CHOCORUA LAKE CONSERVANCY
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Chocorua Lake Conservancy

FALL/WINTER 2020 NEWSLETTER

Above: A thing of beauty, in a beautiful place: The completed Basin View Lot wall, ready to withstand New Hampshire's weather extremes throughout the year—and throughout the years, for generations to come. **Below:** Visitor viewing area at the Basin View Lot. / *Alex Moot*

A Serendipitous Stone Wall

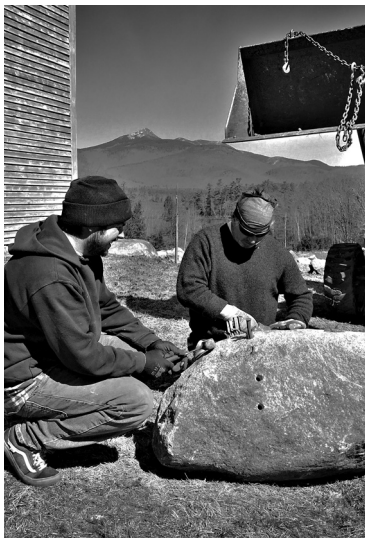
BY JUNO LAMB
Programming & Outreach Director

Serendipity, Part 1

"In 1996," Basin View Lot stonemason Gary Jones recounts, "my mom's mom went blind, so my mom went back to England. My parents' plan was that my dad would finish his work, and they'd retire back there. In October of 1999, my dad rented a house in Alton, New Hampshire, for a week, and my mom flew over, and we proceeded to drive to different areas from there. One day, the last day, we drove up 16, and came up over that hill, and saw that mountain, and my father took a left, and we found this beautiful little wooden bridge. I'd never been there before, didn't even know the name of the mountain. And I took photographs, and they were the last photographs I ever took of my parents in America together."

For thousands of years before the Jones family found their way to Chocorua that October day, humans have crested what is now called Heavenly Hill, just south of Chocorua Lake, and been met by some version of a view that earns the term "breathtaking"—Little Lake and Chocorua Lake gleaming down below, and, rising up behind the lakes, the

long shoulder and stony peak of Mount Chocorua. Now, the view has an embellishment: a stone wall so in keeping with the vernacular that it might have been here for generations, and so well-built that it will be here for generations to come. A wall made not with mortar, but with skill, deep knowledge, and a respect for gravity that Gary Jones has developed over a lifetime of learning and practice.



From left: Stonemason Gary Jones in front of the in-progress Basin View Lot wall; Eric Dube and Pat Shea set feathers and wedges in a boulder. / *Photos by Juno Lamb*

The forces[1] that came together to make this wall possible at this time and in this place span continents and centuries, with a pinch of Chocorua serendipity to hold them all together.

You could say it comes down to geology, to soil that even after hundreds of years of rock-clearing still finds more stones to churn up to the surface in every spring thaw. Or to the many immigrants who came to this place, bringing a diversity of masonry skills from across the British Isles and beyond. To the apprenticeship system. To Gary Jones' great-aunt in Liverpool, who took a liking to a Yankee soldier during the war and married him, and to Jones' father, who got "a bee in his bonnet to come to America" as soon as he met this Yankee uncle. To stonemason Gary Jones' dislike for working in a windowless center office after he'd gotten a taste of working outdoors. To Chocorua serendipity.

It's all these things.

Stony New England

The rocks play a starring role. The first stone walls in New England were walls of consumption. Settlers needed a place for all the upturned rocks and boulders as they cleared fields for farming. The quantity and weight of all these rocks accounts for the small field size in New England. It was easier to wall in eight one-acre fields than to haul the rocks the distances required to build one eight-acre field. This was one contributor to the destruction of New England farms in the latter half of the 19th century, Jones says. Mechanized tools needed a larger turn radius than was possible in a small field. "You've got a couple of acres, and you can't turn this newfangled thing that they got, and you're like, they're giving land away out in Iowa, and word is you can pull two miles in one direction!"

As farming went west, city-dwellers of means began to see a value in recreation in nature, and the early tourism industry grew. People buying land in rural areas for summer camps and houses wanted nicer, more decorative walls near their houses, so some walls became what Jones calls "walls of affluence." All that settling and farming had left its mark, though. By the later decades of the 1800s, Jones says, 256,000 miles of stone walls crisscrossed New England and into New York. And through all this time, successive waves of immigrants brought their own skills and flair to the work.

Then, in the mid-'60s, Jones himself arrived on these shores, and had as thorough an apprenticeship here as any young Welsh or Irish stonemason's son might have had. His first teacher, starting when Jones was in college, was Jim Maloney, "a former union mason," who gave him a "great fundamental education in the masonry business." Next came John Lewis, of Welsh descent. And then Henry Varian, an "Irishman from Cork."[2]

The Basin View Lot Wall

"Henry Varian taught me the importance of string," Jones says, "and using string, even to tell the customer, this is what it's going to look like. I do it all with string." First is a string coming down from a top point, a cleat or piece of wood with a nail in it. "They call it being hung by a dead man," Jones says, "like someone's holding the string...and then we pull the string down to the ground and you lay the corner to the string." Before he laid a single stone at the Basin View Lot, he says, "I set the top of that wall up in strings and said, look, this is going to be the top."

Various factors made the Basin View Lot wall challenging. "Number one," Jones says, "was the size of the boulders. You don't realize how big they are, because they're in the wall now, but I set the boulders with a particular technique and I use a little gadget that you never see in the end, and I went through 400 of these little drop-ins that allow me to pick up a big boulder with my tractor like I was picking it up with my fingers. So that means 400 tractor placements of these boulders that weighed four or five hundred pounds apiece. If you went and measured the boulder, you'd be amazed, because granite weighs 160-166 pounds per cubic foot. In the end I calculated that the whole wall weighs 308,000.6 pounds, or 154 tons."

Another challenge, particular to dry stone walls, is that the wall had to be self-supporting. "It had to stay there, in other words, and gravity has to be the medium that holds it together, so there are techniques that I use to make that happen." From May, a month that included snow and sweltering temperatures, through our long, hot, dry summer, Jones worked on the wall with help from his crew: Pat Shea, a full journeyman mason that Jones has worked with on and off for two-and-a-half decades; Eric Dube, who's worked with him for several years now; and his son Liam Jones, a level one certified dry stone waller.

The work requires judgment and patience. "One of my favorite things

[1]In addition to everyone for whom we share our gratitude on p.3. / [2]To read an account of Jones' apprenticeship with Jim, John, and Henry, visit chocorualake.org.

to do is the dry stone wall because that's really the extreme of managing chaos, because the stones don't even have a uniform shape, they're just literally oblong or round, and you have to somehow tease a structure out of it. That's the greatest challenge with dry stone work," Jones says. "That build was a four month challenge. But you just keep going every day, and in a few weeks, oh, we can move on to this next section, and you wrap up a particular run of wall, and all of a sudden you're at the top where it slows down again because you have to get the height somewhat uniform, with all sorts of round boulders. It was a grueling four months, but I'm very happy. That particular spot, the bridge and the mountain, have a special meaning for me."

Serendipity, Part 2

In 1999, Jones was ready to leave Nantucket, his home of a dozen years. "I came off island three times," Jones says, "and rented a car, and drove to NH. I asked John Lewis, who was from North Conway, 'Where would you live?' He said, 'I'd look in Tamworth or Sandwich if I had to do it all over again.'" Jones looked at a place in Sandwich, and on his next trip north, looked at another place. "And then the third time, this thing came on the market, this little cabin on eight acres on Washington Hill in someplace called Chocorua. I saw the cabin and said this is it.

"One day I drove down MacGregor Hill Road to get to 16, and I drove around the corner, and there it was. I'm within a mile of it, you couldn't get closer, of the last place I took a picture of my parents when they were in America. It was just so magical. Chocorua has always been really blessed for me. I can't even tell you how goofy the whole serendipitous nature of the thing is. I got the job at the view 20 years from the year I bought the place. To celebrate my anniversary in Chocorua, to do the wall in the view, has been an honor, and very magical for me. An unexpected fortuitous event. But I think Chocorua is a serendipity machine. I think Tamworth is. It's very magical here. But you know, you've got to have the eyes for it."

PRESIDENT'S LETTER

A Busy Summer at the Lake

DEAR CLC MEMBERS AND FRIENDS,

This past summer reminded us of what we already knew to be true—people turn to the outdoors and nature for health, recreation, and sanity especially during difficult times.

We rely on the outdoors for adventure, peace of mind, and inspiration. Among many other truths, this pandemic is showing us clearly and loudly the importance of convenient, attractive public lake access for every person in New Hampshire and beyond.

At the Chocorua Lake Conservancy, we believe that providing public lake access is good for people, the planet, and the local economy. Chocorua Lake is one of the only lakes in New Hampshire that provides lake access for picnicking, swimming, and boating to all visitors without any state or town funding. For over 50 years, the CLC has preserved one of New Hampshire's most treasured areas for use by nearby residents and occasional visitors.

The CLC's seventeen acres of public lake access around Chocorua Lake at the Grove and Island were often overcrowded on hot days this summer. Because of COVID-19, nearby White Lake State Park was limited to 50% of its normal capacity, so visitors there were being turned away and directed to Chocorua Lake. Some visitors to Chocorua Lake parked in the wrong places or left trash behind, but the Grove and Island did not suffer any lasting damage. The CLC's public access areas all remain beautiful

THE BASIN VIEW LOT NEARS COMPLETION

Like any large endeavor, The Basin View Lot has been a multi-year project involving many dedicated people within the Chocorua Lake Conservancy (CLC) and numerous local contractors. While many hands have touched this project, it was not always "light work".* As the heavy lifting phase of the project nears completion and the finishing touches begin to unfold, the CLC would like to recognize those who have made this possible:

- The Bowditch/Vander Clute family for making their property available for view access and for diligently working with the CLC on the many details.
- All of the campaign funders, including the 358 households who made gifts and pledges, and the NH Land & Community Heritage Investment Program (LCHIP), Fields Pond Foundation, Samuel P. Hunt Foundation, and The Tamworth Foundation.
- Alex Moot, our Board President, who led the fundraising efforts.
- The members of the Land Conservation Committee for the vision and the development of the Conservation Easement.
- The members of the Lake and Property Management Committee for the design and management of the project, and the coordination of contractors.
- Our many wonderful contractors: Don Johnson of Forest Land Improvement (view shed management and tree clearing); Gary Jones of Jones Brick and Stone (the extraordinary stone walls); John Roberts Excavation (grading and substrate materials); Gemini Sign (the Basin View Lot sign) and Good Neighbor Fence (the soon-to-be-installed gate to the barn).
- And finally, our Stewardship Director, Lynne Flaccus, whose capable guidance was ever-present on all phases of this project.

The Chocorua Lake Conservancy would like to express a deeply appreciative "Thanks" to everyone involved for the creation of a safe and beautifully presented site to enjoy arguably the most iconic view in the State of New Hampshire.

— SHELDON PERRY
Vice President, CLC Board

*e.g. The new wall weighs 308,000 pounds!

recreation areas. Troy Emerson, the CLC's Lake Patrol Officer, did a great job keeping both areas free of trash all summer.

That our public access areas were often crowded and people occasionally ignored posted rules was a common problem throughout the state this summer. Hiking trails, land trust preserves, parks, and state and federal forests all saw substantially more visitors this year. We are fortunate to be able to work with other organizations and partners on strategies to balance the CLC's mission of providing public access to Chocorua Lake with our mission of preserving the natural beauty of the Basin for future generations.

Lynne Flaccus, CLC's Stewardship Director, and members of our Lake & Property Management Committee have been meeting frequently and working with the Tamworth Police Chief, Road Agent, and Board of Selectmen on solutions to the overcrowding problems to ensure public safety. At the CLC's request, the town relocated signs along Old Route 16 at the Island to create dozens of additional parking spots for visitors. The town also posted signs at the Tamworth Residents area just north of the Island to ensure Tamworth residents continued to have sole access to this area.

We are concerned, however, about the increasing erosion of the lakeshore on the west side of the Narrows Bridge, which was accelerated this summer by many visitors parking, picnicking, and swimming along this shoreline. Because this shoreline is private property adjacent to a town road, we are working with the property owner and town officials on how best to prevent visitors from using this area and to remediate the erosion by planting native shrubs along the lake.

We are all fortunate to have access to an area of such natural beauty, deep traditions, and human connections. We notice these things most profoundly during trying times. Even if it feels like there is little we can do to impact broader events, we must keep the conviction that inspires us to take care of the land. What we do today may seem insufficient, but we know that our work will eventually benefit the land that we love and the people we serve.

In the Chocorua Lake Basin, we are blessed to spend time in one of the region's most beautiful areas. Protecting special places is a long and often costly process. Protecting land in perpetuity and providing public lake access requires vision, perseverance, and money.

We are grateful for the hundreds of local landowners, nearby residents, and occasional visitors who support our work, and, with their help, we will continue to protect the Chocorua Lake Basin and provide convenient, attractive public lake access for thousands of annual visitors and nearby residents.

Alex

Alex Moot
Board President

A big thank you to all of our 2020-2021 Business Partners. We are so grateful for your support of our mission.

- Ammonoosuc Survey
- Cormack Construction Management, Inc.
- Costantino Real Estate, LLC
- Extreme Terrain
- The Farmstand
- Forest Land Improvement
- Gordon Moore Electrical Contractor, Inc.
- Mac Hill Electric
- Minuteman Press
- New Hampshire Mushroom Company
- Paul L. King Land Surveying
- ROCKHOPPER Races LLC
- Whippletree Winery
- White Mountain Oil & Propane
- White Mountain Survey & Engineering, Inc.

CORRECTION

Credit for the images in the article "The Aquifer Beneath Us" in the spring edition of our newsletter was misattributed. Credits: The large map of the watershed and aquifer was created by The Society for the Protection of NH Forests; the potential wastewater impact map was created by Dr. Robert Newton; and the map of the most vulnerable area of the aquifer is from a 2009-2010 GMCG study, with summer intern/UVM Graduate Student Mia Akaogi, entitled "Vulnerability Analysis of the Ossipee Aquifer."

A Quiet Summer for the E&O Committee

BY RUTH WELD
Chair, Education & Outreach Committee

As Chair of the Education & Outreach Committee, it's been an incredibly quiet season. This spring and summer, Lynne hosted virtual education events, in-person stewardship days, and field trips on CLC conservation lands, which I believe are more fundamental to the core of our organization than the barbecues and cocktail parties. Learning how to care for the land and understanding the layers of the ecosystem we are part of is crucial. But a couple of times a year, a burger and lemonade in the shade with other friends of the CLC is a very welcome idea.

Due to COVID-19 concerns, we cancelled every social event for the summer. I especially mourned the Parade of Lights—I have always loved the parade, having been in the lead boat with my dad when I was little and with my partner for the last few years. It's usually the final CLC event of the summer season. I view it as a farewell to the summer folk and a celebration of our community as a whole—figuratively passing the torch back to the year-round residents, who nurture and care for this land and kindly tolerate us while we're here.

The end of the summer season comes when you can smell smoke from fires*, the lake is just barely too cold to swim in, and you need a hot drink in the afternoon if you've been sitting still with a book (or a computer) too long. I love this time of year, especially in Tamworth. All the birds and bugs are as raucous as ever, there's a crunch in every step along a wooded path, and it's finally time to pull out the next layer of clothing. The end of this particular summer season brings a mild sense of dread for the upcoming winter days in isolated, pandemic-avoiding bubbles…

2020 has been stressful on an individual level, strange on a community level, and tragic in so many ways. In times of stress and distress, it's natural to turn to your community for support.

When you can't hug your friends or invite them into your home, or visit family across the country, it puts more stress on the individual, partnership, and family. I'm grateful that our small town came together to adapt in this time of crisis. The expansive and physically-distanced Farmers Market at the Brett School, everyone making masks for each other, and neighbors registering each other to vote were a few of the wonderful moments I witnessed. Keeping a community safe, like caring for our bioregional ecosystems, means protecting our most vulnerable neighbors, adapting and growing our practices as needed, and dropping individualistic or self-serving attitudes. Protecting others is a moral imperative. I hope we can all gather again next summer, but we won't be able to unless everyone keeps distancing, washing hands, and wearing masks.

This winter will be difficult for many people—please seek help from a mental health professional if you feel depressed or are in an unsafe home environment. Mental health is equally important to physical health! We need community now more than ever. Be kind to each other, check on your neighbors, stay in touch with far-flung friends and family, and keep your fingers crossed for a burger and lemonade together next summer.

From top: Ruth Weld leading the Parade of Lights in 2015. / *Betsy Whitman Memishian;* Baby Ruth eating a Chocorua pinecone, c. 1993. / *Courtesy of Ruth Weld*

Domestic Violence Hotline:
1-800-799-SAFE (7233)
TTY 1-800-787-3224
If you're unable to speak safely, you can chat at thehotline.org, or text LOVEIS to 22522.

Suicide Hotline:
1-800-273-TALK (8255)

Veterans Crisis Line:
1-800-273-TALK (8255) and press 1

More Mental Health Resources:
nimh.nih.gov

*fireplaces! It is illegal to start campfires in NH without a permit.

STEWARDSHIP CORNER

We Are All Stewards

BY LYNNE FLACCUS
Stewardship Director

This was a busy summer of stewardship, even with fewer stewardship volunteer days and landowner visits than a "normal" year. I missed walking with landowners, and spending time with those whom I only saw briefly from afar and masked. Natural history walks and paddles, always my favorite, were few and far apart.

Weaving in stewardship days, with limited numbers, while navigating the effort of mask wearing, was a pleasure—not just to get work done, but to see others and work with our hands. We tackled invasive plants, (bittersweet, oh my!), spread mulch at the Grove and Island, raked the berms and swales, collected water quality samples, weeded shrub plantings, planted new shrubs at the Grove, and monitored for exotic invasive plants in the lake (the lake is still invasive-free!). Being around others was a special treat when these types of group experiences were so limited this summer.

Lynne Flaccus

In August, in what seemed like the hottest and driest part of the summer, we planted new shrubs and trees at the Grove. Our goal was to get roots in the ground to help with erosion prevention, and to help guide visitors to the access paths that were previously designed for foot traffic and protecting shorefront. The shrubs have all set buds for next spring and are doing well, thanks to some extra help from John B., a wonderful volunteer who comes to the lake a few times a week to enjoy the Grove and the view. He offered to water and keep an eye on some of the shrubs whenever he came. So nice to have John take that initiative, and take the worry of dry weather off our minds!

The Grove and Island were unusually busy this summer, as you will read elsewhere in the newsletter. Our Lake and Property Management Committee worked hard to help manage crowding and to make sure impacts were minimal. Like so many places all over the state, visitors were coming to the lake to get outside, to cool down during our hot dry summer, to find trails, and to recreate within their family bubbles.

Above: Blossoms on a new witch hazel planting in the Grove. **At right:** Volunteer steward Lucy Gatchell at Moose Meadows this autumn. / *Lynne Flaccus*

Balancing public access for a diversity of visitors and uses with care for the natural environment is an ongoing effort even in quiet times. It requires listening to others, creativity, patience, experimentation, and yes—our volunteers. We learn along the way from those who live in the area and those who pass through for brief periods. Keeping public spaces safe and enjoyable for all requires participation from everyone, whether that's through volunteerism and specific projects, driving slowly over the bridge, careful parking, picking up fishing line and tackle and trash, keeping dogs under control, sharing beach space and the quiet of the lake, respecting private property, or just being in a place and using it with respect and care. We all are stewards wherever we are and whatever we are doing—even grocery shopping these days means being aware of how our actions and behaviors affect others.

We can use your continued help in this partnership. Please offer ideas, lend a hand, expect the best of everyone you encounter, and be a good role model in all of your recreational pursuits!

On Using the "Chocorua Map" App

BY ERICA BODWELL

For the past four years, since my husband Andy and I lucked into owning a small cabin in Tamworth (we live in Concord, NH), we have been walking, skiing and snowshoeing with our two dogs, Gracie and Althea, on the CLC and TNC trails around Heron Pond, but had never used the delightful app developed by Rick Allmendinger until this summer. With the coronavirus looming, and not wanting to add to the crowds so desperate to get outside, we decided to have a quieter summer and poke around the beauty of the Tamworth area. Using the app, we discovered geological wonder, wildlife, and exciting terrain, right in our own backyard.

We parked at the Hammond Trail parking lot on Scott Road, which was surprisingly empty for a Saturday morning in July. Crossing the road and the wide field of blueberries, with a picturesque farmhouse and barn on the right, the dogs ate their fill of berries, and we entered the woods on Old Mail Road.

Our first destination, about a mile in, was Blacky's Flat Kame Delta, also the start of the Highland Trail. With the Hunters Trail, this rugged trail forms the sides of a triangle, with Old Mail Road as the hypotenuse, and as the app suggested, is a nice detour from Old Mail Road, adding distance and moderate elevation to the hike. We were on the lookout for the Twin Giant Boulders, "erratics left by the Laurentide ice sheet," which marked the intersection of the Highland and Hunters Trail. (All quotes are from the app.)

Descending the Hunters Trail, our hike was starting to feel like a treasure hunt. We first came across Hunter's Blind, a crumbling stone structure that, according to the app, was used as a hideout for hunters. Stepping around it, we came next to the Cellar Hole. The app suggests that it may have been a way station for travelers, but we imagined that people had tried to farm there, given the crumbling stone walls.

Next time you take a walk, see if you can find this intersection. / *Erica Bodwell*

Back on Old Mail Road, we arrived at arguably the most spectacular part of the hike, the Valley of the Boulders. Two enormous boulders, leaning against each other like an old married couple, marked the intersection with the Bickford Heights Trail and were astonishing to find in these otherwise familiar woods. I wished I'd brought my 9-year-old niece along, as she would have loved to scramble into the cave formed by the two boulders. These rocks were likely "plucked off those ledges" on the sides of Mount Chocorua, and it wasn't hard to imagine the glacier crawling across this land, scraping earth from earth and dropping it where it pleased.

Rounding several more huge boulders, we turned onto the Bickford Heights Trail and learned from the app that we had crossed the Meltwater Channel before the steep climb to Bickford Heights. At the top, we were thrilled to find not only an abundance of blueberries but a vista with a stunning view of Mt. Israel. We learned from the app that the bedrock we were sitting on was Concord Granite and 365 million years old, related to the rock underlying coastal New England and Newfoundland, and not the Osceola Granite underlying most of Mt. Chocorua. Again, the app made it easy to picture a glacier moving through such a vast area, and how it changed what was there before.

We continued down the steep Bickford Heights Trail until it intersected with the familiar Middle Trail, which took us around Heron Pond. Thanks to the app, in later hikes we opted to leave the Bickford Heights Trail at the intersection with Watkins Way, a bit of a gentler hike down. We paused to gaze at Heron Pond, "one of several kettle holes in the area." The lovely quote from Frank Bolles included in the app gave a poetic description of the stunningly beautiful Heron Pond.

Back at our car, we guessed that the hour and a half loop was perhaps four miles. We took our time and followed the map in the app, finding surprises and learning much about the area along the way. We felt so grateful for the generosity of the people who made and make the Chocorua Lake Conservancy so special, and for the wonderful app.

Noticing Patterns in the Lake

BY LYNNE FLACCUS
Stewardship Director

I always enjoy watching the seasonal changes around the lake, especially with the approach of fall and dropping temperatures. Despite the drought this summer, and an increase in visitor use, the natural patterns continue, there for the observant to see.

Out on the lake this summer, you might have noticed a few still days when a fine film formed on quiet portions of the lake. This contrast to the clear water we see most days might have led you to wonder if something is going on with the quality of the water. Early this spring, this happened when the pines were shedding their yellow pollen everywhere. I'm usually reminded to watch the water surface for pollen when I start sneezing, my hiking boots turn mustard color after a morning in the field, or my black lab comes in from outside tinged with yellow.

Later in the summer, with the drought-dry roads and dust that was kicked up by cars or by the town road crew while grading, another layer formed, especially along the shoreline, depending on which way the wind was blowing. About the same time, you might have noticed that shrubs along the shore were covered with a dusty hue. One rare rain storm and high wind event in early August kicked up a frothy mix from surface waters and shallow bottom sediments that drifted to the southeast shore. Wave action and wind kicks oxygen into the lake, sometimes creating foam or bubbles that mix with whatever particles are settling at the surface or rising up from the bottom. This can leave a bubbly film at the surface in quieter coves of the lake. On our CLC lake paddle in August, shortly after the above rain event, we discovered this film, an interesting mix to paddle through after slipping from the more open and windy water of the lake. We could see what appeared to be algae, plant bits, exoskeletons of insects, and other organic material, kicked up from the bottom and mixed with the dust.

The shiny clear surface of Chocorua Lake during a late-summer lake paddle. / *Lynne Flaccus*

Though all the water quality sampling data from this summer won't be fully processed and analyzed until this winter, we saw no obvious changes in collected samples this summer to trigger concern. That's good news! Spending time on the water, you can see and feel (during a swim on a hot summer day) the daily and seasonal cycles both at the surface and down below even without sampling equipment. Changing air temperatures, rain, and wind can all influence summer patterns in the lake, especially water temperatures at various depths. Surface water temperatures may fluctuate, but down near the bottom, temperatures remain fairly constant.

In the fall, changes occur when temperatures drop at the surface, and the lake "turns over." As surface temperatures drop, the surface water becomes heavier and sinks to the bottom (water is most dense at a temperature of 39ºF). With a bit of help from the wind, the heavier water forces cooler and oxygen-poor water at the bottom back to the surface. This mixing of the bottom and top layers of water redistributes oxygen and nutrients in the water column in the fall season. Winds, rain, and streams flowing into the lake help with this annual mixing of the lake waters. As lake water continues to cool, it becomes lighter, and eventually surface water reaches 32ºF and forms ice crystals. The fish, turtles, amphibians, and numerous invertebrates that overwinter under the ice depend on this mixing to provide oxygen and nutrients below the surface. Water temperatures at the bottom slow these creatures' metabolisms, and the surface ice acts as a winter blanket for those that live below.

In spring, another turnover occurs. Melting ice, and then the water warmed by the sun, will sink to the bottom, winds will drive that cycle, and another mixing of layers redistributes temperatures, oxygen, and nutrients again.

While most of us can see or feel the seasonal changes and respond to local weather conditions on our neighboring waterways, it can be difficult to grasp the effects of the overall climate on the lake. Scientists' predictions are well-documented for what New Hampshire can expect as the climate changes, and effects on lakes and streams will become more obvious with time.

New Hampshire is expected to have increased annual average temperatures, and an increase in the number of days we see temperatures over 90 degrees

in summer. Though precipitation is expected to increase annually, it will vary by season and be less evenly distributed in time or by location. Rain events are expected to be more extreme with longer periods of drought in between. Winter temperatures are expected to be higher as well, with fewer days of freezing temperatures and less ice cover on lakes and streams.

We see and feel weather patterns when we go outside each day, but the general trend of these larger changes may be less apparent on a day-to-day basis. What does it mean for our lakes? The potential impacts of changing temperatures at the surface can influence the timing of fall and spring turnover and both ice formation in winter and ice-out timing in spring. Both of these changes can impact the normal cycling and distribution of oxygen and nutrients that is so important for the plants and animals that have evolved with these cycles.

Heavier rain events, especially after periods of drought, aren't absorbed quickly enough by the surrounding forests and soils. Run-off and flooding from these rain events carries sediments that in turn carry nutrients like phosphorus. An increase in phosphorus and other naturally occurring nutrients provides an extra boost to the algae and aquatic weeds (both native and exotic), which can "bloom," especially with higher summer temperatures. Algal blooms can block sunlight below and deplete oxygen levels, even more so when they die back and decomposition uses up more oxygen. The changing plant growth and oxygen levels will in turn create challenges for fish and other animals of the lake.

These are just a few consequences of climate change we might see, though some may be unnoticeable while we are out for a paddle or swim in any given week. We may view our experiences on the water as just another "weather event," but it will be harder to miss the trends of less snow and ice, hotter days, bigger sporadic storms and, eventually, the ecological impacts on our waters. Being observant and paying attention to what is happening around us, reducing our impact where we can, and working on solutions around the lake, however small they might seem, is critically important.

WATER FACTS AND FIGURES

How much fresh drinking water is there on earth?

97% of earth's water is salt water.

2% is taken up in ice: ice caps and glaciers.

The rest is fresh water, but **less than 1%** is available to us as surface water.

Each fall in New Hampshire, deciduous trees begin to lose their leaves. As they do, and as conifers slow photosynthesis, less water is taken up in the process. Have you noticed how lakes and stream levels come up in the fall, even with little rain?

Did you know a tree is around 50% water? A healthy 100-foot tree can take up and release as much as 11,000 gallons of water in a season!

Climate change models for this area predict an increase in heavy rain events, with longer periods of drought in between. This year, most of New Hampshire was in drought or severe drought for much of the summer. Looking ahead, we will both want to conserve water in our home systems, and to collect water when it rains, both to store it for use on gardens during periods of drought and to reduce problematic stormwater runoff (see epa.gov/soakuptherain).

Here are some ideas for home water conservation:

- Low-flow toilets. Or put a brick in your tank to take up volume.
- Conserve flushes in your home by only flushing when you need to.
- Turn off your faucet when brushing teeth or shaving.
- Use a small basin instead of a large sink for washing your dishes.
- Get a rain barrel for watering your garden and indoor plants, even if it's just a 5-gallon bucket under the gutter spout. More information here: epa.gov/soakuptherain/soak-rain-rain-barrels
- Use a tap filter instead of buying bottled water—this reduces plastic use, too, and the risk of plastic contamination in oceans and waterways.
- Use mulch in your gardens to retain moisture and reduce the need for watering.
- Have leftover water from steaming veggies? Allow it to cool and water your flowers!
- Finished a cold drink and have leftover ice? Toss it in the garden!
- Take short showers. Better yet, turn off the water while you lather up!

Visit chocorualake.org/news/water-quality-history to learn about our award-winning Berms & Swales project, a Best Management Practice to reduce stormwater runoff from Rt. 16 that was causing an increase in phosphorus levels in the lake.

We leave you with two images showing some of the magic of the lake basin, and with our wish that you enjoy a peaceful winter wherever you are.

The Cook Memorial Library has been working this summer on an oral history project about the 2002 Women of Tamworth Calendar project, which reminded us of this joyous photograph of Ashana Michaels taken on the Narrows Bridge. Thanks to organizers Annie Provenzano and Margo Mallar, and all the participants, the calendar raised over $100K toward projects that supported Tamworth's kids. / *Annie Provenzano*

Hemlock Woolly Adelgid

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The Hemlock Woolly Adelgid *(Adelges tsugae Annand)* is a very small, sapsucking insect related to aphids and scale insects. An exotic introduction from Asia, the adelgid was first discovered on the US east coast in the 1950s near Richmond, Virginia, and has spread north and south since then, devastating hemlock stands during its spread. After an initial infestation, trees can die within several years, following a progressive loss of their crown needles. Although not strongly valued for its timber, hemlock is an extremely important species in our eastern forest ecosystems, helping to maintain fertile soils and stream water quality. The shade provided by hemlock lower branches helps keep stream temperatures cool and dissolved oxygen levels high, conditions required for trout to flourish. Hemlocks also serve as a protective winter shelter and food source for numerous animals. Further, hemlocks can survive up to 800 years, making them among the longest lived organisms in our country.

Adelgids can be recognized by

"Things are noticeably cooling off. Wind picks up. No bugs though. That's good. The colors change daily. Everything is drifting into red and violet with some burned orange. Nobody is around except an occasional leaf peeper. There are so many things going on in the world right now. Many of them are bad. But when I am in this field it is just me and the mountain and the fast changing light. Scrambling for grace." —Alex Kanevsky, October 2020 / *Photo and painting by Alex Kanevsky*

the small cottony sacs at the base of hemlock needles that individuals (all females) produce around their body as they mature in the spring and fall. University and government programs have researched the potential of various insect predators, also known as "biological control agents" (mostly small beetles and fly larvae), to help control the adelgid, but it is premature to determine their impact. Physical clipping of infested twigs and chemical controls (horticultural oils, systemic tree injections) are effective homeowner control methods, but treating trees with insecticides in the deep woods, especially near streams, is usually impractical.

Hemlock woolly adelgid on a hemlock branch. *Matt Wallace*

Some research studies have concluded an inevitable northern expansion of the adelgid as winters continue to warm due to climate change. The impact of the adelgid in northern forests may be greater than the southern Appalachians, due to the higher density of hemlock in northern New England.

Ed.: Learn more about the Hemlock Woolly Adelgid, the State of NH's action plan, and what to do if you spot this pest in your area, here: nhbugs.org/hemlock-woolly-adelgid

The Chocorua Lake Conservancy publishes and distributes an educational newsletter twice a year, in the Spring/Summer and Fall/Winter. Current and past issues are posted online at chocorualake.org.

Have an idea for a newsletter article? Let us know!

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CHOCORUA LAKE CONSERVANCY
Land & Water Stewards Since 1968

The Chocorua Lake Conservancy is a volunteer-led land trust dedicated to its mission of protecting the natural beauty of the Chocorua Lake Basin and providing public access for present and future visitors.

Close to Home

Fall colors shimmer across the misty early-morning surface of the lake. / *Alex Moot*

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