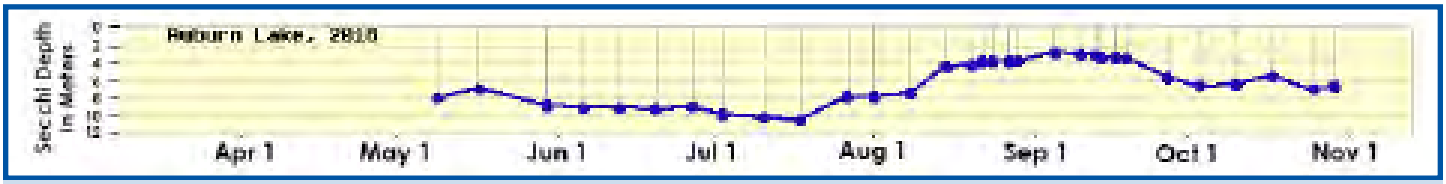
Long Pond in Parsonsfield has a history of above-average water quality, with Secchi readings averaging 6.8 meters over a 35-year period. For the past two years, however, the lake has experienced severe algal blooms. The dramatic changes have been documented by LSM certified lake monitor, Art Bubar. Additional information regarding the condition of the lake has been documented and provided by Deb Hiney and Laurie Callahan and many other lakeside residents. Maine DEP staff visited the lake twice last summer to conduct comprehensive baseline sampling, in an effort to better understand the dynamics of the unexpected decline in water quality. The lake association maintained regular communication with the community regarding possible risks associated with exposure to the water during the bloom.

East Pond, Oakland/Smithfield has a four-decade history of periodic algal blooms. The history of this lake is documented thanks to LSM/VLMP past volunteers (Bob Joly) and current volunteer lake monitors like Mel Croft and Gary Allison. Last summer, East Pond underwent a successful aluminum sulfate treatment to inactivate internal phosphorus sources in the lake. Transparencies following the treatment obtained by DEP were greater than 5 meters during all visits – good readings for the lake. Alum treatments are very costly, and only take place following a thorough assessment, and mitigation of watershed sources of phosphorus. Treatments may be effective for a decade or more.

Georges Pond in Franklin experienced severe algal blooms in 2017 that appeared to persist under the ice, as an algal bloom was in evidence immediately upon ice-out and persisted into the summer of 2018. During the past two years, the Georges Pond Association has substantially increased in size and capacity, and has mobilized to meet the challenges of the bloom; they have conducted a survey of the watershed, are mitigating sites that were identified and have initiated discussion of a possible future alum treatment with consultants and the DEP. Many thanks to LSM diligent volunteer, Brian Friedmann, who has been a key player in this effort from the start!

Togus Pond in Augusta experienced a severe algal bloom for the first time in more than a decade. The event was documented by LSM certified lake monitors Kathleen Campbell and Douglas Miller, who kept the lake community well-informed about the implications regarding exposure to the bloom. Dolichospermum (formerly known as Anabaena), Microcystis (cyanobacteria), and a dinoflagellate were identified in water samples. Togus has experienced internal recycling of

ME Lakes Water Quality... **continued on page 25**



Lake Auburn experienced dramatic changes in Secchi readings over the course of the 2018 summer.

Matt Scott, Maine's Goodwill Lake Ambassador, Addresses Lake Association Meetings Across Maine

Matt Scott, *LSM Advisory Board*

Matt Scott is one of Maine's best known, and most experienced lake professionals. A member of LSM's Advisory Board, Matt was the primary architect, and long-time leader of the Maine DEP lakes program when the agency came into being in the early 1970's. He played a critical role in supporting and shaping the VLMP (now LSM) when it was part of the DEP. Matt also served as Deputy Commissioner of the Department of Inland Fisheries and Wildlife, and was Chair of the Maine Board of Environmental Protection, and President of the North American Lake Management Society.

Although Matt is now retired, he continues to be active as a fisheries and lake water quality consultant, and he works closely with LSM and other lake groups throughout Maine. Last summer, Matt offered to represent LSM at lake association meetings throughout Maine. Given the busy summer schedule, and knowing that lake groups are always looking for a featured speaker at their annual summer meetings, we readily accepted his generous offer and publicized his availability.

Matt represented LSM at six meetings last summer, extensively travelling the length and breadth of the State. The theme of his presentations was "All Maine Lakes are Vulnerable, Some More-So than Others". His expertise and knowledge of Maine fisheries was a big drawing factor.

His first presentation was at Nickerson Lake in Aroostook County, where he ran into a few old acquaintances and colleagues, discussed the lake fishery and addressed watershed runoff concerns. Next, Matt travelled to Long Pond in Parsonsfield, a lake that has experienced severe algal blooms for the past two years. A large, and receptive crowd benefitted from Matt's perspective. From southern to northern Maine, Matt then travelled back to Aroostook (aka: The County) to speak to a group at Drews (aka: Meduxnekeag) Lake, which was also experiencing an algal bloom.

Sebec Lake in the Dover-Foxcroft area of Piscataquis County was Matt's next trip, where he met with an energized group to discuss ways to ensure that the excellent water quality of the lake would be maintained. Then it was off to Unity Pond (Winnecook Lake) in Waldo County – another lake that has experienced chronic severe algal blooms. Matt's extensive historical experience with this lake provided an important perspective to attendees. He touched on topics ranging from DDT fish-kills to outlet dam concerns. Finally, Matt met with a group representing the Sysladobsis chain of lakes, including Upper and Lower Dobsis, Junior, Duck and West Grand Lake in Penobscot County, where he discussed fisheries, dam ownership, paper company land transitions, and the value of lake association capacity in addressing the concerns raised.

At each meeting, Matt indicated that he "would not always be politically correct or appropriate, but would be scientifically accurate", based on his extensive experiences and knowledge. The crowds appreciated his wry humor and honesty.

Matt has already received requests to speak at meetings next summer. We hope he will continue to have the time to share his rich expertise as Maine's Goodwill Lakes Ambassador. ***Thank you, Matt!***

And for those of you that missed out on Matt's speaking tour, he will be offering his services again for the 2019 summer season! If you are interested in having Matt present at your event, please contact LSM at stewards@lakestewardsme.org or (207) 783-7733, and we will put you in touch with him.

Interested in Sponsoring an LSM Summer College Intern? Please see Page 28 for Details.

ME Lakes Water Quality... continued from page 23

phosphorus in the past when dissolved oxygen levels have been depleted; this likely occurred in 2018 as well.

Abrams Pond in Eastbrook approached bloom conditions again last summer. Extensive water quality documentation in this small lake by LSM certified lake monitors Bill and Kathleen Cotter have helped us understand the dynamics of the bloom cycles that have occurred in Abrams Pond for the past several years. Volunteers like the Cotters help identify problems in lakes early on, thereby facilitating the work of research agencies (DEP) and LSM staff in the coordination of additional investigation, and engaging the lake community in the identification and mitigation of causative factors in the watershed.

North Pond in Smithfield *had its worst algal bloom ever last year.* The lake was hit hard by a severe storm that occurred a year ago, with the west shore losing many trees. North Pond is relatively shallow; high water temperatures around the fourth of July likely contributed to the bloom as well as some intermittent phosphorus release from bottom sediments on windless days, and possibly evaporation. Thanks to data collected by LSM volunteers (see list below), over a period spanning nearly five decades, we know that Secchi readings last fell below 2 meters in 2010; we also know that the 2018 bloom was the sixth time the lake has bloomed during the period of record.

North Pond, Smithfield volunteer monitors:
Early 1970s – Dr. Ron Davis and company
1978-81 Charles Scott
1983-84 Robert Williams
1990-99 Bob Joly (also monitored East Pond)
1999-2002 Jim Demchak
2003-04 Harvey Chesley
2005-06 Charles Murdock/Nick Hadley
2008-09 Daniel Lagueux
Since then: DEP and UMaine, Orono staff & BRCA *(Now 7 Lakes Alliance)*/Colby College have collected a great deal of data.

Basin Pond in Fayette was an unexptected surprise! While Secchi readings didn't drop to 2 meters, a significant reduction in transparency occurred from double digit readings to 4 meters (not a nuisance bloom as defined in Maine statute). *For context, Basin competes with Pleasant Pond in Caratunk and Jordan Pond on MDI for the deepest transparency readings in Maine each year. The long-term average for this lake is 12 meters, with occasional 16 meter readings.* The dramatic change in 2018 is troublesome! Relatively few algae could be seen through the microscope. It is therefore possible that picoplankton have made their presence known in North and Basin Ponds. Samples have been sent to Dr. Jim Haney at UNH to be scanned for fluorescence, which if present, would indicate that picoplankton may be the issue in these two ponds.

Photo of 2018 Gloeotrichia bloom at Meduxnekeag (Drews) lake taken by Doug Suitor (Maine Department of Environmental Protection).

Meduxnekeag (Drews) Lake in Aroostook County experienced an unexpected severe Gloeotrichia bloom last summer. LSM certified lake monitors, Tana Mcnutt and Cara O'Donnell documented the very unusual conditions in this lake, which in recent years has experienced improving, and above-average Secchi readings. By September, Secchi readings had dropped to 2.9 meters, and Gloeotrichia density was "off the chart". DEP staff visited the lake and confirmed the conditions. Once again, LSM volunteer data provided critical early detection of this unusual phenomenon.

Ellis (Roxbury) Pond in Western Maine has experienced bursts of algae growth associated with late summer turnover/mixing in recent years. Such events often take place late in the season (September or October) when few people spend time on or near the

Photo of October, 2013 algae bloom in Ellis Pond, courtesy of LSM Lake Steward, Ross Swain.

water, thus no documentation of the conditions takes place. The blooms typically last a very short time before the algae die and form a visible residue/scum on the surface. Depending on weather conditions, the surface residue may be evident for a few days, or only a few hours. LSM certified lake monitor, Ross Swain has documented this phenomenon in Ellis Pond on multiple occasions, augmenting his observations with excellent photographs. Samples collected by Ross confirmed the presence of microcystis, a cyanobacteria that has the potential to produce algal toxins. Ross captured another such brief event last summer.

Little Kennebago Lake - LSM lake monitors Willis and Ellie White reported the effects of severe weather in early summer in the Little Kennebago Lake watershed. A "microburst" in the area resulted in extensive damage to trees and severe soil erosion. Otherwise clear streams were said to be running "black" with soil particles. Such events are taking place more frequently throughout Maine, ostensibly due to climate change. The storms can result in significant phosphorus loading to lakes in a very short period of time.

Puffers Pond in Dexter had a sewage spill directly into the lake in September. A new school was constructed within the last decade, and the engineering plan for hooking into the municipal sewer district, was flawed. As a result, when the nearby pump station fails, sewage flows into the lake! The sewer district estimated that 500-700 gallons flowed into the lake, but given the video

ME Lakes Water Quality... continued on page 33

2018 Lake Monitoring Conference

New members of the milestone monitoring club are 5 Year Service Awardees (L-R) Sally Smith (next to LSM Board President Bill Monagle), David Edsall, Arthur Jacobson, Jane and Ron Snyder.

Jesse Wheeler (L) of Acadia National Park and Billy Helprin (R) of Somes-Meynell Wildlife Sanctuary reported on their locally-sustainable citizen-based program to help prevent the spread of invasive aquatic species on Mount Desert Island.

John Laskey (R) received his 35-Year Service Award for his dedication to Tripp Lake.

IPPers were eager to test their aquatic plant identification skills.

Awarded for 15 Years of lake dedication are (L - R) Rich and Lonny Schneider, and Edward Simmons.

Oustanding Regional IPP Leadership Award presented to Raymond Waterways Protective Association. (L-R) - Peggy Jensen, Bob French, Sibyl French, Ross Wescott, Bunny Wescott, Neil Jensen, Lisa Hall.

Lake Stewardship in Song & Verse: A Parody of 'With A Little Help From My Friends' by lake steward Bunny Wescott. Singers are (L-R) Roberta Hill, Jeff Dennis, Bunny Wescott, and Scott Williams on guitar.

LSM Development Coordinator, Alison Cooney, spoke about various fundraising initiatives and thanked our generous donors.

There were many prizes to be had by certified Lake Stewards, thanks to our generous conference sponsors!

Thank You to our Generous Conference Sponsors!

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Summer intern Sarah Hammond channeled 'American Gothic' while handing out prizes to deserving lake stewards.

Congrats to 10 Year Service Awardees (L-R) - Joe Saunders, Biff Atwater, Jenn Chase, Janene Gorham

Jesse Wheeler (L) of Acadia National Park and Billy Helprin (R) of Somes-Meynell Wildlife Sanctuary accepted their award for Outstanding IAP Prevention on Mount Desert Island.

Wendy Dennis was honored for 40 Years of devotion to the lakes in the Cobbossee Watershed District.

LSM Invasive Species Program Director, Roberta Hill, discussed the importance of healthy vegetated buffers to a rapt audience.

Maine's preeminent geochemist, Dr. Steve Norton, reported on recent studies of Lake Auburn's unusual lake sediment.

LSM Lake Steward and Development Team member Mike Cloutier spoke with LSM Lake Steward and Board Member Bob French about the importance of fundraising.

Scott Williams delivers a talk on The Variability of Secchi Transparency in Maine Lakes in Recent Years.

Thanks to our generous sponsors, many items were available at our silent auction, which was a big success!

Many thanks to our fabulous kitchen crew: (L-R) LSM Volunteer Em McAlpine, LSM Board members Phoebe Hardesty and Sibyl French, and LSM Volunteer Bev Haas.

Meet Our 2018 Interns

Sarah Hammond

This past summer was an extraordinary experience that I was thankful to have had. *Lakes Stewards of Maine* has a special place in my heart; a huge part of my childhood was spent either at or on a lake. I learned from a young age that the lakes in Maine are special, and that a lot of people had a deep passion for them; working with LSM only reinforced that idea. Not only did I have the utmost pleasure of working with the core staff, but the interaction with the volunteers was a true gift. I admire the ability of this organization to bring people together under one common goal, the preservation of Maine lakes.

I'm currently studying Environmental Sciences and Economics at the University of Maine Orono, and this internship was the first time I was able to apply what I am learning in a workplace. I'm concentrating on sustainability and natural resource management, and have learned that community-based conservation is one of the most effective ways to tackle environmental issues.

The work I did with LSM was rewarding, and the skill set I took away is something I'll always cherish. From aiding with the IPP 101 workshops, to helping coordinate the production of the annual conference, to drilling holes into trunk scopes, I am thankful for it all. I am grateful to have had the chance to work with and be a part of such a dedicated, kind, passionate team of people that care deeply about the work they do.

Tristan Taber

Tristan Taber began his work with Lake Stewards of Maine *(then VLMP)* in January of 2018. He is a current graduate student at the University of Southern Maine (USM) in the biology program. His research is focused upon biomorphic properties in salt marsh species, wave energy attenuation, pollutants, and potential aspects related to sea level rise and climate change resiliency. This research should be concluding in the summer of 2019. Tristan's other projects and research include a dam removal in Iowa, and during his undergraduate degree in landscape architecture, developments in urban farming for the World Health Summit 2010, and stable isotope analysis as a metric for salt marsh restoration. Other work has included hydrologic restoration activities and salt marsh monitoring with Casco Bay Estuary Partnership, teaching at USM, and work with Maine Department of Environmental Protection. Tristan is a member of: the executive board for the New England Estuarine Research Symposium, the fraternal organization of Phi Kappa Psi, and the Union of Concerned Scientists. He is originally from Bangor, Maine, and is a current resident of Hallowell. "It was a great pleasure working with the generous and friendly folks of VLMP *(now LSM)*. Their work is clearly important, but laborious. I want to thank them for their efforts and I was glad I could assist for a while."

Spencer Harriman

After Graduating from Clark University in the spring of 2018, I was very excited to be joining the team here at LSM for a third summer! The previous summers here at LSM were incredible, and I knew joining them again would only build on what I had learned previously. The experience once again reinforced the appreciation I already had for citizen science and the incredible people who work with LSM. During this past workshop season, it was amazing to see the level of participation and passion from the communities we were able to visit. I have continued to gain a greater appreciation for the hard work everyone at LSM puts in to make it all happen, and the astounding efforts of the volunteers.

Following last summer, I was given the incredible opportunity to stay on with LSM through the winter and the coming summer of 2019. It has been an immeasurably great experience continuing to work here, allowing me to help with the workload this time of the year and take on new tasks and projects. My time here during the winter has stimulated my anticipation for the upcoming season, and I am excited for what is in store!

Would You Consider Sponsoring an LSM Summer Intern? **You or your business can provide a college student with an unforgettable summer experience supporting volunteers who are working to monitor and protect Maine's lakes, while building on academic and career interests! Our internships offer opportunities to explore Maine lakes through real-life work experiences in lake and social science, public education, volunteer training, nonprofit organization operation, and social media marketing. Sparked your interest? Please contact LSM at (207) 783-7733.**

Littorally Speaking... continued from page 5

conditions for some naturalized species, prompting at least some of them to 'awaken' and become more aggressive.

Any forecast of the future carries with it some uncertainty, but the scientific consensus is strong on the following point: in Maine's new warmer, more extreme-weather-prone climate, 'there will be winners, and there will be losers.' Science (and common sense) tells us that the most adaptable species--including those we now consider most invasive--will rank high among the winners.

There is no soft-pedaling any of this. Those of us who love our lakes and wish them to be here in all their wonder and glory for our children's children to enjoy, have an enormous challenge before us. In addition to doing what we are already doing, we must work to meet the new challenges of a changing climate head on, doing all we can as individuals, in our communities, and in our watersheds to minimize potential for climate-related harm. At the same time, we need to take action to address the root causes of our current climate problem: excess carbon in the earth's atmosphere and the continued increase in carbon emissions associated with the burning of fossil fuels. The good news is there is much each one of us can do to help on both fronts, and, therefore, much reason for hope! *High among my personal rays of hope are all of you, my fellow lake stewards!* I have come to think of you as some of the most capable, self-motivated, resourceful, can-do, people on the planet. I know from experience what you can do when you set your minds to it, and this gives me confidence that, working together, we will make serious progress on this urgently important front as well.

Looking for some next steps? Please stay tuned! LSM will be sharing much more information in the weeks and months to come, on what each one of us can do to help save Maine's extraordinary clear, clean lakes from the most harmful effects of climate change.

Citations:

Figs. 1, 2, 3 - Fernandez, I.J.; C.V. Schmitt; S.D. Birkel; E. Stancioff; A.J. Pershing; J.T. Kelley, J.A. Runge; G.L. Jacobson; and P.A. Mayewski. 2015. Maine's Climate Future: 2015 Update. Orono, ME: University of Maine. 24pp.

Fig. 4. Hodgkins, Glenn A., James II, Ivan C., Huntington, Thomas G. 2005. Historical Changes in Lake Ice-Out Dates as Indicators of Climate Change in New England, 1850-2000. U.S. Geological Survey.

Fig. 5. - Bradley, Bethany A., University of Massachusetts Amherst; Allen, Jenica M., University of New Hampshire. 2016. Out of the weeds? Reduced plant invasion risk with climate change in the continental United States. Biological Conservation, Volume 203, November 2016, Pages 306-312

[1] Bradley and Allen.

Notes from the Front Lines... continued from page 13

Highlights of the 2018 IPP Season - *by Roberta Hill*

- With the help of our wonderful IPP hosts and partners, LSM conducted fourteen IPP training events from York to Washington County. *Approximately 270 individuals attended one or more trainings in 2018.*
- The *new* **Field Guide to Invasive Aquatic Plants** finally made it to the printer, and hundreds of copies have already been distributed! Field Guides are distributed free-of-charge to all newly-certified lake monitors.
- The Acadia Jump Start Project is complete! Nineteen of Maine's most experienced Invasive Plant Patrollers (we lovingly refer to them as the 'Uber-IPPers') participated in the 2018 survey, covering ten ponds: Jordan, Witch Hole, Lakewood, Bubble, Aunt Betty, Upper Breakneck, Lower Breakneck, Beaver Dam, and The Tarn. This marks the completion of a three-year project, conducted in partnership with Acadia National Park and Somes Meynell Wildlife Sanctuary, that brought IPP volunteers from across Maine together with newly-trained locals to screen all waters of Mount Desert Island for the presence of aquatic invaders, while helping to jump-start a local citizen-based early detection program.

Newly-trained IPPers on the shore of beautiful Lake St. George.

- It was a banner year for UAO (unidentified aquatic objects)! Approximately 200 specimens were submitted to us this summer for identification. This is nearly double what we typically see in a given year, perhaps due to increasing ease of taking and submitting digital photos. (Nearly half of the 2018 submissions were sent electronically via email.)
- The **Pixie Williams Herbarium** is really coming together! As far as we know, this is Maine's only herbarium devoted exclusively to aquatic and wetland plants. All herbarium sheets are being scanned at high resolution, and will eventually be made available online, including at the Consortium of New England Herbaria website. The Herbarium will soon be open to the public by appointment, as well.

Cyanotoxin Update

by Linda Bacon
LSM Quality Assurance Officer;
Aquatic Biologist, Maine DEP

In 2015, Environmental Protection Agency (EPA) established Drinking Water Criteria for the algal toxins *microcystin* and *cylindrospermopsin*, and in December of 2016, EPA released draft recreation criteria for both of these toxins. Samples collected by volunteers and Department of Environmental Protection staff from blooming lakes nearly 10 years ago indicated that microcystin was present in some Maine lakes that bloom. Since 2014, DEP's Lake Assessment Section has been obtaining samples from both blooming lakes and lakes that do not support blooms to better characterize risk of algal toxins in Maine lakes.

The protocols followed by DEP align with those being implemented by the Cyanobacteria Collaborative, headed-up by Hilary Snook of EPA. Samples are collected from open water, near the shore, and if scums are present, from the scums themselves. These locations were chosen to characterize conditions related to use of the lake for drinking water, recreation in boats, swimming, and consumption by pets and livestock. Approximately half of the samples have been analyzed thus far, and we expect to wrap up sample collections in 2019.

Maine currently uses the EPA advisories as guidelines. Multiple meetings with the Centers for Disease Control (CDC) and the Drinking Water Program have taken place to discuss developing a possible Maine advisory. Because there is so much variation in what we've seen for microcystin concentrations from year to year and during algal blooms, and because the state's ability to conduct comprehensive continuous monitoring for toxins is so limited given the number of lakes in Maine, it is likely that a statewide advisory approach will be taken, similar to the fish consumption advisory for mercury.

The Maine DEP website has a webpage dedicated to cyanobacteria that includes a list of precautions lake users should take when blooms exist. **https://www.maine.gov/dep/water/lakes/cyanobacteria.html**. Near the bottom of this page, under *"Can you tell me about a specific lake?"* is a link to a list of lakes that have had at least one bloom in the past. These 122 lakes have been evaluated for bloom frequency and risk of future blooms. Eventually we are likely to have a list of lakes that have exceedances of the microcystin criteria posted as well. **https://www.maine.gov/dep/water/lakes/bloomrisk.html**.

Fortunately, Maine has been managing its lakes for HABs (Harmful Algal Blooms) indirectly for decades because the Class in statute, "GPA", includes the phrase "shall be free from culturally induced nuisance algal blooms". Maine statute defines nuisance algal blooms as Secchi transparency readings of less than 2 meters; preliminary data suggest that most lakes that produce microcystin during a bloom, are less clear than this.

Thanks to the persistent good work of LSM citizen lake monitors, we generally know when a lake is approaching the bloom threshold.

Welcome, New Lake Stewards!

New Volunteer Lake Monitors Certified in 2018

Alyssa Andrews; Rangeley Lakes Region Lakes
Sarah Andrus; Chickawaukie Pond
Anne Argast; Cold Stream Pond
Charles Baeder; 7 Lakes Alliance Area Lakes
Glenn Ball; Meddybemps Lake
John Bickford; Horseshoe Pond
Kirk & Tammy Bickford; Crystal Lake (Dry Pond)
Jesse Bosdell; Long Pond & Great Pond
Alan Brearley; Bauneag Beg Lake
Reed Bridge-Koenigsberg; Great Pond
Maddie & Rob Brookings; Phillips (Lucerne) Lake
Amy Brown; Saturday Pond
Kaylin Brown; Messalonskee Lake
Christine Bunyon; Kezar Lake
Jacob Camnett; Holland (Sokosis) Pond
Kathleen Campbell; Togus Pond
Emily Carman; 30 Mile River Area Lakes
Marci Casas; Rockport Area Lakes
Jim Clark; Bauneag Beg Lake
Jake Cockrell; 7 Lakes Alliance Area Lakes
Duncan Coles; Rangeley Lakes Region Lakes
Steven Corbett; Chemo Pond
Edward Damm; Graham Lake
Emma Dennison; Highland (Duck) Lake
Lisa Deschenes; Moose Pond
Patricia Dugan; Norway Area Lakes
Laura Duran; Highland (Duck) Lake
Nathan Durant; Messalonskee Lake & Webb (Weld) Lake
Susan Fenn; Sewall Pond
Larry Fleury; Pattee Pond
Paul Fontaine; Flying Pond
Ryan Frati; Mount Desert Water District Lakes
Kelsie French; Clary Lake (Pleasant Pond)
Sue Fulshaw; Cushman Pond
David Gay; Long Pond
Lucas Govert; Great Pond & Long Pond
Beth Graham; Flanders Pond
Ulrike Guthrie; Alamoosook Lake
Ben Hall; Chamberlain Lake & Telos Lake and Round Pond
Logan Hallett; 7 Lakes Alliance Area Lakes
Susannah Hammersley; Branch Lake
Sarah Hammond; Moosehead Lake
George Haselton; Lilly Pond
Tim Hawkins; Highland (Duck) Lake
Eric Hoffmann; Unity Pond
Rosemary Holdsworth; Georges Pond
Karen Holmes; Cathance Lake
Francis Hopcroft; Seal Cove Pond
Valyrie Ice; Branch Lake
Cary James; Meddybemps Lake
Robert Johnston; Allagash Lake
Susan Kaagan; Parker Pond
Joseph Kellogg; Trickey Pond
Andrea King; Bunganut Pond
Ian Kiraly; various lakes
Heidi Kleban; Moose Pond
Lora Laffan; Grassy Pond
Anna Lampman; various lakes
Harriet Harriet Langley; Bryant Pond
David DaLaPointe; Turner Pond (Mirror Lake)

Holly LeBlanc; Pleasant Lake
William Lerman; Pattee Pond
Brian Levesque; Unity Pond
Jim Linsley; Highland (Duck) Lake
Jim Littlefield; Kennebunk Pond
Dave Lovejoy; Varnum Pond
Jonnie Maloney; Long Pond
Sharon Mann; 7 Lakes Alliance Area Lakes
Kelly Margolis; Wood Pond
Isobel Michaud; Wilson Lake
Douglas Miller; Togus Pond
Olivia Mills; Lakes Environmental Association Lakes
Sadie Mills; Tolman Pond
David Nadeau; Highland (Duck) Lake
Lindsay Nelsen; Tacoma Lakes
Donna Nelson; Holland (Sokosis) Pond
James O'Brien; Norway Area Lakes
Lauren Olson; 7 Lakes Alliance Area Lakes
Kelly O'Neil; Webb Lake
Steve & Tina Osborn; Branch Lake
Lee Owens; China Lake
John Paradiso; Sebago Lake
Eric Parker; Allen Pond
Nadya Pearson; North Gorham Pond
Elizabeth Peele-Haidinger; Meddybemps Lake
William Penney; Kennebunk Pond
Chris and Dominic Perkins; Moose Pond
Marie Phero; Georges Pond
Lauren Pickford; 7 Lakes Alliance Area Lakes
Carol & Sonny Pierce; Mooselookmeguntic Lake
Maurice Plante; Pattee Pond
Richard Qualey; Highland (Duck) Lake
David Randall; Pleasant Lake
Chris Ricardi; Sabbathday Lake
Jesse Ricardi; Sabbathday Lake & Great Pond
Lloyd Roberts; Chickawaukie Pond
Marissa Rossi; 30 Mile River Area Lakes
Gene Roy; Pattee Pond
Kristin Schroder; Trickey Pond
Ryan Schutt; 5 Kezars Ponds
Paul Shook; Norway Area Lakes
Sierra Simpson; 5 Kezars Ponds & Bryant Pond
Amy Soper; 7 Lakes Alliance Area Lakes
Ken Sparkes; McCurdy Pond
Cheryl & Kirk St. Peter; Cross Lake
Kirsten Stemmler; Lakes Environmental Association Lakes
John & Paula Titus; Maces Pond & Rocky Pond
Dawn & John Towey; Quimby Pond
Kathy Trenholm; Chemo Pond
Terry Turner; Panther Pond
Cathy Watson; Watchic Pond
Cynthia Westlund; Kezar Lake
Dian White; Tacoma Lakes
Kim White; Highland (Duck) Lake & Lower Narrows Pond
Lisa Willey; Highland (Duck) Lake
Karen Wilson; Highland (Duck) Lake
Robert Winship; Bradley Pond
John Wolanski; Panther Pond
Jane Woodbury; Farrington Pond

Listings by lake can be found online at www.LakesOfMaine.org

Passings

We care deeply about Maine's volunteer lake monitors. If you would like to share news of a monitor's passing, please contact us.

Phil Boissonneault

Phil Boissonneault earned a degree in biology from St. Francis Xavier University in 1965. He worked at the Portland Water District for 38 years, starting as a chemist, and retired as a water quality advisor. He was also active in the Maine Water Utilities Association. Phil and his wife, Claudette, moved to Panther Pond in Raymond in 1968 and raised three sons. He enjoyed all aspects of living on a lake, including boating, water and cross-country skiing, skating, fishing, swimming and snowshoeing. He was also very active in the Panther Pond Lake Association, and later became a lake monitor and steward.

Beth Bond

Beth Bond embraced life fully. Some of her happiest times were spent on Sheepscot Lake in Palermo, where she and her husband, Mike, enjoyed 30 summers. Beth loved canoeing, and she and her sister, Lynda, would often spend joyous hours paddling on the lake or close-by rivers. Wanting to help preserve the pristine beauty of the lake, Beth joined the Sheepscot Lake Association Board. She spent countless hours monitoring the water quality of Sheepscot, officially reporting the data, and continued her advocacy to preserve the healthy lake environment.

George Bouchard

George Henry Bouchard, Jr. was a devoted husband, father, and grandfather. He grew up in Ipswich, MA, where he was active in Boy Scouts and later became an Eagle Scout, which led to his lifelong love of nature that included many trips to Pequawket Lake in Steep Falls. George studied chemistry at several universities, and later landed his dream job at Scripps Oceanographic Institute. He traveled the world on scientific research ships, visiting Antarctica several times, and discovered the Bouchard Seamount in the Pacific Ocean. He monitored Pequawket Lake for a number of years, and also served as the LSM *(then VLMP)* Regional Coordinator for York County.

Don Bushnell

Donald J. Bushnell, Jr. was an avid boater, and took great pride in earning his Master 100-ton captain's license from the U.S. Coast Guard. However, his fondest captaining responsibilities were those cruising with his closest friends and family along the British Virgin Islands, the Florida Keys, Casco Bay (Maine), Long Island Sound and North Pond (Maine), where he was also a lake monitor.

Janie Crowell

Janie Rosie Crowell grew up in Maine, spending nearly every summer of her life on Craig Pond in East Orland, where she became a lake monitor in 2003, and recorded data for well over a decade. She graduated from Ellsworth High School and the UMaine School of Animal and Veterinary Sciences. She loved the outdoors and considered sunsets, moonrises, loons on the lake, a turtle warming in the sun, an owl on a low hanging bough and the croak of frogs at Craig Pond to be daily gifts.

Susan Gammon

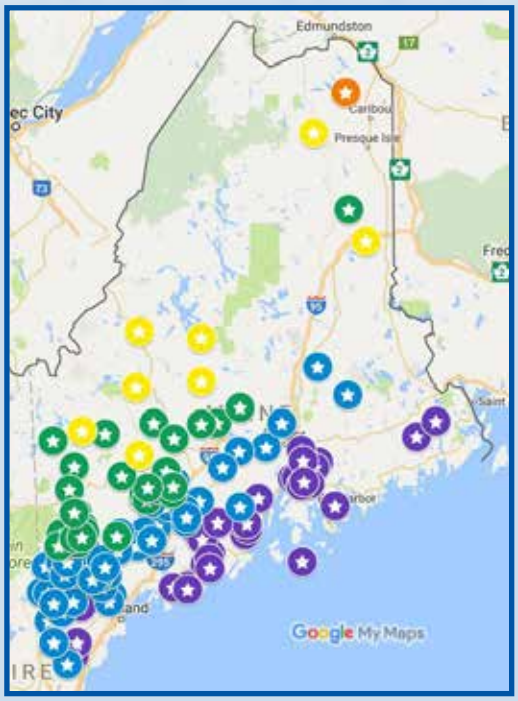
Susan R. Gammon was raised in East Livermore, and later married and moved to a farm in Canton. She received a Bachelor's Degree in Education from UMaine, and while she only taught for a short time, her true passion was working outside. She worked as a geologist for the state of Maine, and later retired from Androscoggin Valley Soil and Water Conservation District, where she received awards for her dedication to developing programs for Maine farms. Her camp on Burgess Pond in Fayette was her happy place, where she spent many hours kayaking on the lake, and was a lake monitor for several years.

Bill Watts

James William Watts, III, aged 76, was known for his deep intellect, wry sense of humor, integrity, and kindness toward others. He obtained a PhD in chemical engineering from Tulane University and had a career for 40+ years in the oil industry in Houston, TX. In 2000, Bill and his wife Beatty purchased a camp in Lakeville on Lake Sysladobsis. Summers spent on the lake became Bill's favorite time of year. He enjoyed fishing, boating, bird watching, and particularly spending time with his children and grandchildren. He was an LSM water quality monitor for 10 years.

Please Remember to Document and Report Your Lake's Ice Cover!

The winter season is upon us, so please document your lake's ice cover. LSM acts as a state repository for **ice-in** and **ice-out** records, some stretching as far back as the mid-1800's. Lake ice cover data, when paired with water quality data, may improve our understanding of the relationship between the duration of ice cover and water quality. You can report ice-in/out dates to LSM by phone at 207-783-7733, or via e-mail directly to **Christine@LakeStewardsME.org**. View a map of ice coverage data online at **https://www.lakestewardsofmaine.org/near-real-time-lake-data/**. We will be actively updating the map of reported ice-in/out dates on our website as part of the Near Real-Time Lake Data initiative. Submit ice-in/out dates, including your name, the lake's name and related town, to have your data included in the statewide map on the LSM website.



ME Lakes Water Quality... continued from page 25

footage captured by a local resident and the duration of the spill, it is likely that many more gallons reached Puffers Pond. This violation of Maine's GPA classification standard for lakes and ponds has resulted in impending DEP enforcement. Fortunately, the spill occurred late in the summer when fewer people were on the pond and water temperatures were dropping. Relocation of the sewer access will hopefully prevent this from happening again.

Highland Lake in Windham & Falmouth has experienced picocyanoplankton blooms over the last few years. Picocyanoplankton are extremely tiny phytoplankton that are difficult to see using standard microscopes; recent literature indicates that these organisms are becoming more prevalent in marine systems, presumably due to warming ocean temperatures and adequate nutrients, and may be increasing in freshwaters as well. Last year--owing in large part to the efforts of Highland Lake Association 'sparkplug', Rosie Hartzler--a monitoring plan was developed and volunteer working groups were assembled. The groups included a water quality research team, with LSM volunteer extraordinaire Keith Williams, DEP Biologists Jeff Dennis and Linda Bacon, Dr. Karen Wilson and three of her USM students, Pete Countway from Bigelow Labs, and Drs. Steve Norton and Aria Amirbahman from UM, Orono. To ensure researchers had sufficient data to properly analyze the phenomena, LSM trained an additional team of volunteers from the Highland Lake community. Analysis of the data gathered during the past several months will be taking place through the winter. Many samples were collected to ultimately characterize the food web in the lake. Fortunately (or maybe unfortunately, given the formidable team that had been assembled to capture and study the phenomena) the lake did not bloom as badly as it has in recent years, though transparencies were reduced. Come what may, there is every expectation that new insights will be gleaned from the data that *was* gathered this year, while the uniquely collaborative monitoring effort will undoubtedly continue.

Maine is truly fortunate to have so many beautiful lakes and ponds; it is luckier still, to have so many LSM-certified monitors keeping an eye on the health of our lakes! When asked for a word that best describes the work they do and why they do it, a majority of our volunteers who were polled replied "stewardship." It is this sense of 'taking responsibility for protecting something that is cherished for future generations,' that underlies LSM's citizen lake scientists' extraordinary commitment to observing and documenting the health of our lakes, year after year. ***And it is the continued growth of our lake steward family, that most gives us hope for the future of Maine lakes!*** ◔

Save the Date!
2019 LSM Annual Lake Monitoring Conference Will Be Held On Saturday, July 27th

Building & Maintenance Committee Headlines

By Steve Lambert
LSM Development Associate, Building & Maintenance Committee

The LSM Center for Citizen Lake Science experienced a major facelift this summer. After years of aspiring to improve the worn appearance of our headquarters, and months of planning and fundraising efforts, we finally had our wishes realized.

Over the course of the summer, the aged and tired siding was replaced with new red cedar clapboards, which have been stained a light gray. The arches that distinguish the structure were rebuilt, and all the trim was wrapped in white aluminum. The garage windows were replaced with energy efficient and maintenance-free vinyl counterparts. We added a storm door to the unprotected front entrance, and corrected drainage issues in back of the main building. To top it all off, a new stainless steel cap was installed on the large central chimney. The place looks beautiful, and is well-protected from the elements.

The LSM Center for Citizen Lake Science got a facelift last fall with new red-cedar clapboards.

Thanks to the ongoing passion and dedication of our volunteer lake stewards, who inspire all of us to ensure the fulfillment of our mission, we were able to find the means to make the above-mentioned facilities improvements, ensuring the long-term integrity of the historic building that houses LSM's Center for Citizen Lake Science.

Grant Funding Available to Lake Groups for Conducting Watershed Surveys

LSM anticipates a continuation of the citizen lake watershed survey small grants program to lake associations and communities in 2019. More information will be forthcoming early in the year.

Lake watershed surveys conducted by community volunteers are an effective tool for identifying and resolving land use problems that may be having a negative influence on lake water quality. Watershed surveys also increase overall public awareness about threats to lake health. Citizen surveys of lake watersheds have been successfully conducted for many Maine lakes during the past three decades. The surveys are intended to identify relatively easy-to-detect and resolve problems associated with soil erosion – a significant source of the pollutants phosphorus and sediment - to Maine's lakes. Details concerning the process of conducting a survey can be viewed at: **www.maine.gov/dep/land/watershed/materials/lakewsurveyguide.pdf**.

Citizen (volunteers) Watershed surveys are a very effective component for building community support for long-term lake protection. Bringing together individuals with diverse ecological, economic, recreational and social perspectives, has been shown to enhance long-term lake stewardship. Interested representatives from lake communities (lake associations, conservation commissions, road associations, etc.) should contact Scott Williams at LSM for additional information.

Lew Wetzel Dedication

Last July, a granite bench was dedicated to Lew Wetzel, who first discovered that the Pleasant Lake dam in Casco was leaking, and whose efforts played a significant role in the replacement of the dam. Lew has been a long-time LSM Certified Lake Monitor on the lake, as well as Director Emeritus on the LSM Board of Directors. Through the years, his outstanding commitment to many community and statewide lake conservation efforts has always been innovative. He is pictured with his wife, Mimi.

Active Retirement Living

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- Invasive aquatic species survey findings
- Active Lake Stewards throughout Maine
- Maps of all types
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- Watershed management efforts
- Published lake research documents
- Graphic representation of lake data

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