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For The Sake of Maine's Lakes

Fall 2020 Volume 49

Maine Lakes:

A Brief and Incomplete History (Part I)

Just this last month, Maine Lakes turned 50. While it wasn't the anniversary year we wanted it to be (really, was it the year anyone wanted it to be?) and our plans to celebrate at our Maine Lakes Conference in June were scuttled by COVID, we hope to manage some kind of in-person celebration of our "50+1" anniversary in 2021. As part of our celebration, we present here a brief (and incomplete) history of Maine lake conservation, how far we've come, and a little bit about Maine Lakes' role in moving key lake protection issues and actions forward. Look for Part II in our next issue.

The Original Lake Stewards

Imagine Maine's landscape 15,000 years ago, covered in a sheet of ice more than two miles thick. As it melted, this slow-moving glacial ice changed the landscape, scraping over our renowned mountains and further shaping many of the more than 6,000 lakes across the state. The earliest stewards of this landscape and these lakes were the people of the Maliseet, Micmac, Penobscot, and Passamaquoddy tribes. They depended upon fish, plants, and wildlife from both coastal and inland waters for their physical, cultural, and spiritual survival. We owe a huge gratitude of debt and thanks for their role in actively protecting these resources from earliest times through today and into the future.

The Role of Sportsmen (and Women)

In the first part of the last century, the unique and world-class fisheries found in Maine's clear, clean lakes helped build an angling industry that still thrives today. The Maine legislature long ago recognized the need to foster the stewardship of game species by passing a bill in 1897 requiring fishing and hunting guides to register with the state. They registered more than 1,300 guides that first year, with the first one being a woman, Cornelia "Fly Rod" Crosby, a skilled fly fisherman from Rangeley. Today, there are more than 6,300 registered Maine Guides still fostering stewardship of fish and wildlife resources with their clients across the state. Guides and anglers have long recognized the value of conserving and protecting lake waters and lake habitat in order to sustain fisheries for future generations. The passage of the Sport Fish Restoration Act (also known as the Dingell-Johnson Act) in 1950 created a system that generates revenue by adding excise taxes on sport fishing equipment. Funds are used to support conservation and restoration, boating safety programs, and fish and habitat restoration projects. Maine's Department of Inland Fisheries and Wildlife typically receives around $3 million annually from this fund. And Maine's lakes and fisheries have reaped great benefits.

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A postcard showing Cornelia "Fly Rod" Crosby (1854-1946). Cornelia was issued the first Maine Guides license in 1897, and spent an illustrious career in journalism, marketing Maine's clean water, healthy fisheries, and outdoor recreation opportunities (newenglandhistoricalsociety.com).

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Maine Lakes Forms Environmental Justice Committee

By Steven Mogul, Committee Chair

The Maine Lakes Statement on Racism and Equality was adopted in July. In it, we acknowledge and condemn racism in any form, and pledge to do what we can to eliminate the impacts of systemic racism. As advocates for healthy watersheds for *ALL* residents of Maine, our work is tied directly to the environmental justice movement, which supports and embraces racial justice. Please read the full statement at www.lakes.me.

Rather than merely state our concern, offer our support, and declare our beliefs, we felt it was important to commit to concrete action, so the conclusion of the statement creates an Environmental Justice Committee as standing committee of the board. For being outspoken at the meeting in which the Statement was adopted, I was appointed to chair the new Environmental Justice Committee.

Although Environmental Justice may seem to be an offshoot of the Black Lives Matter movement, which was brought back to the forefront of our attention after the murder of George Floyd, it is a subject that predated that catalytic event. It includes issues of siting locations of toxic waste depositories and industrial development in poorer communities, limited access to recreational opportunities, disproportionate impact of pollution on indigenous communities and communities of color, as well as issues relating to the sovereignty and interests of indigenous people.

The Environmental Justice Committee was formed not only to fulfill the promise in our racism and equity statement, but to explore ways in which Maine Lakes can marshal its substantial resources and collective knowledge at the crossroads of lake conservation and justice for historically under-served populations. At its first meeting, the Environmental Justice Committee considered a number of objectives, including:

- Improving access to water-based recreational opportunities for under-served populations, including access to swimming instruction
- Collaborating with indigenous communities and communities of color on outreach regarding the value of clean Maine lakes
- Utilizing our expertise in watershed protection to support other organizations that are promoting racial justice
- Providing opportunities to educate our own members and board on racial and environmental justice issues.

The Committee is not interested in becoming a think tank. We want to be a committee of action. We don't want to simply talk the talk. We intend to walk the walk. Look for more updates on the committee's work in future issues.

President's Message

What a year this has been!

As we celebrate 50 years of supporting Lake Associations and lake conservation, we have seen incredible changes to our lives resulting from COVID - which continues to drive how we communicate and advocate for lakes.

Our annual meeting was held virtually in June with a series of online webinars over several weeks with outstanding speakers. Many of our members and others interested in lake stewardship – 878 viewers – participated in these webinars , many more than at any of our in-person conference in our 50-year history. We missed the social aspect to an annual meeting, but the technical sharing was superb.

There has been an unprecedented turnover in lake property ownership over the past several months. The volunteerism and engagement of lake stewardship over the past 50 years (in our organization and in our peer organizations) has created an attractive and healthy environment that has increased the demand for lake front properties. COVID concerns and the "new normal" of remote workstations has driven a robust market and appreciation for what we have in our daily lives here in Maine. The turnover in ownership is both an opportunity to welcome new owners and a challenge in the battle to ensure healthy lake environments continue for our children and grandchildren.

The Maine Lakes Board of Directors is strong and diverse, both geographically and by background/ experience. This year, the Board has committed to inculcating environmental justice, ensuring that all voices are respected and encouraged in our education, advocacy, and action agendas.

There will be numerous challenges for Maine Lakes over the next year, as funding from foundations and grant makers is reduced due to COVID and state budget shortfalls put our LakeSmart funding at risk. It is a challenge we need to embrace and plan for, so we can continue the strong and committed dedication to environmental lake stewardship that has been the hallmark of Maine Lakes for the last 50 years. Now more than ever, we need to leverage the passion of our members, both as volunteers and as financial supporters. We thank you in advance for your support!

Dick Tinsman, President

Notes from the Executive Director

Who doesn't want to be done with the year 2020? It's easy to be discouraged, especially when the holidays are coming, when we are missing grandbabies and parents and siblings, and when the 18-pound turkey in our fridge looks like it's going to feed us from now until the New Year. But as I said in our recent appeal letter (which hopefully all of you received), I am trying to remember all the opportunities that this unprecedented COVID time has brought.

For me personally, it gave me unexpected time with my teenagers, whose usual busy social and work lives spent mostly out of the house came to a grinding halt in March. It was a pleasure to have their company and they kept me entertained, centered, and sane.

For my work life at Maine Lakes, the opportunities came in the form of expanding our horizons with new tools and technologies. Our conference, in a virtual format of "Wednesday Webinars" reached hundreds of viewers from across the country. New collaborative software has helped our small staff feel connected and productive from our remote offices. Our switch to virtual trainings for LakeSmart helped keep the program going, after initially thinking that we'd have to abandon our LakeSmart programming altogether in 2020. Our lake education program had to be on hiatus, giving us the opportunity to work with partners and explore ways to re-envision Lakes Alive! as a program that reaches more students in more places across the state.

We are planning for many more opportunities in 2021. There are new audiences to reach — new camp owners, new camp renters, new boat owners — who will play an important role in protecting our lakes and ponds in the future. Connecting with new audiences, working on Environmental Justice issues, and building our programs will give us more than enough work in the year ahead. We hope to count on your continued support. Happy Holidays, and best wishes for a happy, healthy 2021!

Susan Gallo, Executive Director

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Some Dark Decades

In the 50s and 60s, degradation of lake and river resources was rampant across the county. In a booming post-World War II era, industrial expansion and newfound affluence changed the landscape of Maine's lakes. The market for summer camps boomed, and a building frenzy created many of the camps we all know and love today. Unfortunately, little or no regulation guided their construction, and we lacked knowledge about the future risks that even these usually small buildings located close to the water's edge would pose to water quality. Effluent into Maine's freshwater bodies and rivers was widespread, and polluted rivers and fishkill events became much too commonplace. Maine's tradition of massive log drives had degraded fish habitat in many of our largest rivers for more than a century, with repercussions for fishery health and sustainability in lakes connected to these historic drives. It was time for a change.

Three men take water samples on a curve of the Cuyahoga River in Ohio, which caught fire over a dozen times in the late 1960s (Alfred Eisenstaedt/The LIFE Picture Collection/ Getty Images).

A Reckoning

The first Earth Day was on April 22, 1970 and changes were on the way to protect Maine's lakes. In October of 1970, a group of passionate founders concerned with the health of Maine's lakes incorporated the first state-wide non-profit with a sole focus on lake conservation. The Maine Congress of Lake Associations (COLA) had an ambitious mission to preserve the "aesthetic, recreational and commercial value of freshwater lakeshore properties" and focused on a wide range of environmental issues including watershed ecology, water quality risks, lake water levels, shoreline woodland management, agricultural soils practices, recreational and residential building standards, and water and boating safety education. This was a heady time for clean water across the nation. The Environmental Protection Agency was about to be created, followed shortly by the Clean Air Act. The Maine Department of Environmental Protection (DEP) was just two years away from its birth, as was the landmark Clean Water Act. People were dismayed by dirty water and pollution, and they were ready to act. Maine COLA was there in those early days to capture the enthusiasm and energy of people looking to solve problems, clean up lakes, create new laws protective of lakes and water quality, and improve the future of Maine's clean lakes with sound, progressive environmental policies. Maine COLA helped grow a community of lake associations that now numbers almost 200 in the state. These lake associations mobilize members to protect lake water quality, support outreach to local schools, maintain boat inspection programs in their communities, run LakeSmart programs for shoreland homeowners, and support sound lake protection policies both in their local communities and in Augusta. Maine Lakes owes its early success entirely to its partnership with these terrific lake associations and their tireless efforts to protect lake and water quality.

Spring pulpwood drive on the Brown Company timber holdings in Maine, feeding logs through the sluice at Long Pond. Drives like these continued in Maine until 1968, with the last log drive down the Kennebec River (credit: picryl.com).

A New Era of Lake Protection

The 1970s ushered in a windfall of laws and regulations that helped protect the future of Maine's clean, clear lakes. And Maine COLA was there to help shepherd them through the legislature, providing resources to legislators and grassroots activists to testify in Augusta, an advocacy program that remains a high priority for the organization today.

Waiting for lakes and rivers to significantly degrade, and then spending countless dollars to bring them back to their former glory was not an effective long-term solution. The mindset for regulators started shifting to proactive protection, a much more cost-effective and sustainable solution for protecting our freshwater resources. Maine's landmark Shoreland Zoning laws was a first step in this direction. Created in 1971, and amended many times since, Maine's Shoreland Zoning laws were a model for other states in proactively protecting water resources by planning development in a way that minimized risks to water quality. The Clean Water Act created water quality standards and reduced effluent into rivers and lakes, important steps to protect Maine's water quality (see box FMI). As of the mid-1980s, discharge into all Maine lakes had ceased, and all Great Ponds (lakes over 10 acres in size, including 30 lakes originally on the "dirty thirty" list) were deemed to meet the Class A standards set by the Maine legislature which means they are "suitable for the designated uses of drinking water after disinfection, recreation in and on the water, fishing, agriculture, industrial process and cooling water supply, hydroelectric power generation, navigation and as habitat for fish and other aquatic life."

The Volunteer Lake Monitoring Program was created by the legislature in 1971 for the purpose of training volunteers to monitor lake water quality. Now one of the flagship programs of the Lake Stewards of Maine, which also proactively monitors invasive plants, the volunteer monitoring program is the oldest lake-monitoring program in the U.S. Expansion of lake protection efforts were being made outside the legislature as well. Lakes Environmental Association was incorporated in 1970 and continues to work regionally in the greater Bridgton area on a wide range of water quality, land protection, and environmental education issues, including overseeing the statewide courtesy boat inspection program. Today, along with lake associations, there are many other organizations working on water quality, lake education, and lake conservation around the state, including 7 Lakes Alliance (Belgrade), Midcoast Conservancy (Edgecomb), Friends of the Cobbosee Watershed (Winthrop), the Acton-Wakefield Watershed Alliance (Acton), 30-Mile River Watershed Association (Farmington), and Coastal Rivers Conservation Trust (Damariscotta). Together with the Maine DEP, lake associations, town officials, local planning boards, and local soil and water conservation districts, these groups and Maine Lakes form a formidable, multi-faceted collaborative team working together to protect lakes and ponds from degradation across the state.

The Long Evolution of the Clean Water Act

"Our planet is beset with a cancer which threatens our very existence and which will not respond to the kind of treatment that has been prescribed in the past. The cancer of water pollution was engendered by our abuse of our lakes, streams, rivers, and oceans; it has thrived on our half-hearted attempts to control it; and like any other disease, it can kill us." -Senator Edmund Muskie, 1972

The Clean Water Act of 1972 has deep Maine roots. As Governor from 1955 to 1959, Edmund Muskie recognized the connection between our economy and our natural resources. He identified water quality improvements as a component of an economic development plan, since improved environmental conditions would attract new businesses to the state. Muskie created a Water Improvement Commission to work on classification standards for Maine's freshwater rivers and lakes, but industries' undue influence on water quality legislation stalled their work.

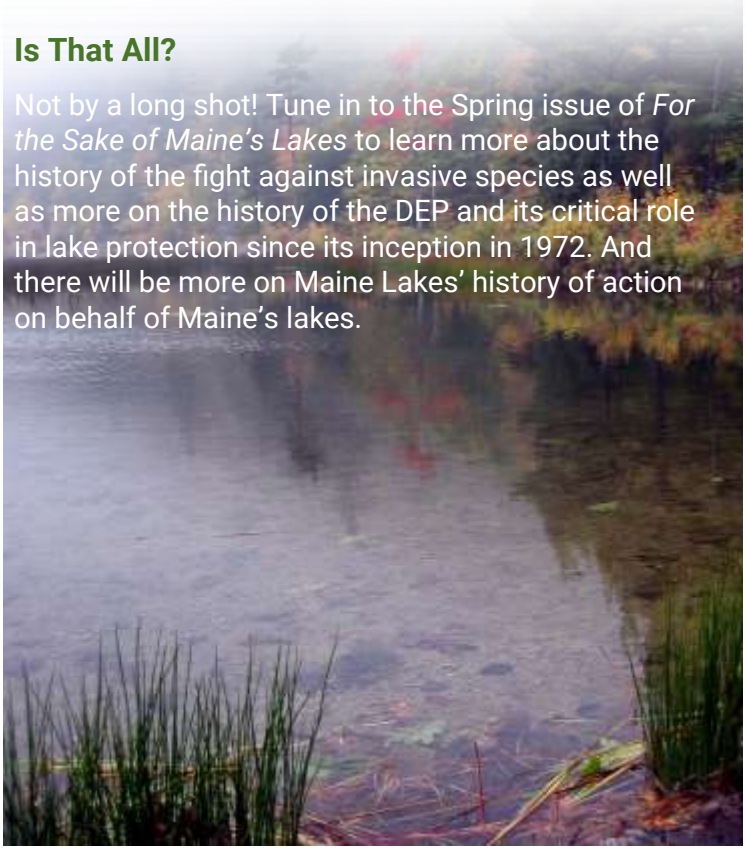
Muskie became a U.S. Senator in 1959, serving on the Public Works Committee and as chair of the subcommittee on Air and Water Pollution. Senator Muskie worked tirelessly throughout the 1960s, submitting multiple unsuccessful bills as he refined what would eventually become The Clean Water Act. He focused on compliance rather than enforcement, and one of his primary goals was the creation of federal water quality standards for interstate waters. After more than 10 years, Muskie introduced the Clean Water Act on October 28, 1971. The bill then spent 10 months in conference, with a final vote of 366 to 11 in the House and unanimous passage in the Senate. Despite his own administration urging him to sign the bill, Nixon vetoed the bill. Just two hours later that veto was overridden overwhelmingly (and with bipartisan support) in both the house and senate. While the Clean Water Act remains a vital tool for lake and river protection, constant vigilance is needed. Maine Lakes helped mobilize grassroots advocacy during the 2019 "Dirty Water Rule", which unfortunately passed despite overwhelming opposition from the public and from scientists and water quality experts. There will always be more work to be done to keep landmark legislation like the Clean Water Act strong, and Maine Lakes and our grassroots activists will be here to act. FMI, see Take Action on p. 15. *(Edited from DEP/ARC GIS story map: Maine: 50 Years of Water Quality Restoration and Protection. See link at www.lakes.me.)*

Maine Lakes Today

It's not just our name that has changed - from Maine COLA to Maine Lakes Society to Maine Lakes – our mission has also expanded. Merging with the Maine Lakes Conservancy Institute in 2013 brought us Lakes Alive! and our on-boat education programming, currently under review and hopefully emerging in 2021 as a program with a greater geographic and more equitable reach. Changes at DEP helped us take on the LakeSmart program, which perfectly aligned with our focus on lake associations and the reduction of phosphorus and other pollutants. LakeSmart has reached more than 1,200 landowners to date, and is poised to grow by leaps and bounds in the coming decade as more regional partners come on board and more trained LakeSmart evaluators amplify and spread the message of LakeSmart living. The new edition of our *Lake Book* is due out in January, and will include more information in a new format that will help get the word out about lake conservation. Our Advocacy efforts continue to make a big difference in Augusta, with compelling testimony from our members helping drive lake-friendly legislation year after year. This coming session will be no exception. We look forward to another 50 years of working to protect Maine's lakes and ponds, to partnering with our many collaborators, and to supporting more lake associations across the state as we work to protect these gems for all future generations.

Is That All?

Not by a long shot! Tune in to the Spring issue of *For the Sake of Maine's Lakes* to learn more about the history of the fight against invasive species as well as more on the history of the DEP and its critical role in lake protection since its inception in 1972. And there will be more on Maine Lakes' history of action on behalf of Maine's lakes.



Maine's Landmark Shoreland Zoning Act

A Success Story

Maine's Mandatory Shoreland Zoning Law was first enacted in 1971 in response to increasing development pressure along lakes and rivers. The legislature concluded that strict regulation of land-use activities was necessary in the shoreland zone to protect water resources, including among other things pollution prevention, wildlife habitat, fish spawning grounds, aesthetic value, open space, and shore cover. Through the years, the law has been strengthened and amended in response to environmental and citizen concerns. Citizen planning boards, local officials, and legislators have all shaped and honed the law over the last 40 years.

And we know the law has worked. A 2013 study[1] by the Vermont Department of Environmental Conservation (in cooperation with the Maine DEP) compared water quality in Maine, where strong long-term shoreland zoning standards have been in place, to Vermont, where initial shoreland zoning laws were repealed in 1975. The study compared water quality data from lakeshore sites in the two states, and showed that the kind of development allowed on Vermont lakes was degrading aquatic habitat and biota, while the kind of development allowed on Maine lakes was protective of both. Maine's residents and visitors benefit enormously from clean, clear lakes and streams; a healthy fishery; tree-lined shores; and an economy fueled by healthy water resources. Today, Maine's shoreland zoning law is recognized as a national model of responsible environmental regulation. Clearly, shoreland zoning makes sense to Mainers. While it will no doubt continue to be fine-tuned, the original intent of the law is just as valid today as it was four decades ago.

Edited from the Introduction to "Maine Shoreland Zoning: A Handbook for Shoreland Owners" published by the Maine DEP.

[1] Determining if Maine's Mandatory Shoreland Zoning Act Standards are Effective at Protecting Aquatic Habitat. 2013. Kellie Merrell, Jeremy Deeds and Mark Mitchell (Vermont Department of Environmental Conservation) and Roy Bouchard (Maine Department of Environmental Protection). https://dec.vermont.gov/sites/dec/files/wsm/lakes/Lakewise/docs/_mainezoning.pdf.

Welcoming Keoka Lake:

Developing a LakeSmart program in the time of COVID

Resilience is the ability to withstand or quickly recover from disturbances: more resilient systems are able to absorb larger shocks without changing in fundamental ways, while less resilient systems are much more vulnerable to collapse. Imagine a forest that thrives after a windstorm knocks down larger trees, giving the smaller ones room to grow. Like a forest, the LakeSmart program is a highly complex system. Lake association volunteers are its center, and many other organizations help keep it functioning at a high level. **How resilient would this system be in the face of unprecedented change?**

Turns out, VERY. Thanks to accessible, reliable technology (hooray for Zoom!) and passionate, adaptable volunteers, we were able to keep the LakeSmart program alive and thriving. One of the highlights of 2020 was the development of our online training program. Maine Lakes collaborated with Lakes Environmental Association (LEA) to train new Evaluators in an entirely new way. With the help of a dedicated and experienced Coordinator, and an enthusiastic team of volunteers, we were able to successfully create a LakeSmart team for Keoka Lake! Here's are some things they had to say about the experience:

Ginger Eaton, Keoka Lake Volunteer: For me, and probably you…there were lots of much-anticipated events and family traditions that had to be outright cancelled! We were, of course, deeply grateful to all be healthy and still able to spend our summer months in Maine on our beloved Keoka Lake. As a second-generation board member of Keoka Lake Association (KLA), I would normally be running our annual summer educational event. COVID put a stop to that, so instead I trained to become a Lake Smart Evaluator!

I was part of the first-ever fully remote group that, under the leadership of Roy Lambert (working from Oregon), gained access to the tremendously researched curriculum on watershed lake sustainability. I was thrilled to be part of a team of three representing KLA that included myself, Doss Hasson and Priscilla Treadwell. The experience truly changed us and informed our knowledge far more than anticipated. Our Team went on to assist three Keoka Lake landowners to each earn a Lake Smart Award by the end of August 2020.

I genuinely ask to any of us who consider ourselves to be *"stewards of our beautiful lakes"* to please learn more about Maine Lakes and Lake Smart!

Ginger Eaton, a newly trained evaluator on Keoka Lake, assists with construction of a plunge pool to slow down runoff on a LakeSmart property.

Roy Lambert, Lakes Environmental Association/ LakeSmart Volunteer: What's a LakeSmart coordinator to do when he can't travel safely to Maine? I'd never contemplated that possibility until COVID kept me in Oregon this summer season. I am LEA's LakeSmart coordinator and I also chair the LakeSmart Committee for Maine Lakes - the program sponsor - and teach new evaluators. How much could I do from Oregon?

It turns out, a lot. With the wonders of Zoom and screen-sharing, teaching new evaluators the lake-friendly practices that reduce storm water runoff into the lake (with its phosphorus load) is almost as easy as being there. The challenge is coupling that "book" knowledge with the practical experience that comes from walking a myriad shorefront properties. But even this challenge can be addressed with modern communications and willing evaluators. Copious photos of problematic property features facilitated feedback and discussion. The discussion resulted in deeper understanding of where LakeSmart lines are drawn.

Keoka Lake, Trickey Pond, LEA, and Maine Lakes are lucky to have new LakeSmart evaluators this year. LEA is lucky because the evaluators who originally thought of themselves as benefitting their "home" lakes have proved to be a potent force for LakeSmart even on other area lakes. Now that's what regional coordination looks like!

Meet Board Member Jasmine Saros

Reprinted with permission from a recent UMaine blog by Marcus Wolf.

Jasmine Saros, who joined the Maine Lakes board this past June, leads research into how warmer winters affect toxic blue-green algal blooms in Maine's lakes

Toxic blooms of blue-green algae have infested lakes across Maine and the U.S. at greater frequency over the years. The associate director of the Climate Change Institute seeks to understand the role global warming plays in their incidence.

Dr. Saros will lead a team of researchers from UMaine and other institutions in studying how warmer winters affect the presence of these summertime toxic algae accumulations, known as cyanobacterial harmful algal blooms (cyanoHABs), in Maine lakes over the past 125 years. Michael Kinnison, Maine Center for Genetics in the Environment, Peter Countway from the Bigelow Laboratory for Ocean Sciences, Denise Bruesewitz from Colby College, and Charlie Culbertson from the USGS New England Water Science Center will work with Saros on the project.

The study, funded by a $249,432 grant from USGS, will focus on how rising temperatures in the winter months have influenced the prevalence of Gloeotrichia. The toxin producing, bloom-forming species serves as the primary cyanoHAB of concern in lakes with low or medium levels of nutrients. It also produces microcystin-LR, the most prevalent and harmful cyanobacterial toxin in Maine and the Northeast.

Information from Saros and her colleagues' research could enhance warning systems for summer cyanoHABs and help government officials and nonprofit lake management agencies prepare for them based on conditions from prior winters.

"The ecological factors that promote formation of cyanoHABs are poorly understood, and large uncertainty remains about how climate interacts with other drivers to shape cyanoHABs," says Saros, also a professor of paleolimnology and lake ecology in the UMaine School of Biology and Ecology. "The long-term perspective provided by the fossil record in lake sediments will help us to understand the role of climate in driving these blooms."

Winter has become the fastest changing season in Maine, with the warming rate twice that of summer. With past studies finding a link between cyanobacterial summer blooms and winter conditions, and the presence of Gloeotrichia increasing in low-nutrient lakes in the Northeast, the question of how warming winters influence the frequency of these blooms has come to the forefront.

Saros and her team will confirm the forces that drive the uptick in cyanoHABs over the past century by harvesting, dating and analyzing sediment cores from 12 lakes varying in nutrient concentrations and climate zones. They will inspect the cores for algal pigments, sedimentary DNA (sedDNA) and sediment chemistry. By conducting multiple analyses on the sediment cores and using climate data and land use records, the group will ascertain how the interaction between nutrient composition and temperature affect the frequency of cyanoHABs, and how increasing temperatures during winters have influenced their presence. Researchers also hope to learn how the effects of warming winters relate to cyanobacterial diversity and cyanoHAB dominance overtime.

The study will support ongoing research conducted through the Maine-eDNA program facilitated by Maine EPSCoR (Established Program to Stimulate Competitive Research). The team will recruit a UMaine Ph.D. student to conduct pigment and metabarcoding analyses of sediment cores, and two undergraduate students from Colby College to help perform sediment coring and chemical analyses and present team findings at conferences.

The USGS allocated the funding for the project as part of the national Water Resources Research Institute (WRRI) Grant Program. The Senator George J. Mitchell Center for Sustainability Solutions houses Maine's congressionally authorized water institute and receives the base funding from the national- and state-level WRRI grant funding programs.

"We're excited about this project because it will advance understanding of this important issue by using new tools developed through Maine-eDNA and by continuing strong partnerships with Maine DEP (Department of Environmental Protection), the Portland Water District and Lakes Environmental Association with help from USGS funding," Saros says.

Wake Boat Study

By Dr. Danielle Wain, 7 Lakes Alliance

A wake boat study was initiated this past summer in response to concern from the East Pond Association that wake boats might impact the longevity of the 2018 alum treatment. There are two possible ways this may occur: direct disturbance of the treated sediment beneath the boat and disturbance of shallower untreated sediments followed by lateral sediment transport leading to burial of treated sediments. In August 2019, with the assistance of Camp Manitou, an experiment was designed to test the depth of penetration of the wakes to determine the likelihood of these mechanisms.

To measure the boat wakes, a 1-MHz pulse-coherent acoustic Doppler current profiler (ADCP) was placed by divers on the bottom of the lake at the deepest point. Additionally, two sediment traps were deployed for two months, one at the deep hole and another at 16' depth, to measure the deposition of sediments in the lake to get an estimate of how much sediment is resuspended and/or transported over the summer.

Camp Manitou ran the same boat configured in three ways over the ADCP: surfing (10 mph, full ballast, wake plate), extreme wakeboarding (20 mph, full ballast, no wake plate), and water skiing (30 mph, no ballast, no wake plate). Three passes in each configuration were made, each separated by 10 minutes. We observed that when the boat is configured for surfing, the wake penetrates approximately 7'. When the boat is configured for extreme wakeboarding, the wake penetrates approximately 3'. Not surprisingly, the use of the wake plate seems to be the key difference in how deep the wake penetrates.

So what does this mean for water quality? In summer 2019, we saw continued improvement in water clarity and phosphorus concentrations compared with conditions pre-alum treatment. But there was a moderate increase in both in late July and early August (although still much better than pre-alum treatment!)

We did not observe anoxia in the lake until early August, indicating that the increase in phosphorus (and subsequent decrease in Secchi depth) was not likely to be due to internal loading from the sediments. Even if anoxia were present, the alum in the sediment would prevent such release. Analysis of other elements present in the water column confirms this. Aluminum does not dissolve from sediments under anoxic conditions (which is why it is used as a phosphorus binder). Thus, an increase in aluminum in the water column (as observed) must be due to a different mechanism, likely sediment transport from other regions of the lake. While sediment transport can be due to wind and wave action, the increase in aluminum coincides with peak boating activity in the lake of all types.

In summary, regular boat wakes penetrate down to about 3' and wake boats are about twice that (7'), which is not deep enough to directly disturb the alum treatment. That doesn't preclude disturbing shallower untreated sediments (if boats go in water less than 7'), which can be suspended and redeposited on top of treated sediments. To avoid disturbing sediments underneath the boat, wake boats should be operated in water that is >10', much of the lake in East Pond.

We would like to thank Steve Henderson at Washington State University for loaning of the ADCP, Sharon Mann for deploying the instrument frame, and Pete Hansen from Camp Manitou for coordinating the wake boat. Originally printed in the East Pond Association Newsletter.

While social media can certainly get you down at times, other times it can warm your heart. I found this gorgeous photo on a Facebook group called Maine Wildlife, a treasure trove of interesting observations, quick snapshots of wildlife and truly beautiful works of art, like the image captured here by Michael Sevon in mid-October at (surprise!) Deer Meadow Pond. The beauty of the reflection and the colors along the shore are just stunning. I was so pleased he allowed us to share it here. If you would like a print, please reach out to Michael at sevonemail@gmail.com. Thank you, Michael, for capturing this stunning scene!

Swimming Maine's Lakes

Maine Lakes got an interesting message this summer from a woman looking to connect with us about her goal to swim every lake in Maine. That caught our attention and we were excited to learn more about this unique adventure.

Ali Simons has always been a swimmer. Growing up in Winslow, she competed for Winslow High School, specializing in long-distance and butterfly. Her dad Phil, the fire captain in Waterville for 29 years, was her biggest fan and would tell anyone who would listen how proud he was to watch her compete. As an adult, Ali grew restless of the confines of the pool. Open-water ocean swimming didn't have great appeal and that appeal has diminished significantly with reported great white shark sightings (and a deadly attack) this past summer. She spent lots of time with friends as a kid on East Pond, where her love of lakes, and lake swimming, was realized at an early age and seemed a perfect fit for her long-term swimming goals.

She thought about an ambitious plan to swim every lake in Maine starting in 2019, and shared her plan with her dad who of course supported her 110 percent. That was all she needed to move ahead, and last year she clocked swims in 21 different Maine lakes. Unfortunately, Ali's dad Phil passed away this past year on Christmas Eve. While feeling the loss acutely, it made her even more committed to carrying out the plan that her dad was, as always, so proud of and excited for her to complete.

Ali and her dad Phil

Ali finishing another lake swim

Ali swims at least a mile in each lake to make it count, which takes her about 15-20 minutes to complete. There are open water swimming rules that prohibit a wetsuit, so her season can't be extended much past September or start much earlier than June. She does wear swim socks that help a little. This past year she added 31 lakes to her list, and she will most likely be found swimming in western and northern Maine in 2021. She's chipping away at her list, which if you take off the smallest and shallowest lakes, numbers around 1,500 lakes. Clearly, this is a long-term project.

Ali's favorite lake so far is Mountain View Pond west of Greenville, where – you guessed it – there is a gorgeous view of Big Moose Mountain. Ali is passionate about clean water in Maine's lakes because she's already had to bypass potential swimming opportunities in lakes experiencing algal blooms. Ali was kind enough to support Maine Lakes this past summer with a birthday fundraiser on FaceBook that raised almost $500, for which we are incredibly grateful. We'll keep in touch with Ali to hear more about her adventures, and may be reaching out to you, our members, in the years to come when she is looking for access at lakes without public launches or town beaches. We are hopeful you may be able to offer her a parking space and a dock from which to launch herself on another mile in another beautiful Maine lake.

2020 Charitable Giving Don't forget that the CARES Act, passed earlier this year, has an incentive for charitable giving in the form of an "above-the-line" deduction for charitable gifts made in cash of up to $300. If you are not itemizing on your 2020 taxes, you can claim this new deduction. Maine Lakes would be happy to be the recipients of your year-end giving, and will, as always, provide you with a thank you and acknowledgement letter to be used for tax reporting purposes. Visit www.lakes.me and click the blue "Donate" button for easy online giving, or mail donations to us at the address on page two. Thank you!

LakeSmart 2020

It was the week of March 8th when I first saw my schedule dramatically shift. First, a speaking engagement was cancelled. Then an after school education program. Then a conference. Then another speaking engagement. By the time April rolled around and we made the decision to cancel our in -person LakeSmart training workshops, I knew the summer would look very different than how I had imagined.

When I joined Maine Lakes as LakeSmart Program Manager back in January, I was already anticipating a year with many challenges. Not only was I stepping into a role previously filled by the wonderful Maggie Shannon, I also knew that the program was in the process of developing some BIG changes. That said, nothing could have prepared me (or any of us!) for what 2020 had in store. There was time this spring when I wondered if all of the wonderful services that Maine Lakes has to offer – LakeSmart, Lakes Alive!, the Maine Lakes Conference – would actually come to a complete stop.

Instead, 2020 turned into a very busy and productive year! Temporarily pausing provided space for everyone at Maine Lakes to reflect on the LakeSmart program and thoughtfully plan and prepare for the future. It also gave us an opportunity to explore new ways to connect Maine lake lovers to the LakeSmart program and other conservation messages.

LakeSmart by the Numbers: 2020

12	New Evaluators Attending Virtual Trainings
100	LakeSmart Evaluations Completed
48	LakeSmart Awards Granted
7	Lake Associations Participated

Without a doubt, our biggest project this year was the development of new standards for our LakeSmart property evaluation. This project, dubbed "LakeSmart 2.0" began before I came to Maine Lakes and is actually still underway. It has involved literature reviews, interviews, online surveys, focus groups, and meetings (many of you were probably involved) and hours and hours of discussion. It's been a lot of work, but we are very happy with the process and are very excited to share the improvements with you in 2021!

We also moved a little outside of our comfort zone this year and tested new virtual training methods. With a terrific team attitude and a healthy dose of support from a LakeSmart Hub, we were able to successfully train a new team on Keoka Lake (FMI see page 7).

One of my favorite activities this year was my participation in our Wednesday Webinar series, held in lieu of our annual, in-person Maine Lakes Conference. It was fun to share information – especially about loons! – with a big, broad audience and connect with folks from all over the country.

Of course, the absolute highlight of my summer came any time I was able to connect with our LakeSmart volunteers! While I was disappointed to not have the opportunity to meet most of you in person, I was always excited to connect over email or through a phone call. Best of all were the few chances I had to visit you on your lakes and see all of your excellent work firsthand. Thank you for all that you do.

It might have been tempting to slow down or give up during these stressful, tumultuous times but you all continued to charge ahead and make progress. Our work is more important than perhaps ever before! Thank you for your inspiration!

Thank you, Wynn!

Wynn Muller left the Maine Lakes board this year after 12 years of service. Wynn served in many capacities, bringing his unique brand of financial expertise and creative problem solving to his time as at-large member of the Executive Committee, Treasurer, Chair of Development and contributor to the Conference Committee. Wynn was also the first Chair of the Council of Lake Associations, a fitting post for a lake association president who made the most of every opportunity to build community for Wilson Lake. In true "Wynner" fashion, he took a lake use threat and turned it into a model ordinance that built the capacity of Friends of Wilson Lake (FOWL), launched his retirement career as a Maine lake activist, and made FOWL a household name in Wilton. A dedicated planner, he crafted development forecasts to help sustain and grow Maine Lakes as an organization. As a passionate lake conservationist, LakeSmart evaluator, water quality monitor, President of FOWL, and active community member in both Wilton, ME and Wilton, CT, we know he'll find good use for his extra time. Thank you, Wynn, for your many years of service to all Maine lakes, from Maine Lakes!

Meet More Lake Heroes

Maine Lakes is continuing to honor 50 Lake Heroes in our Anniversary year, and it's not too late to nominate your lake association, your favorite lake volunteer, or yourself! Send a photo with a paragraph stating why your nominee deserves to be recognized as a Lake Hero to info@lakes.me, and watch for results on FaceBook!

DAVE GAY (Belgrade Lakes): Dave has been actively involved with LakeSmart in the Belgrade Lakes for more than 10 years. He has worked tirelessly as a screener and an evaluator, and at several points has stepped in to rescue the program when circumstances led other staff and volunteers to unexpectedly leave the program with unfinished business. He has volunteered at the local farmers market to encourage lakefront owners to sign-up for screenings and took two years to research and collect information about lake and road associations near Great and Long Ponds. He has spoken regularly at homeowners' associations about LakeSmart, and he formed a committee to write a "white paper" with recommendations to streamline and improve the organization and its conservation corps partner. His dedicated participation led to more than 80 LakeSmart screenings each year for several years in a row. He is an unsung hero.

JOHN ELIASBERG (Georges Pond): John Eliasberg, president of the Georges Pond Association, has helped energize volunteers to adopt a highly effective LakeSmart program while also building a strong leadership board; increasing membership in the lake association from 35 to nearly 200 dues-paying members over the course of three years; securing grants and private donations to pay for an alum treatment of the pond as well as making watershed improvements; and developing key partnerships with the Maine DEP, water-quality experts, community leaders, and others. All the while, he shows up with an abundance of energy, clear thinking, immense integrity, awe-inspiring persistence, and characteristically good humor. Every lake association would be blessed to have a John Eliasberg!

BART HAGUE (Waterford): Bart Hague, President Emeritus of Maine Lakes, was inspired to a life of environmental activism by a visit to his aunt's "Haunted House" overlooking McWain Pond when he discovered that his favorite pine grove had been cut down. He went on to study Forestry at Yale, began work for the Eisenhower administration and helped form the US Environmental Protection Agency. Along the way, he has been active in many environmental organizations in both Massachusetts and Maine, including the Newton Conservators, McWain Pond Association, Lake Stewards of Maine (LSM), Natural Resources Council of Maine, Western Mountains Land Trust, and Crooked River Watershed. He has been honored for his activism by both US EPA and LSM (2006 Outstanding Lake Stewardship Award). He and his wife Mary Ann, now own his aunt's house in Waterford and have placed most of their property and over a mile of Crooked River shoreline in a conservation easement that helps protect the headwaters of Sebago Lake.

GEORGE FERGUSSON (Clary Lake): In 2011, Clary Lake and its Association (CLA) were in trouble. A dispute with the owner of the dam controlling the lake level had lead to seven years of unswimmable, unboatable water and significant environmental damage to the resource. Only 28 of 100+ homeowners were members. Now in 2019, thanks to the unwavering efforts of George Fergusson, the Association's long-time Secretary, the CLA has purchased and repaired the dam, the water level has been restored, and 148 (!) members can once again enjoy the benefits of a healthy lake. George has lived on Clary Lake his entire adult life, and has been its prime steward for decades. He instigated the 2012 petition to DEP for a Lake Level Order, and then bore the brunt of legal harassment by the dam owner that prevented

the Order from being implemented for five years. This included endless hours compiling and drafting documents for court, attending innumerable hearings, and managing fund-raising for legal expenses. His personal solicitation of new members meant that when the dam fell into bankruptcy, the Association was able to raise $120,000 for purchase and repair. George is a certified Water Quality Monitor, and has measured and maintained daily records of the lake level for years, information that was crucial to DEP's recent approval of CLA's Water Level Management Plan. He has been tireless in meeting with town officials, state agency staff, the press, contractors, and attorneys to keep the effort moving forward, and continually encouraged the Board of the CLA even when the quest seemed hopeless and endless.

FRIENDS OF WILSON PONDS ASSOCIATION: Friends of Wilson Ponds Association is an outstanding example of lake residents combining efforts to care for their ponds. Their organizational skills shine and as a group, they organize invasive plant paddles, loon counts and are actively involved in LakeSmart. Between the two Wilson Ponds – Upper and Lower – there are a number of LakeSmart properties and trained LakeSmart evaluators! Lower Wilson Pond is home to Rum Ridge Association, which is a community surrounded by a 100ft intact buffer, which protects the pond. Additionally, Friends of Wilson Ponds works very closely with the Piscataquis County Soil and Water Conservation District and sponsors two youth from the Greenville community to attend PCSWCD's Teen Wilderness Expedition program. This program encourages youth to explore and engage with the outdoors and inspires future stewards of our land and waters.

LAURIE & JIM FENWOOD (Cold Stream Pond): Two of our superstar LakeSmart team members, both retired wildlife biologists, Jim and Laurie Fenwood spend their summers on Cold Stream Pond in the camp that Jim's grandfather built in 1937. They appreciate that Cold Stream Pond is currently one of the clearest lakes in Maine, but see that threats to water quality are increasing every year. They are active members of the Cold Stream Camp Owners Association (CSCOA), an organization committed to protecting and improving water quality in the lake. Jim is on the board of directors and administers the CSCOA website and email campaigns, and Laurie produces the association newsletter. Laurie and Jim started the LakeSmart program at Cold Stream Pond in 2015 and use the screening process to prioritize cost-share grants for projects that help protect the lake as well as a way to achieve LakeSmart program goals. In 2016, they secured and administered an $85,000 EPA grant for water quality projects around the lake, using LakeSmart to rank the projects. With funding from the CSCOA, Jim and Laurie (and other Lake Stewards of Maine volunteers) monitor water clarity and sample for total phosphorus. They participate in the annual Maine Audubon loon count, assist road associations, and coordinate with the Towns of Enfield, Lincoln, and Lowell.

KATHY HOPPE (Maine DEP): Kathy has had many contributions to lake protection and the public understanding of lake science, fragility and remediation. She was one of the initiators of the LakeSmart program when it was at DEP, and she has assisted with and lead water quality and NPS projects throughout Aroostook County. Her work combines scientific, technical and regulatory knowledge with practical, real-world smarts. Kathy has recently been of tremendous help to the Friends of Cross Lake (FOCL) with its efforts to improve and protect Cross Lake's water quality. She knows that knowledge alone is not enough; to make a difference it must have an appealing application the public will take up. She is tireless and uniquely responsive to any request for help with lake information, research or programs; and has been an advocate for water quality in lakes, streams and rivers all across Maine for many decades. Considered by many to be one of the most important Lake Heroes in the state of Maine, she remains an active advocate for water quality in lakes, streams and rivers.

Kathy (middle) is pictured here with a former colleague, Leon Tsomides (L) and a former Americorps Volunteer (R).

Lake Heroes (cont'd)

THOMAS LARNED (Kennebunk): Thomas has been a force since 1997 for water quality and community on Kennebunk Pond (KP). Creator and advocate of the "Keep Kennebunk Pond Blue" philosophy, Tom edited the "Kennebunk Pond Ripples," a quarterly newsletter, from 1997-2007. And since 2001, as president of the Kennebunk Pond Association (KPA), he has led 16 certified plant patrollers, eight directors, and a team of six certified LakeSmart members. He has built a strong base of volunteers from the 112 members who show up yearly to KPA's annual meeting in July. He has helped install six new septic systems, and taken e-coli tests on the pond for 21 years. Tom has spent countless hours making loon rafts and loon signs for first one pair, now two, on KP. He helped turn KP from an endangered lake back to normal, and spear-headed with Rich Mead a 2001 watershed training sponsored by a state grant.

With the help of Sal Gebbia, Tom orchestrated a KP public beach improvement project on Lyman's Beach, and since 1997 he has attended the annual Maine Lakes Conference. Twice he assisted Roberta Hill's LSM team as a plant patroller at Acadia National Park. For several years he collected water readings for a UMaine professor and sent in ice-in and ice-out dates. If there is a question from anyone regarding water clarity, erosion control, a vegetated buffer, nonpoint source pollution, the Lyman Beach bulletin board – Tom is there with a hand and an answer.

CAROLYN SHUBERT (Coastal River Conservation Trust): Carolyn has worn many hats at the former Pemaquid Watershed Association, which recently joined Damariscotta River Association to become Coastal Rivers Conservation Trust. When it comes to freshwater protection and stewardship, she has done it all. She has provided education to the public, met with local pond associations, shared her wealth of knowledge about LakeSmart related matters, promoted loon conservation through the Lead Tackle Exchange program, coordinated volunteers, forged new relationships, kept the municipal governments apprised of changes, worked with the Healthy Beaches program to see beaches were monitored, and so much more.

The volunteers and the staff have formed lasting relationships with Carolyn over the years because she is just one of those incredibly hard-working, thoughtful and kind people. Carolyn gave her notice to Coastal Rivers some months ago as she and her husband had plans to sail across the Atlantic in their boat. Unfortunately, COVID changed the world and they have had to delay their trip but we wish her many wonderful adventures in the future!

KACEY WEBBER (Piscataquis County Soil and Water Conservation District): Kacey has worked for the PCSWCD for 7 years as its Educational Coordinator. She works to educate constituents, landowners, children and people of all ages; and dedicates her time to bringing diverse programming including LakeSmart evaluations and Watershed education across Piscataquis County. Kacey carried the LakeSmart program at PCSWCD into a HUB last year and works extremely hard to bring recognition to the program. Kacey works to identify local programs and people that can help push LakeSmart and its core values. She is always planning to maximize LakeSmart and streamline efforts by consistently pushing outreach for this program.

When Kacey isn't working you will most likely find her on Sebec Lake with her family. What is most important and why Kacey really is a true Lake Hero, is her shared love of keeping Piscataquis County waters clean and pristine and to help other lake residents care for the lake/pond they live on with full commitment. Kacey's dedication to the LakeSmart program is led with a big heart and the love of Piscataquis lakes and ponds!

LINDA BACON (Maine DEP): Linda is the leader of Maine DEP's Lakes Assessment Section and is widely recognized across the state as an expert lake researcher. Linda has unmatched tenacity and passion for getting work done to exacting standards - a commitment that applies to all facets of monitoring, assessment and protection of Maine's lakes. She is an innovative prob-

lem solver with a diversity of talents. Whether it is fixing boat motors, fabricating lake sediment coring devices from scratch, or building computer hardware and writing code for data storage and analysis before computers were widely available at DEP, Linda is constantly searching for ways to help everyone involved with lake research do their work more effectively, efficiently, and economically.

Linda is a strong guardian of lake data quality assurance and controls – a task which extends to credible data collection, proper equipment maintenance, implementation of sound sampling protocols and meticulous data storage practices. Linda is constantly striving to support citizen scientists and collaborating organizations with information and technical guidance. Her dedication to these responsibilities is an important reason why there is such a comprehensive and trusted dataset on Maine lakes, which helps to inform lake protection decisions at many levels. Everyone who works to protect Maine's lakes has benefitted from her skills and hard work. Linda goes far above and beyond the call of duty on a regular basis, yet still found time to be the keyboardist, singer and songwriter for the DEP's environmental cover band, the Electric Eels. Rock on, Linda!

MARVIN ELLISON (Georges Pond): In 2018, Georges Pond experienced its fourth algal bloom since 2012. The small, and relatively inactive, community around the pond needed to come together to study and understand the watershed problems, and to plan and execute a solution. Towards that end, Marvin has helped membership grow 500 percent, published Georges Pond's informative newsletters, and helped raise more than $300,000. This work has included collecting baseline scientific data, creating a ten year Watershed Based Management Plan, completing the first of two alum treatments, and supporting a productive 319 Grant. Marvin has also been integral in the association's LakeSmart effort of more than 70 property evaluations (50 percent of the total properties on Georges Pond) over the last three years. Not only is Marvin remarkably effective, he does so in a manner that is calm, clear, informative and productive. Marvin seeks advice from experts and listens carefully to the membership. Marvin also personally thanks every member and donor for their support; writes and produces (with Nancy Cooper) the association's well-received newsletters; is leading a website redesign; and continues to apply for many grant opportunities. Georges Pond enjoyed the best water clarity on record in 2020, an accomplishment that could not have happened without Marvin's leadership.

Attention Council of Lake Associations!

For our spring newsletter, we are looking for articles from our lake association members. Whether you want to write something new or send us an article from your newsletter, we welcome your input!

Please reach out if you'd like to contribute by emailing info@lakes.me. Thanks in advance, we look forward to hearing from you!

Update From the Maine Climate Council

The Maine Climate Council voted just days ago to finalize draft recommendations for the state's next Climate Action Plan (CAP), a document that will guide Maine's efforts to meet ambitious climate goals set by Governor Mills. The Climate Council is a nonpartisan collection of scientists, industry leaders, lawmakers, and municipal officials convened by the governor in 2019 to develop a four-year plan to prepare for the impacts of climate change and provide a path to reduce emissions of 45 percent by 2030, and at least 80 percent by 2050.

Maine's lakes are already impacted by climate change, and are poised to suffer further declines in water quality and impact property values and municipal income if greenhouse gases are not reduced in the future (see box to right FMI).

The CAP provides policy recommendations in eight strategy areas, including the transportation sector, natural and working lands, and community resiliency. Specific policies identified in the CAP will need to be implemented via administrative actions or passed through the Legislature. Though much work remains, Maine Lakes and other environmental organizations around the state are optimistic that the CAP sets us in the right direction to protect our environment and spur our economy.

The final CAP aims to increase the total acreage of conserved lands in the state to 30% by 2030; ensure that new renewable energy development is sited properly to protect natural resources and watershed values; and develop new incentives to increase carbon storage on priority lands, among other recommendations.

The CAP also provides a number of strategies to spur the renewable energy economy, especially in promoting technologies like electric vehicles and heat pumps seen as key to meeting emission reduction goals.

"The final Climate Action Plan succeeds in promoting an appropriately diverse set of policy solutions to our climate crisis, including recognizing the critical role our natural and working lands play in controlling carbon," says Eliza Donoghue, Director of Advocacy & Staff Attorney at Maine Audubon.

"Investment in the environment is investment in the economy," says Vaughan Woodruff, the CEO and Founder of Insource Renewables, based in Pittsfield, which specializes in the installation of solar panels and heat pumps. "With many clean energy technologies now proving to be cheaper than fossil fuels, Maine can take the good work of the Maine Climate Council and utilize successful state entities, such as Efficiency Maine, to ensure the benefits of these technologies are accessible to people across Maine."

The final Climate Action Plan is due to be released December 1 and its recommendations will need to be either administered through state agencies or passed through the state legislature. Look for calls to action in the legislative session ahead. To sign up for alerts, email info@lakes.me or visit https://www.lakes.me/take-action.

~Adapted from Maine Audubon press release, 12 November 2020, Nick Lund, Outreach Coordinator

Pleasant Lake, Casco © James Treadwell

Maine Lakes & Climate Change

- Much like Maine's air temperatures, the temperatures of rivers, streams and lakes have been increasing over the last several decades. Winter ice thickness and duration have correspondingly decreased. Warming waters affect which species thrive and eliminate those adapted to cold water.
- Surface temperatures of lakes in northern New England increased 1.4°F per decade from 1984-2014 – faster than the worldwide average – with smaller lakes warming more rapidly than larger lakes. Maine lake surface temperatures have warmed on average by nearly 5.5°F.
- Increases in precipitation and runoff over the last century, combined with a reduction in acidic deposition and longer growing seasons, have resulted in a rise of dissolved organic carbon (DOC) in our rivers, streams and lakes, and thus export of DOC to the Gulf of Maine. This can alter aquatic species and influence temperature and stratification patterns, thus altering plankton dynamics in aquatic systems.
- The water quality of a significant number of rivers, streams and lakes has improved as a result of the laws and regulations put in place to mitigate the effects of development, agriculture, and forestry practices on water quality. However, recent increases in the volume of stormwater runoff have resulted in transport of tons of soil and pollutants into our waters, thus laws and regulations may need adjusting.
- If Maine continues to receive more intense rainfall, stormwater transport of nutrients and other pollutants to our fresh waters will increase. Increasing nutrients will shift biota to less-desirable species, including nutrient-loving invasive species, cyanobacteria and possibly toxin-producing harmful algal bloom species. Waters will then be less likely to meet their classification standards and be designated as impaired. The restoration of these waters will be expensive; in one example, restoration of East Pond in the Belgrade Lakes region cost more than $1 million.
- Multiple studies on Maine lakes have shown that shoreline property values decrease when water clarity is reduced. This causes a domino effect with respect to property taxes by shifting the tax burden from shoreland to upland properties. These studies estimate that our lakes generate annual revenue of approximately $4 billion.

These highlights are summarized from a recent scientific assessment published by the Maine Climate Council.

For a the complete report, see the Scientific Assessment of Climate Change and Its Effects in Maine. A Report by the Scientific and Technical Subcommittee of the Maine Climate Council. 2020 Augusta, Maine. 370 pp. Visit www.lakes.me for a link.

Would you like to know more about lake ecology? Are you curious about how water quality is affected by runoff and erosion? Are you dreading the long winter ahead and looking for something to occupy your time? Consider enrolling in an engaging online lake class taught by professionals at Michigan State University Extension. While this course is based in Michigan, the similarities between Michigan and Maine make it applicable to anyone wanting to know more about Maine's lakes.

Introduction to Lakes is a six-week online course specially designed for lake users, lakefront property owners, and lake managers. From the comfort of your home or office, participants have 24/7 access to six online units complete with closed captioned video lectures, interactive activities, additional resources, discussion forums, quizzes and live chat sessions with classmates and MSU Extension experts.

Topics include lake ecology, lakes and their watersheds, shorelines, water laws, aquatic plant management, and community involvement in lake stewardship. The course is taught on a week-by-week basis, allowing for online communication between classmates and instructors through topical discussion forums. The course also includes three Ask-an-Expert webinar sessions with instructors and outside experts.

Maine Lakes is pleased to offer $20 off the registration fee to the first 25 students. Follow the link on our homepage (www.lakes.me).

FMI about the class, visit www.canr.msu.edu/introduction_to_lakes_online/

Photo credit © Brian Dewey

Great Blue Heron

One of Maine's most majestic birds (after the Common Loon, of course!) has to be the Great Blue Heron. You'll know the bird in flight by its S-shaped neck and long trailing legs. If you've ever watched one hunt, you know they can stand stock-still in shallow water for what seems like hours, waiting until the perfect fish swims by and then, at the just the right time, jabbing at lightning speed to grab their prey. If you haven't stopped to wonder at these amazing birds, I highly suggest you do. They are a bird worth watching!

You can find Great Blue Heron (*Ardea herodias*) all over the state, from freshwater wetlands to shallow lake edges to saltmarshes along the coast. Along with fish, they are good at catching crayfish, insects, frogs, small ducks, and snakes. They also hunt on land, often in agricultural fields, where they can be very successful catching small mammals including mice, voles, chipmunks, rats and even rabbits. A quick Google search of "heron hunting mice" will bring you dozens of fascinating clips of these talented predators in action.

Another interesting aspect of Great Blue Heron natural history is their breeding habitat. Surprisingly, these herons typically build their nests in the tops of large old trees, usually bordering a wetland. While most herons nests in groups, or colonies, in Maine there are quite a few lone nesters. These birds might have tried to join an existing colony and been rejected, or they may be pioneers starting a new colony in a new location. Colonies can number up to 500 individuals, but in Maine typical colonies are around 9-12 breeding pairs. The largest colony recorded in the state was 120 pairs, though that colony has been abandoned since 2015. The largest colony active today is home to about 80 pairs.

Males collect much of the material for nest building, presenting sticks to the female who weaves them into a large saucer-shaped nest cup. She will line the nest with pine needles and moss, taking up to two weeks to perfect it. The pair typically return to the same nest site year after year, adding on to their nests over time until they may reach a width of four feet across and three and a half feet deep. These large nests often kill the trees over time, though they can continue nesting for many decades after the trees die. Some colonies first noted in the 1970s are still active today! An older heron colony can look quite eerie with these long-legged dinosaur-like birds perched in skeletal dead trees.

The Maine Department of Inland Fisheries and Wildlife (DIFW) lists the Great Blue Heron as a Special Concern species due to population declines over the last several decades. It is also listed as Species of Greatest Conservation Need in the state's Wildlife Action Plan. Causes for declines are likely linked to Bald Eagle predation though nocturnal predators like racoons are suspected as the cause for some entire colonies being abandoned during the nesting season in recent years. While human disturbance might be a problem for some colonies, others are located very close to human activity without apparent issues or abandonment.

As a result of concerns over declining populations, Danielle D'Auria, the wildlife biologist who manages wading birds as well as loons for DIFW, began a Citizen Science project in 2009 using volunteers to find and monitor colonies in spring and summer. The project, aptly named HERON (for Heron Nesting Observation Network) has been active for the last 12 years and has done an amazing job tracking nest locations and nesting success. The results have shown that declines are especially apparent in the coastal colonies, while inland colonies have fluctuated with a slight overall decline.

Photo courtesy of DIFW

Starting in 2016, Danielle put satellite trackers on nine herons to monitor their movements during migration. We know that most herons are short-distance migrants, heading down to the southern U.S. or West Indies for the winter. Yet there are always herons in Maine on the coast over the winter. Danielle speculates these are mostly young, inexperienced birds who do not know that they should have migrated. She suspects they don't do well and may or may not survive the harsh winter. Like any snowbird will tell you, it is much easier to spend your winter in a warmer clime.

In fact, all nine birds that have had satellite trackers on them have headed south for the winter. One of the most interesting birds, named Harper, was trapped and tagged with a satellite tracker while feeding in Harpswell in May of 2019. A few days later, she headed north to New Brunswick where she spent the rest of the summer wandering around before migrating to Cuba for the winter. When she returned for the summer of 2020, she passed Maine by, and went back to spend the summer wandering around the north end of Fox Island in New Brunswick. She settled for a time in a colony she had perhaps prospected the year prior, but no one knows if she bred or was just checking out the site. In October, Harper made an epic journey of 2,030 miles over the Atlantic. She left Pointe-à-la-Croix, Quebec at 6pm on October 8, and flew 68 hours nonstop, arriving at Cumberland Island National Seashore in southern Georgia at 3:15pm on October 11. Her flight path swung well east out into the Atlantic, almost to Bermuda before turning west again towards the U.S. From Georgia she headed south to the Everglades, and from there we'll have to see where she ends up for the winter (See map for information on how to track Harper's movements online).

If you'd like to get involved with the HERON monitoring project, please visit the DIFW Citizen Science Portal at https://ifw.citizenscience.maine.gov/ to learn more!

To track Harper's flight path, go to www.movebank.org. Click on Data/ Map and type "Brzorad" in the search menu. Click on the "+" next to Egrets & Herons then scroll down and check Harper (Harpswell Heron), or one of the other herons tagged in Maine: Cornelia, Nokomis, Mellow, Sedgey, Snark, Snipe, Warrior, or Easton's Baby Blue.

PO BOX 427
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Please join us at our 2021 Maine Lakes Conference!

Wednesday Webinar Series

Our 2021 Maine Lakes Conference will once again kick off with a series of informative online webinars focused on lake science and conservation. Join us the **1st and 3rd Wednesdays** of each month at **4 p.m.** starting **February 3rd** through **June 16th.** Check our website, www.lakes.me, after the new year or email info@lakes.me to be notified when registration is open.

Regional Round Tables

If COVID risks decrease and regulations allow, we hope to host three regional roundtables (Lakes Region, Belgrade Lakes, and Bangor) in June for our members and member lake associations to come together in person to interact, network, and learn from one another. If you have ideas for topics to discuss, please email info@lakes.me with your ideas! Look for updates to plans on our website and in the next newsletter!

Thanks again to our 2020 Wednesday Webinar Sponsors