

the
WATER  **COLUMN**

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

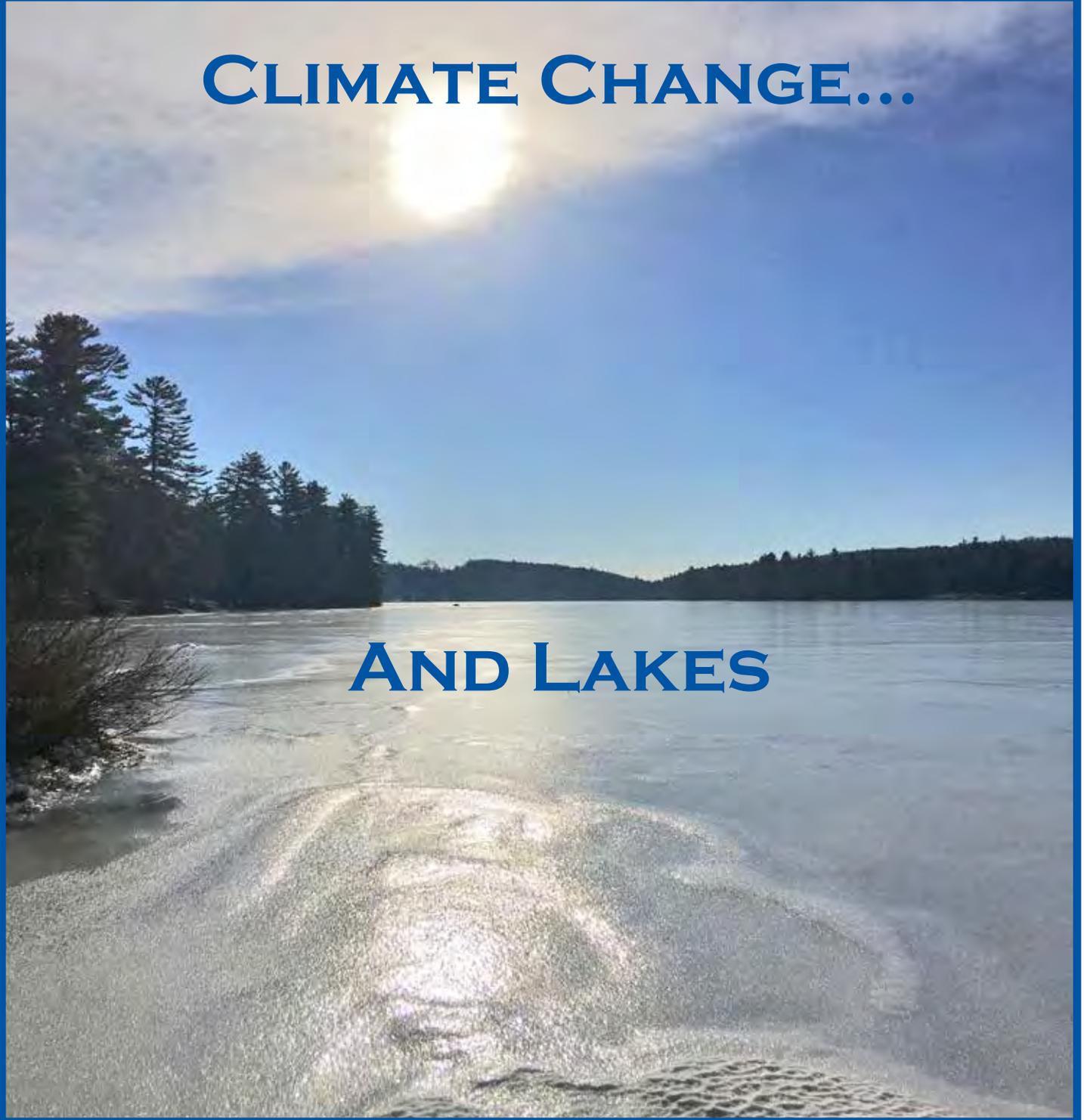
Vol. 23, No. 1

Celebrating the Work of Maine's Citizen Lake Stewards

Winter 2018-19

CLIMATE CHANGE...

AND LAKES



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Cover Photo: Long Pond in Livermore, by Jonnie Maloney
 the Water Column ©2019 Lake Stewards of Maine



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 as a 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

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.



By Scott Williams
LSM Executive Director

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.

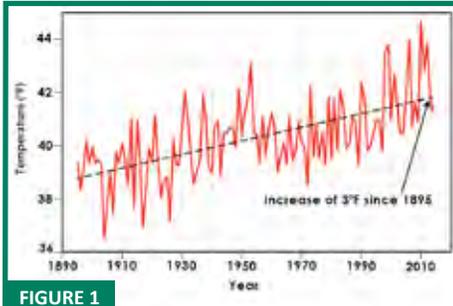


FIGURE 1

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

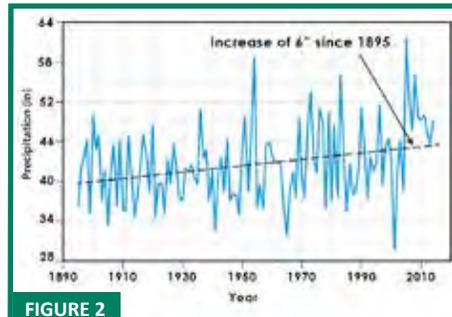


FIGURE 2

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

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.

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

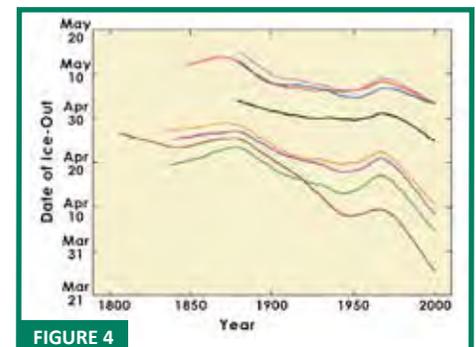


FIGURE 4

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.

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

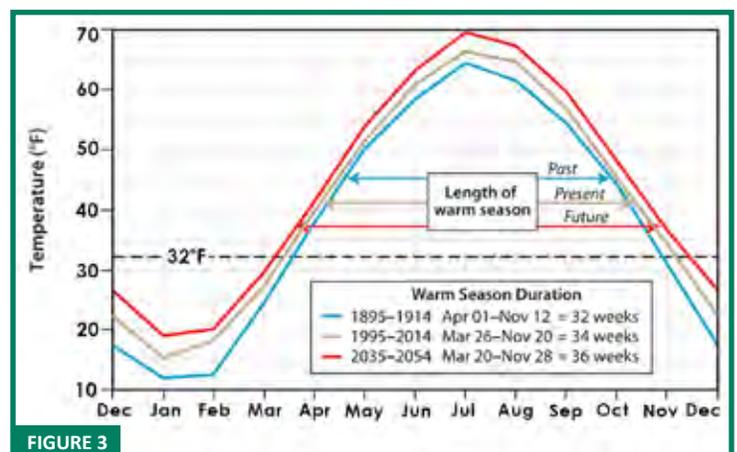


FIGURE 3

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 (*Ludwigia 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 UNH¹ 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.

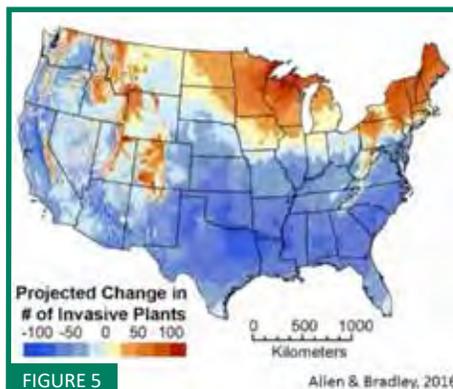


FIGURE 5 Scientists project that Maine will be a 'hot spot' for future invasive plant introductions. Plant species include both terrestrial and aquatic invaders.



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

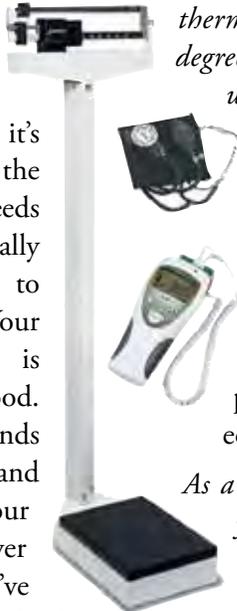
QUALITY COUNTS!

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



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

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 given 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 recertifications, 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

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!



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.

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.

Under the Hand Lens:



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



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.

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

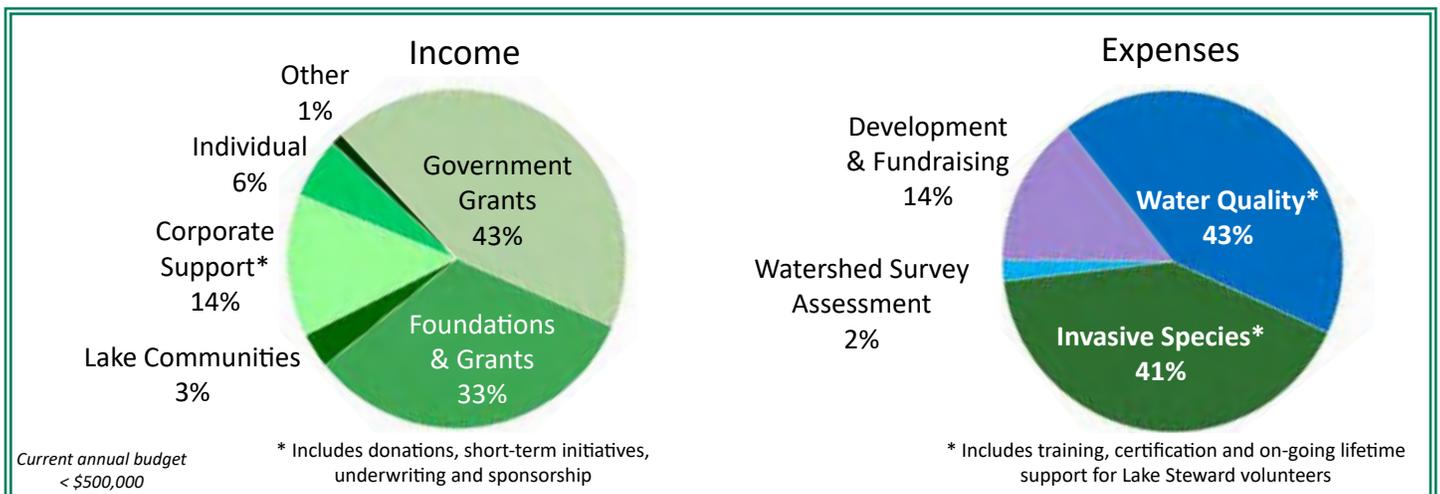
through a *Community Guardian Angel*. With a goal of \$50,000, Board members, individuals and lake associations have already contributed over \$33,000 to the *Community Guardian Angel*!

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



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:



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

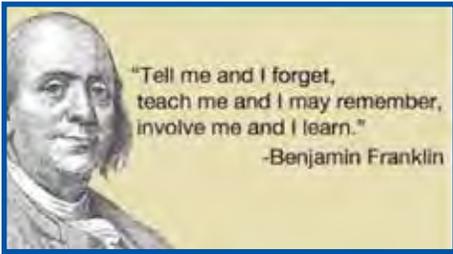


If you are an individual or business who is interested in discovering opportunities for supporting *Lake Stewards of Maine*, please contact Alison. She is always looking for a good reason to go out for coffee! ☘
alison@LakeStewardsME.org
 (207)783-7733

Did You Know?

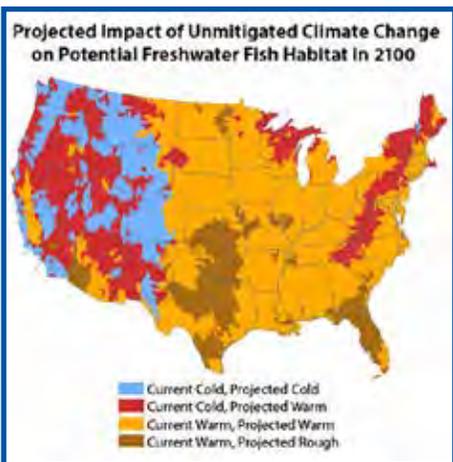
- LSM's workshops, basic monitoring equipment and on-going technical support are provided free-of-charge to the public, giving everyone who is interested the opportunity to learn about lake science.
- The valuable data collected by LSM volunteers is scientifically credible. The historical body of data--gathered 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!* ☘

Rising to the Growing Challenges Facing Maine's Lakes



The Challenges

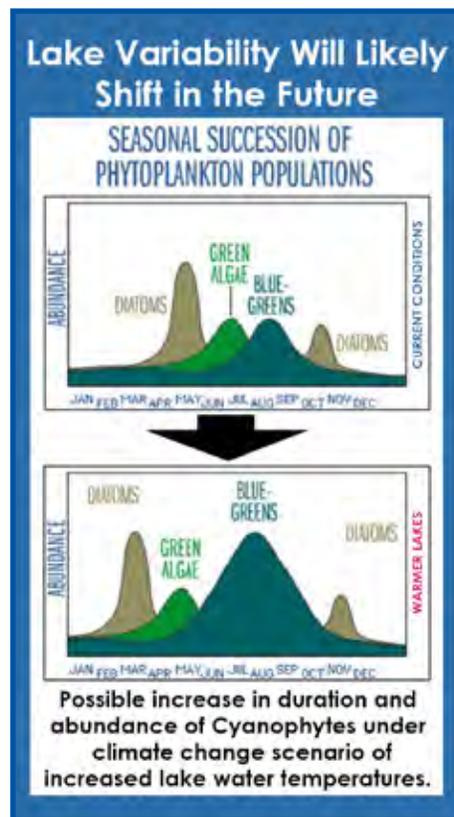
Maine's lakes face an increasing and unprecedented number of threats and challenges, ranging from the introduction and detection of invasive aquatic species, to nutrient enrichment (primarily phosphorus) in runoff from watershed development, and an increase in the occurrence of harmful algal blooms (HAB's). 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



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

lake water over a relatively short period of time.

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!

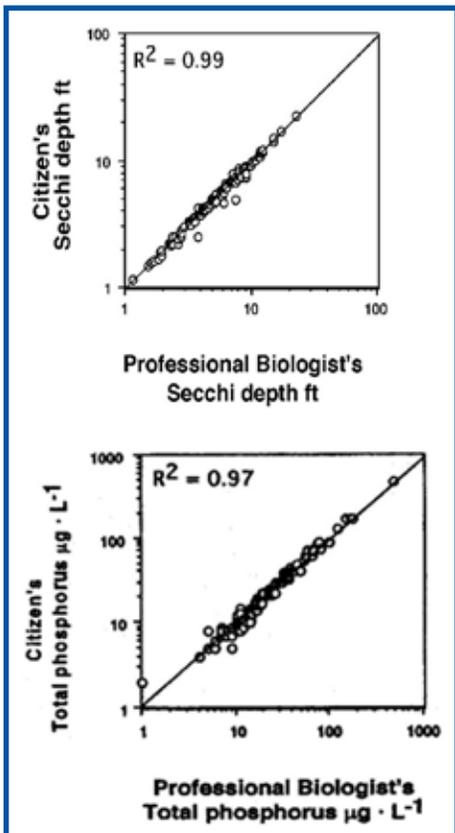
LSM volunteers have been at the national forefront of the citizen lake science movement since 1971! During the past half century, volunteer lake monitors have monitored the health of hundreds of lakes throughout the state of Maine, generating an enormous volume of scientifically-credible information 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



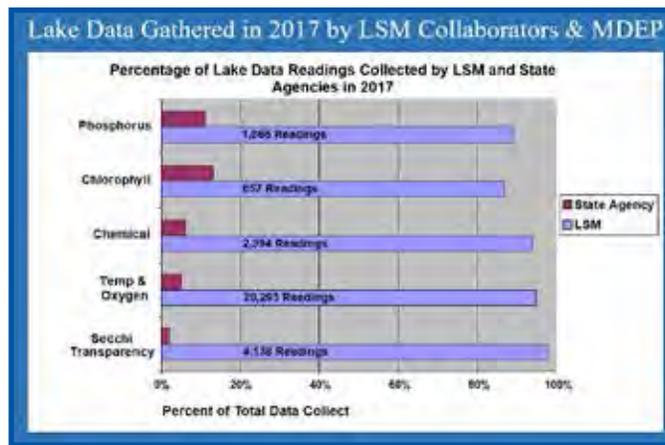
Assurance (QA) is achieved through a comprehensive, high-level process that assures all users of volunteer data that the information is credible, and is on-par with similar data gathered by professional lake scientists. (For more on LSMs Quality Assurance Project Plan, please see *Quality Counts* on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



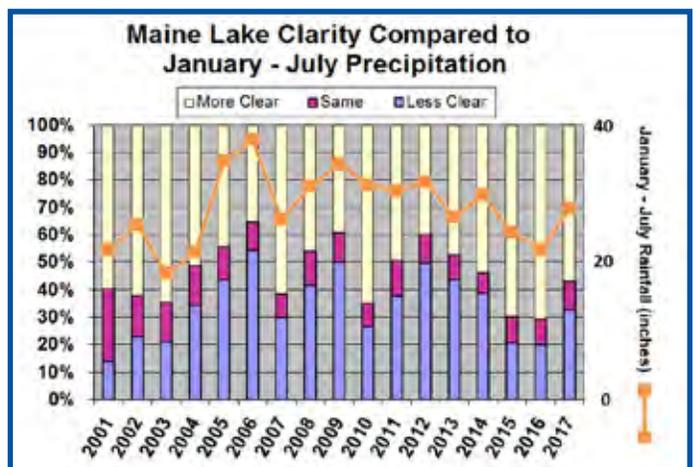
Secchi readings taken throughout the summer season (May through September, or longer) provide a very good overall picture of both seasonal and annual changes in lake water quality, and these readings will likely provide the first indication of climate-induced change for many lakes. The historical water 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:
 Drier 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 occurrence of this plant in Maine. European frog-bit grows best in shallow, slow-moving water



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

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.

"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



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

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, Nicaous (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. 🌿



(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 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.*



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.*

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. 🌿

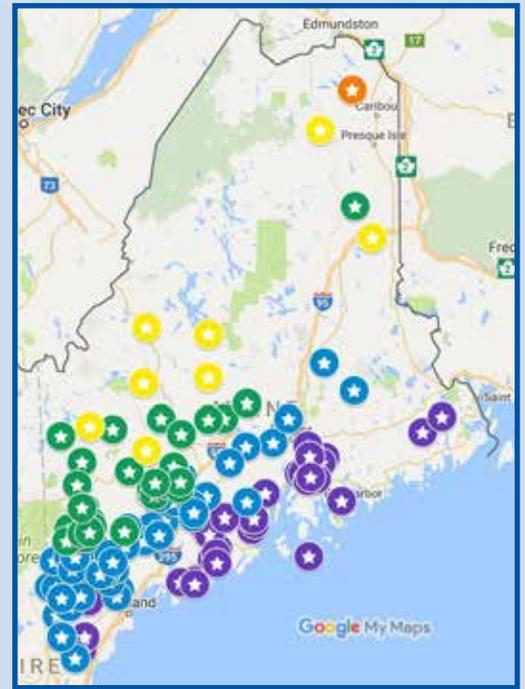
Notes from the Front Lines... continued on page 29

SAVE THE DATE!

2019 LSM ANNUAL LAKE MONITORING CONFERENCE WILL TAKE PLACE ON SATURDAY, JULY 27TH

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



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

installed on the large central chimney. The place looks beautiful, and is well-protected from the elements.

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. 🌐

