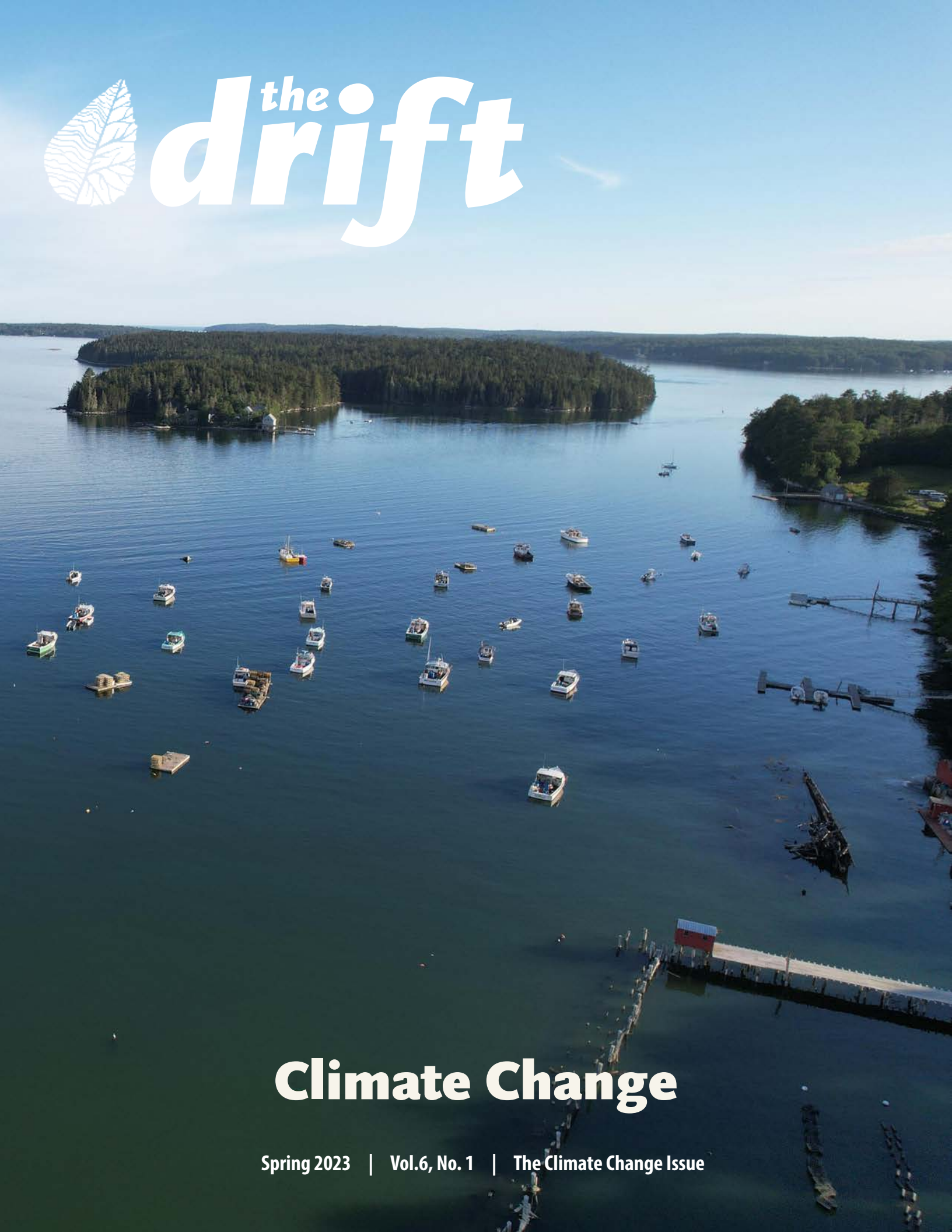

the drift

Climate Change

Spring 2023 | Vol.6, No. 1 | The Climate Change Issue

MIDCOAST

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THE MISSION OF MIDCOAST CONSERVANCY IS TO PROTECT AND RESTORE VITAL LANDS AND WATERS ON A SCALE THAT MATTERS.

WE ENVISION A WORLD WHERE OUR LANDS AND WATERS ARE HEALTHY AND PROTECTED AND WHERE NATURE OCCUPIES A PLACE OF CENTRAL IMPORTANCE IN EVERY PERSON'S LIFE.

OUR CHANGING CLIMATE

...Understanding the local impacts of climate change is crucial in devising strategies to mitigate its effect... there is an enormous potential for local actions to make a difference. They can stimulate global actions.
—James Hansen

ACT LOCALLY WITH US!

By Pete Nichols & Buck O'Herin

"THINK GLOBALLY, ACT LOCALLY", THE BUMPER STICKER TAGLINE COINED IN THE TIME AFTER THE FIRST EARTH DAY IN 1970, IS NEVER MORE URGENT THAN IT IS NOW. FORMER NASA SCIENTIST AND RENOWNED CLIMATE ACTIVIST JAMES HANSEN STATED THE CONCEPT WELL: "...UNDERSTANDING THE LOCAL IMPACTS OF CLIMATE CHANGE IS CRUCIAL IN DEVISING STRATEGIES TO MITIGATE ITS EFFECTS. " HE ADDED, "THERE IS AN ENORMOUS POTENTIAL FOR LOCAL ACTIONS TO MAKE A DIFFERENCE. THEY CAN STIMULATE GLOBAL ACTIONS."

In the pages that follow, you will see what we here at Midcoast Conservancy are doing to 'act locally' through our land, water, and community initiatives: working with landowners to protect their land through a variety of conservation strategies, working to protect the waters that define the midcoast region, and providing trails and activities to deepen the relationship between our communities and the natural world.

We can't do it alone. "Acting Locally" connects us with each other and the underlying fabric of our lives—the natural world, opening us to a larger purpose and a greater sense of what is possible. Every natural system, whether a wetland, rainforest, or free-flowing river needs to work in concert with the other processes and beings in that system to thrive. We are no different. By working together, to promote sustainable communities and protect the environment and our way of life here on the midcoast, we can help to build a more resilient and sustainable future for all beings and the generations to come.

Be part of the solution! Join Midcoast Conservancy as we work to protect 30,000 acres in the region by 2030, become a member or volunteer, attend one of our events or workshops, and most importantly get out and enjoy the beauty that surrounds us all!

NEW FACES AT MIDCOAST CONSERVANCY

Stephanie Hanner
Grants Manager
As our new Grants Manager, Stephanie brings to Midcoast Conservancy her experience in fundraising, marketing, communications, and advocacy roles in Maine's non-profit sector. She has a M.A. in Corporate and Public Communications and an M.A. in International Relations and Diplomacy, both from Seton Hall University, and a B.A. in Public Relations from SUNY Oswego. Stephanie also holds certificates in Grant Writing and Plant-Based Nutrition.

Tripp Henderson
Director of Hidden Valley Nature Center
Tripp grew up in Northern Virginia, building forts in the woods behind his house and hiking in the Appalachians with his family. After going to the University of Kansas, he found his way out to the Pacific Northwest doing trail work on the Pacific Crest Trail, finally landing in Alaska where he built round log cabins with the Forest Service and guided with Alaska Crossings. Upon returning to the Lower 48, Tripp landed in midcoast Maine to continue pursuing his passion for the outdoors. Now with wife and kids in tow, Tripp continues to love getting lost in the woods and on the waters of the Midcoast.

Linc Oliver-O'Neil
MCC Environmental Land Steward
Linc is supporting the Lands team through volunteer and community engagement, event planning and facilitation, and property management projects as a Maine Conservation Corp Land Steward. Linc comes to Midcoast Conservancy as a builder, facilitator, and conflict mediator. Linc strives to (re)connect people to themselves, each other, and the ecosystems they live in. They have two bachelor's degrees from Northwestern University.

Genny Davis
MCC Environmental Water Steward
Genny is serving for the year as our Maine Conservation Corps Environmental Water Steward, helping with our summer Youth Conservation Corps at Damariscotta Lake, and supporting our aquaculture program. She grew up in central Virginia; since graduating with a B.A. in Environmental Studies from Warren Wilson, she has worked at the Patuxent Research Refuge with the Chesapeake Conservation Corps and the New Jersey Audubon at Cape May Bird Observatory as a Monarch Field Naturalist.

WINTER IS ALWAYS A BUSY TIME AT HVNC AND THIS YEAR WAS NO EXCEPTION—AND THE NEW WELCOME CENTER MADE EVERYTHING EASIER! WITH RENTALS AND STAFF (ALONG WITH DEDICATED VOLUNTEERS—LOOKING AT YOU, SANDI HODGE!) ALL CONVENIENTLY LOCATED JUST INSIDE THE GATE, THE STEADY STREAM OF VISITORS HAD NO TROUBLE GETTING THE GEAR AND INFORMATION THEY NEEDED IN ORDER TO HAVE A GREAT DAY ON THE TRAILS. THE PIZZA OVENS AT THE BARN SAW PLENTY OF ACTION: AFTER THE YOUTH SKI CLINIC, AT THE BIATHLON AND ON OUR SNOW DAY POP-UP EVENT, ALONG WITH STAFF MEETINGS AND FAREWELL GATHERINGS.

Which brings us to the biggest change at HVNC: after seven years of pouring himself into all things Hidden Valley, and giving over lots of weekends to work rather than family, Andy Bezon left Midcoast Conservancy at the end of March to start a new adventure at Hurricane Island Outward Bound. As part of his send-off, we renamed the Barn: it is now the Bezon Barn! We are thrilled for him, even as we miss his ginger cheer, and we feel incredibly lucky to have brought on board his successor, Tripp Henderson. As we head into a busy season of programs and events at HVNC, we hope you'll make a point of introducing yourself to Tripp (he's easy to spot at 6'7") and welcoming him into the fold!

The council has been working to get an exciting roster of programs ready for the summer. Be sure to check out the website for all upcoming hikes, workshops and events like the Live Edge Music Festival and the Race Through the Woods. We're really excited to offer an encore presentation of the Coyote and the Boy Ben Marionette Show this September. It filled up fast last year so sign up early! Full Moon Paddles have begun so if an evening gliding in a canoe under moonlight calls to you, sign up on our website to reserve your seat in a boat.

As always, we welcome new council members—with new faces come new ideas and new energy so don't hesitate to reach out and join us for one of our monthly meetings at the Welcome Center. See you on the trail!

@hidden_valley_nature_center
Hidden Valley Nature Center
www.midcoastconservancy.org/hvnc

LET'S HELP PROTECT OUR LAKE FROM INVASIVE PLANTS! SOME OF THE MOST IMPORTANT WORK THAT MIDCOAST CONSERVANCY PERFORMS ON DAMARISCOTTA LAKE IS EARLY DETECTION AND PREVENTING INFESTATION OF INVASIVE AQUATIC PLANTS. AS WE SAW WITH HYDRILLA, EARLY DETECTION CAN LEAD TO SUCCESSFUL REMOVAL. AS LAKE WATER TEMPERATURES CONTINUE TO RISE, THE RISK OF SUCH INFESTATIONS IS ALSO GROWING. MUCH PREVENTATIVE WORK IS DONE BY VOLUNTEERS THROUGH TWO IMPORTANT PROGRAMS, COURTESY BOAT INSPECTION (CBI) AND INVASIVE PLANT PATROL (IPP).

CBI volunteers are assigned two-hour shifts at one of the two public boat launches on the lake. The inspection process is simple: boats and trailers are inspected for plant material as watercraft are launched at the lake and as they are pulled out. A large area of invasive plant growth can begin from one small "hitchhiking" piece of an invasive plant and may grow to choke waterways, out-compete important native plants, and decrease property values. Performing these inspections is not difficult or intimidating and any unknown plant material should be saved for later identification by a trained expert. A small amount of information about each boat is recorded as well. In my experience as a CBI volunteer, I have never encountered anything except positive, appreciative responses from boat owners. I am most often enthusiastically thanked for the work that our volunteers are doing to protect the lake.

Inspecting the lake for invasive plants is another important volunteer activity. Invasive Plant Patrol (IPP) volunteers are assigned an area of the lake shoreline, usually near a public launch or near their property. The volunteer looks for plants in that area that have characteristics similar to invasive species. This is usually done from a kayak or small boat using the naked eye or special scopes provided by Midcoast Conservancy, or by swimming or wading and using a mask and snorkel. Volunteers are thoroughly trained to recognize certain patterns of the few invasive plant species that may be found. A waterproof guide is also provided for use in the water to compare plant characteristics as they are observed. As with CBI, the burden to positively identify potential invasive plants is not placed on the volunteer; all suspicious plants should be identified by an expert. As an IPP volunteer, I have learned that spotting a suspect plant is very easy, because most of the native aquatic plants have very clear characteristics different from those of the invasive species. Having this work performed on as much of the lakeshore as possible is the best way to proactively discover the beginning of a possible invasive plant infestation and address it before it grows larger.

As you can imagine, we need all the volunteers we can get for this important work with CBI and IPP. Please contact Patricia at patricia@midcoastconservancy.org and join our team this summer!

@damariscottalakewatch

Damariscotta Lake Watch - Midcoast Conservancy

www.midcoastconservancy.org/damariscotta

IF YOU FIND YOURSELF DRIVING DOWN ROUTE 1 IN WALDOBORO, TURN INTO THE HISTORIC DOWNTOWN AREA. THERE YOU WILL FIND A CLASSIC MIDCOAST MAINE TOWN WITH OLD BRICK BUILDINGS, NOT LACKING IN CHARACTER. NESTLED IN THIS AREA IS THE MEDOMAK VALLEY OFFICE OF MIDCOAST CONSERVANCY. AFTER SOME YEARS OF VACANCY, STAFF MEMBERS MORGANNE PRICE, ISOBEL CURTIS, AND LINC OLIVER-O'NEIL HAVE SPENT THE WINTER BREATHING NEW LIFE INTO THE SPACE. FEEL FREE TO STOP IN AND SAY HELLO. WE OFTEN HAVE THE MIDCOAST CONSERVANCY FLAG OUT FLYING PROUDLY.

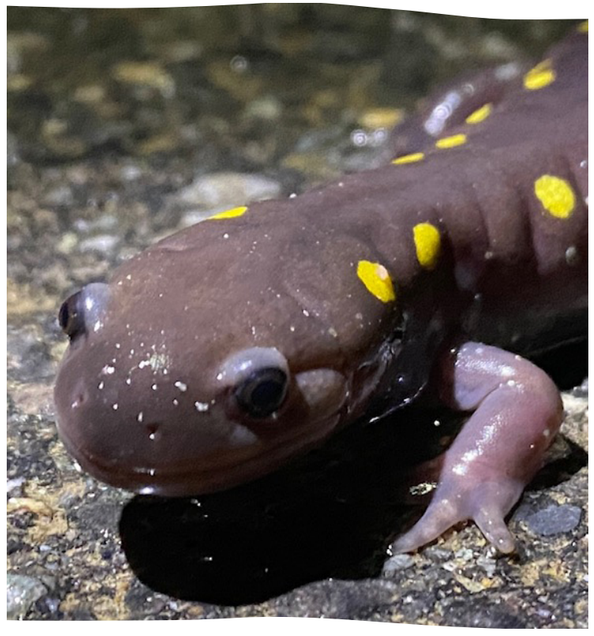
As Morganne settles in as the Medomak River Watershed Manager, she has taken on the role of the Medomak Valley Council liaison for Midcoast Conservancy. Morganne grew up in Waldoboro and remembers what an important part of the area the land trust was. She is hoping to be able to work with council chair Bennett Collins and the rest of the amazing council to reconnect with the watershed and the amazing people who reside in it.

We already have an exciting line-up for the summer. We will be continuing our seasonal water quality monitoring program with the Maine Coastal Observing Alliance, but this year we are expanding our season: yay for more data! On June 17th Waldoboro is celebrating its 250th anniversary and we are looking forward to once again representing land and water conservation in the parade. Keep an eye out for us! Last summer we worked with the Maine Island Trail Association to clean up lobster traps that had washed up on Oar Island. The herculean effort removed many traps, but plenty remain. This summer we will be returning to the island to continue the clean-up. If you are interested in helping out at any of our events, volunteering, or just want to chat, please email Morganne at morganne@midcoastconservancy.org. She always welcomes input from the community! To stay up to date on the happenings in the Medomak region, be sure to follow us on Facebook and Instagram. We post about events and also fun facts about the land, water, and critters we share this space with.

@midcoastmedomak

Medomak Valley - Midcoast Conservancy

www.midcoastconservancy.org/medomak-valley



Photos: Bob Brooks

Our dedicated group has been taking part in Big Night activities and continues to support the Friends of Haystack Mountain on the final fundraising push to complete the purchase and protection of this local treasure.

BIG NIGHT 2023!

Several folks participated in Big Night in mid-April. Big Night is a mass amphibian migration that occurs during warm, rainy nights from late March to early May where volunteers patrol the roads to make sure these critters make it across safely. This year's totals are of the amphibians assisted across the Halldale Road (between Montville Bakery and Howard Road). Participants Susan and Chris Marshall, Bob Brooks and Janice Kasper reported the following observations:

11 Spotted Salamanders
11 Wood Frogs
10 Spring Peepers
2 Eastern Red-Back Salamanders
7 Dead amphibians noted (2 Peepers, 5 Unidentified)

IT'S BLUEBIRD SEASON!

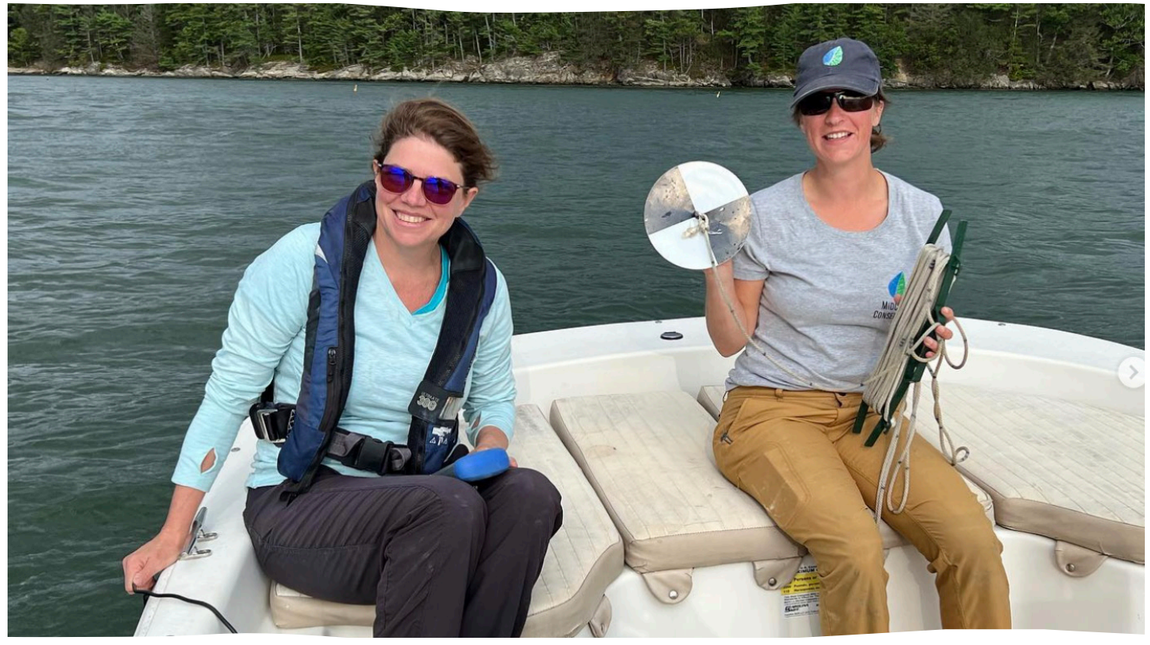
Enjoy this story from birdbox host John Twomey:

In about 1982 a friend, Judd Jones of Montville, was visited by a couple of Norwegian birders who had been attempting to see nesting bluebirds in Maine. They had had no luck but Judd had heard from a mutual friend of ours that a pair of bluebirds were raising chicks on my place. At that point, bluebirds were not a common sight in this area, so Judd called to ask if he could bring the Norwegians over to view the birds. They came by and were able to witness the adult bluebirds bringing food to their young in the old bird box that was attached to the side of one of my outbuildings.

Shortly after this experience I began to build and install bluebird boxes on my farm and have continued to do so up to today. Early on, the boxes were all taken by tree swallows and occasionally chickadees. In the late 1980's bluebirds began nesting in my boxes—but never more than one pair per year. This pattern persisted for 30 plus years and then the number of bluebirds began to increase.

Fast forward to 2022: of the nine bird boxes that Leigh and I have, four are presently occupied by bluebirds. Those boxes currently contain a total of 18 chicks that should fledge within the next 10 days. It is likely that these parent bluebirds will raise another brood of chicks later in the summer! Friends in this area who also have bird boxes are also seeing more bluebirds. (2023 update: activity has begun!)

@sheepscotriverwatershed
Sheepscot River - Midcoast Conservancy
www.midcoastconservancy.org/sheepscot-headwaters



EXCITING THINGS ARE HAPPENING IN THE SHEEPSCOT WATER-WORLD! WE'RE ENTERING OUR 30TH YEAR OF MONITORING WATER QUALITY IN THE RIVER AND EXPANDING OUR ESTUARINE MONITORING PROGRAM THIS YEAR.

The Branch Pond Project with the Atlantic Salmon Federation is moving forward with construction this summer, beginning in June. Aspects of the project include stabilizing the dam and the installation of a fishway and hand-carry boat launch. Once the fishway is installed, alewives will be able to return to this historic spawning pond!

In other news, the Sheepscot Knotweed Project, a community project composed of Sheepscot Valley Council members, local residents, and Midcoast Conservancy, is entering into its second year of knotweed management and riparian restoration work on the Sheepscot River. The knotweed patch at Midcoast Conservancy's Trout Brook North property is showing promising results with no knotweed canes resprouting yet, though some regrowth is expected. Control efforts have also begun on neighboring privately owned properties. We coordinated with the Alna Fire Department to conduct a controlled burn on one easement landowner's property in April as a training exercise to help clear dead, woody knotweed canes prior to spring cutting of live growth. Time will tell if this was an effective method! Stay tuned.

Overall, the Sheepscot River is a watershed that we continue to be dedicated to—for community connection, ecological health, and of course, for the sake of the fish who depend on it!

@sheepscotriverwatershed
Sheepscot River - Midcoast Conservancy
www.midcoastconservancy.org/sheepscot-valley

THERE IS STILL HOPE: A CLIMATE CHANGE CALL TO ACTION

By Pete Nichols

Photo: Tim Trumbauer
Working waterfront in Bremen.

WILDFIRES IN THE WEST, UNPREDICTABLE HURRICANE SEASONS AND SHIFTING WEATHER PATTERNS GLOBALLY MAKE ALMOST DAILY APPEARANCES IN THE NEWS MEDIA AND ARE THE LATEST INDICATOR THAT CLIMATE CHANGE IS UPON US; THIS GLOBAL CRISIS IS FAR-REACHING AND IMPACTS EVERY REGION OF THE WORLD, INCLUDING MAINE. THE STATE OF MAINE IS EXPERIENCING CHANGES IN ITS CLIMATE THAT ARE QUICKLY IMPACTING NATURE, ECOSYSTEMS, AND COMMUNITIES. THESE EFFECTS ARE COMPOUNDED BY THE INCREASING DEVELOPMENT PRESSURES IN THE STATE, WHICH THREATEN THE LANDSCAPE AND BIODIVERSITY ACROSS MAINE. AND WHILE MANY CONSERVATIONISTS HAVE WITNESSED THESE TRENDS FOR DECADES, IT MAY FINALLY TAKE THE IMPACTS THEY BRING TO LOCAL ECONOMIES (I'M LOOKING AT YOU, LOBSTER FANS) FOR US TO WAKE UP COLLECTIVELY TO THIS CRISIS. AT MIDCOAST CONSERVANCY, WE HAVE DECIDED TO FAST-TRACK THAT WORK TO PROTECT OUR WILD PLACES AND COMMUNITIES FROM THESE THREATS.

A changing climate and increasing development pressures have significant impacts on Maine's natural environment, threatening its diverse ecosystems, biodiversity, and water resources. Rising sea levels, more frequent and intense weather events, and warming temperatures have altered the state's ecological and cultural landscape, necessitating the implementation of sustainable conservation practices. To mitigate these impacts, land trusts like Midcoast Conservancy play an important role in protecting and preserving Maine's natural areas through taking a holistic approach to conservation planning and strategy, as Midcoast Conservancy has with our 30x30 Land and Water Conservation Initiative.

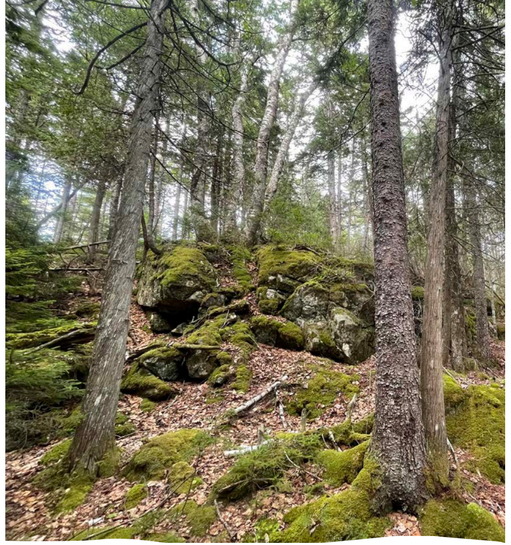
Land trusts like Midcoast Conservancy play an important role in protecting and preserving Maine's natural areas through taking a holistic approach to conservation planning and strategy.

Maine's coastal regions are particularly vulnerable to the effects of climate change, with sea levels projected to rise by 1.3 feet by 2050 and 3.6 feet by 2100. This rise in sea levels is expected to cause coastal flooding, erosion, and saltwater intrusion into freshwater sources, affecting the state's coastal communities and natural habitats.[1] Additionally, Maine has experienced an increase in the frequency and intensity of extreme weather events, such as impacts from southern hurricanes and heavy precipitation events, which cause flooding, property damage, and soil erosion.[2] These impacts, individually and combined, threaten Maine's biodiversity and wildlife habitats, with some species already facing extinction due to changes in temperature and precipitation patterns.[3]

The Maine Climate Change Action Plan recognizes the need for comprehensive strategies to address the impacts of climate change, including conservation and protection of natural areas.[4] At Midcoast Conservancy, we are doing just that by working to conserve and restore the state's natural areas and protect its vital ecological resources.

In addition to the impacts of climate change, Maine is also experiencing increasing development pressures, which are threatening our wild landscape through land conversion and fragmentation. Maine's population has been steadily increasing over the years, and

The impacts of climate change and increasing development pressures in Maine bring to the fore the need for innovative conservation practices to protect the state's natural areas, preserve its biodiversity, and protect the quality of life in our communities. There are ways you can help, so please join us and learn how at: midcoastconservancy.org.



currently has an estimated population of 1.3 million in 2020 (US Census Bureau), which has increased development and land use changes such as the conversion of natural habitats into urban and suburban areas. According to Maine Housing data, between 2010 and 2017, the state's population grew by 3.3%, while the amount of land developed for residential and commercial use increased by 4.4%. This trend is expected to continue in the coming years, putting even more pressure on Maine's natural resources and ecosystems. Considering these combined impacts from climate change and increasing development, Midcoast Conservancy decided to take the issue head on.

After a year of planning, our 30x30 Land and Water Conservation Initiative is launching and aims to conserve 30,000 acres in our watersheds by 2030. Aligned with the global 30x30 goal endorsed by the United Nations,[5] this initiative provides us with the information to conserve our vital land and water resources, reduce the impacts of climate change, and preserve Maine's natural heritage for future generations.

Through this initiative, Midcoast Conservancy will be working to protect forests, wetlands, and other natural areas that sequester carbon and reduce greenhouse gas emissions. These protected lands also provide critical habitat for wildlife, protect water quality, and provide recreational opportunities for residents and visitors alike.[6] The conservation of these areas is critical for maintaining the ecological health of Maine's ecosystems and mitigating the impacts of climate change.

The impacts of climate change and increasing development pressures in Maine bring to the fore the need for innovative conservation practices to protect the state's natural areas, preserve its biodiversity, and protect the quality of life in our communities. There are ways you can help, so please join us and learn how at: www.midcoastconservancy.org.

[1] Maine Climate Council. 2020. Maine Won't Wait: A Four-Year Plan for Climate Action. Available at https://www.maine.gov/dacf/climate/documents/Maine-Climate-Council-Final-Report.pdf.
[2] Ibid.
[3] Intergovernmental Panel on Climate Change. 2019. IPCC Special Report on the Ocean and Cryosphere in a Changing Climate. Available at https://www.ipcc.ch/sroccl/.
[4] Maine Climate Council. 2020. Maine Won't Wait: A Four-Year Plan for Climate Action.
[5] Midcoast Conservancy. 2021. 30x30 Land and Water Conservation Initiative. Available at https://www.midcoastconservancy.org/30x30/.
[6] Ibid.

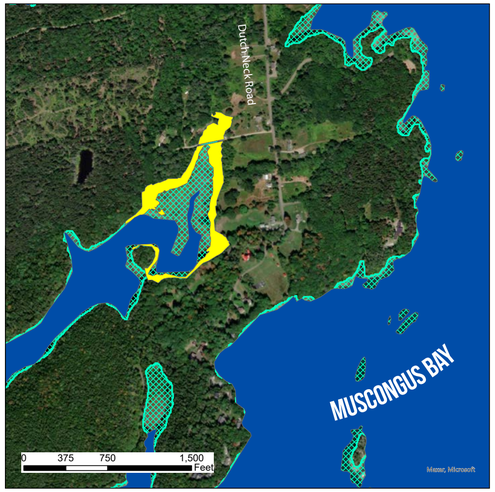
OUR CHANGING LANDSCAPE

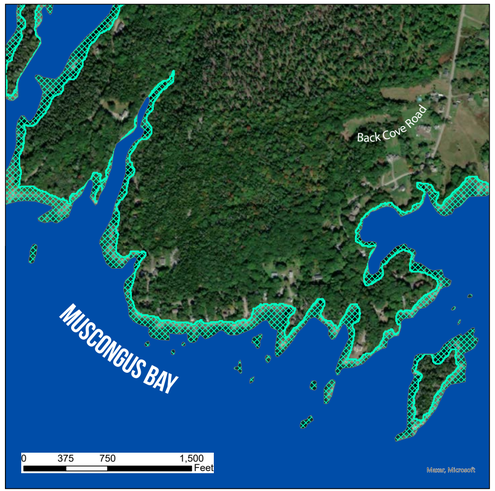
By Chris Schorn

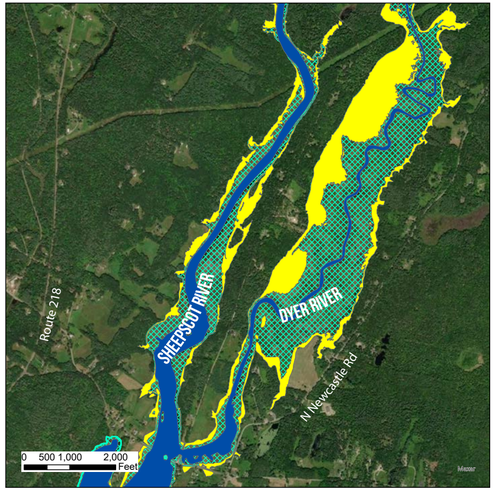
ACCORDING TO MAINE'S CLIMATE ACTION PLAN, MAINE WON'T WAIT. SEA LEVEL RISE IN THE GULF OF MAINE IS PREDICTED TO REACH 4.1 FEET ABOVE CURRENT HIGH WATER LINE BY 2100. WHAT THIS MEANS, FIRST AND FOREMOST, IS LOSS OF SHORELINE; BOTH COASTAL PROPERTIES AND WORKING WATERFRONTS WILL BE AFFECTED. IN ADDITION, THIS WILL RESULT IN MASSIVE ECOLOGICAL CHANGES TO OUR TIDAL ECOSYSTEMS, WHICH PROVIDE INVALUABLE SERVICES BY MITIGATING STORM SURGES AND SEQUESTERING HIGH AMOUNTS OF CARBON FROM THE ATMOSPHERE.

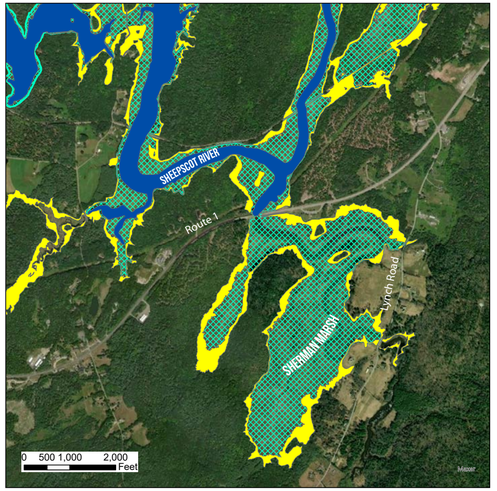
Our tidal saltmarshes also provide habitat for a number of rare, threatened, and endangered plant and animal species—the most emblematic of which may be the saltmarsh sparrow (Ammodramus caudacutus), which requires predictable tide periods to successfully establish nests in the saltmarsh hay.

As sea level rises, these marginal ecosystems will need to "migrate" upland in order to persist; the key question is if suitable landscape exists. We face a drastically changed landscape and shoreline; these maps illustrate what the coastal landscape of midcoast Maine may look like in 2100.









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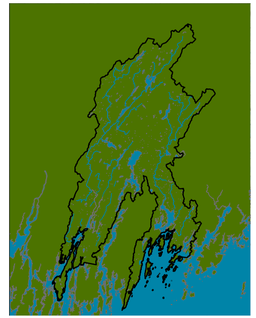


Map of Midcoast Conservancy's Service Area

LEGEND

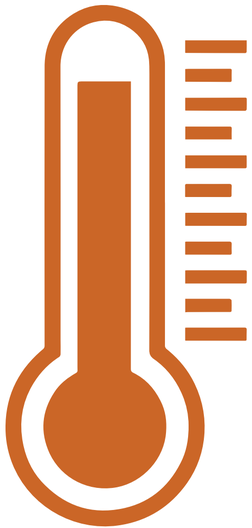
- Current Sea Level
- Saltmarsh Migration Zones
- Expected Sea Level Rise

MAINE'S CHANGING CLIMATE: BY THE NUMBERS

by Air Rhodes & Genny Davis

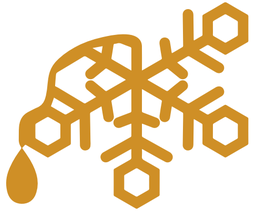
MIDCOAST MAINE IS ALREADY IMPACTED BY CLIMATE CHANGE:

In Maine, our lands and waters are our way of life – where we earn our livelihoods, raise our families, and find fulfillment and peace. Indeed, we are inextricably tied to this place we love and call home. But the climate crisis – a code red for humanity – is disrupting our cherished way of life, threatening our economy, and endangering our future.
— Governor Janet Mills



RAINIER & STORMIER:

- Annual precipitation has increased by 6”
- Storms are more intense, with precipitation from heavy storms +70%
- More frequent: we have 10-15 more intense storms per year
- 4x more nuisance flooding
- …and more drought in summer & fall



LESS WINTERY:

- Winters are warming faster than other seasons
- We have 19 fewer days with snow cover
- Average ice thickness has decreased 9”
- Ice-out is 16 days earlier
- Spring comes 2 weeks earlier

GETTING HOTTER:

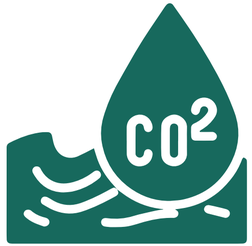
- Annual temperature has increased by 3.2°F since 1895
- Will warm an additional 2 to 4°F by 2050
- By 2050, there will be 36 days annually above 90 degrees

LESS BEACH:

- Sea level will rise between 3 and 5 feet by 2100
- By 2050, sea level may rise 1.6’, which will reduce the dry beach area by 43%

THREATENED SPECIES:

- 1/3 of the plants and animals found in Maine are threatened by climate-change
- 11-58% of Maine’s species (depending on adaptability) will go extinct
- Threatened animals include iconic Maine species like loon, Moose, and Atlantic salmon



UNHEALTHY WATERS:

- The Gulf of Maine is warming more than 3x faster than the world’s oceans, and has warmed 3.7°F
- Maine lake surfaces have warmed ~5.5°F – faster than global averages
- Carbon dioxide + seawater = acid. By 2050, most of the Gulf of Maine will be too acidic for shellfish.

SOLUTIONS:

Maine’s forests sequester an enormous amount of carbon - an amount approximately equal to 60% of the state’s carbon emissions.

Most facts cited here are from the “Scientific Assessment of Climate Change and Its Effects in Maine” by the Maine Climate Council Scientific and Technical Subcommittee, from August 2020.

INVASIVE SPECIES:

- Hemlock woolly adelgid, an insect that kills hemlock trees, is in more than 60 southern and coastal Maine towns
- Emerald ash borer beetle, which kills ash trees, is infesting Aroostook, York, and Cumberland counties
- Invasive plants like knotweed and barberry are choking out native habitats
- Viruses are invasive species: Maine’s Lyme Disease increased 1,290% in 20 years

ICE-OUT IN DAMARISCOTTA LAKE

By Jim Birkett

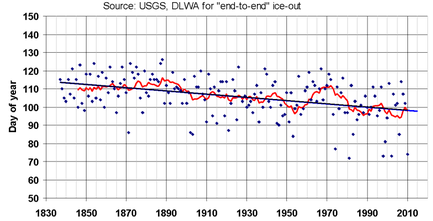
OVER THE YEARS A REMARKABLE AMOUNT OF DATA HAS BEEN COLLECTED CONCERNING ICE-OUT DATES IN NORTHERN LAKES AND RIVERS. THESE DATES HAVE BEEN RECORDED BY INDIVIDUALS, FAMILIES, COMMUNITIES, ASSOCIATIONS, AND BUSINESSES WHO ARE IMPACTED BY THE AVAILABILITY OF OPEN WATER FOR TRANSPORTATION, FISHING OR RECREATIONAL PURPOSES. THE UNITED STATES GEOLOGICAL SURVEY (USGS) IS THE CENTRAL REPOSITORY FOR THIS INFORMATION IN THE US ALTHOUGH IT IS ALSO ON FILE AT THE STATE LEVEL AND AT VARIOUS UNIVERSITIES. IN MAINE, DATA ARE AVAILABLE FOR 29 LAKES AND RIVERS AND CAN BE FOUND ON THE WEB AT HTTP://ME.WATER.USGS.GOV/ICEOUT/HTML.

The USGS Damariscotta Lake data are virtually complete from 1837 to 2021 and it is not difficult to fill in the missing recent data from local observations. That gives us a span of some 184 years to consider! The convention has been to record the date of ice-out not by day of the month but by the day of the year. The accompanying graph shows the individual dates of observed ice-out over the years. In addition to the individual dates, the figure shows (wiggly red line) the ten-year trailing average of the dates. Such averaging over time smoothes the data by reducing the year-to-year scatter. It would appear that ice-out is now generally occurring about two weeks earlier than 184 years ago. It also is apparent that there has been much more variability in dates during the past 25 years of history than during the first 25 recorded years. And note that the difference between the latest observed ice-out (day 126 in 1888) and the earliest (day 72 in 1981) is almost eight weeks!

Local ice records have been kept on wood boards for decades.

Damariscotta Lake Ice-Out Date by Year

Source: USGS, DLWA for "end-to-end" ice-out



But wait! Although these data are the best available, that does not mean that they are perfect. For example, “end-to-end” ice-out is defined as the first date on which one can take a boat from Davis Stream in Jefferson to the Mill Pond in Damariscotta Mills. But how often have the published dates been validated by an observer doing just that? Probably seldom, although we do have a delightful article in “Yankee Magazine” on the late Steve Allen of Jefferson making the trip by canoe. More often the dates are estimated from observations at various vantage points along the lake. In addition, the data presume that it has always been the same Damariscotta Lake! But we know that dams have been installed and modified at Damariscotta Mills and that lake levels have been intentionally changed over the years. Is there something that we should take into account here? A deeper lake results also in larger surface area and a significantly greater mass of water. Lastly, the individual dates have been converted to days of the year, although the calendar is merely a human construct. Should we instead give the dates as days before or after the Vernal Equinox, correlating them with nature’s calendar? (A futile attempt was made to determine the impact of El Nino years on ice-out dates. Sorry, nothing there!) Anecdotally, it appears that ice-out date is more a function of the temperature, wind and rain late in the winter season than of intense cold weather earlier.

The Weather Station in Gray, Maine, has records over several decades of “degree-days” of the winter heating seasons.

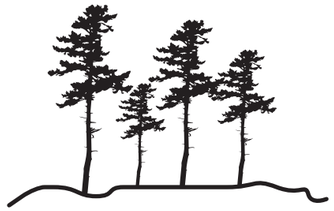
IT AIN'T WHAT IT USED TO BE

by Morganne Price

FROGS ARE SINGING, BUTTERFLIES ARE FLUTTERING, AND THE SWEET SMELL OF MUD IS IN THE AIR. THESE ARE ALL CLASSIC SIGNS OF SPRING IN MAINE, THOUGH THEY FOLLOW A LESS-THAN-CLASSIC WINTER HERE IN THE MIDCOAST. THE GULF OF MAINE IS WARMING FASTER THAN ANY OTHER PART OF THE OCEAN, AND THOSE EFFECTS ARE BEING FELT SHORESIDE. OUR CHANGING MIDCOAST CLIMATE IS IMPACTING MANY OF THE COMMUNITIES HERE. THE WARMING WATERS THREATEN OUR COLD WATER-LOVING FISH SPECIES LIKE BROOK TROUT AND ATLANTIC SALMON. THE REDUCED SNOWFALL AND WARMER TEMPERATURES ALLOW INVASIVE PLANTS AND INSECTS TO THRIVE WHERE THEY HAVE NEVER BEEN BEFORE. THESE ARE THE CLASSIC STORIES OF ECOLOGICAL CHANGE BEING BROUGHT ON BY A SHIFTING CLIMATE.

But what about our human community? Maine has a long history of rugged winters filled with snow, ice, wind, and adventure. Instead of hiding from the frigid temperatures, we embrace winter through ice fishing, snowmobiling, pond hockey, x-country skiing, mushing dogs, and more. When people get out there in the darker parts of the year, they are doing more than just having fun. They are building relationships with their community and their connection to the outdoors. Community is built around friends gathering for a game of pond hockey or riding around on the snowmobile trails with buddies. Generational knowledge and respect for the outdoors comes from children ice fishing with their grandparents. Here they practice patience as they wait to see that little flag fly, indicating a bite. These spaces are where stories are swapped, jokes are cracked, and lessons are learned. Sadly, this past winter did not offer up many opportunities for frosty recreation. Many people were stuck in their homes, unable to access a frozen pond or snowy trails. The technology of ice rinks and machine-made snow at ski resorts are some workarounds for our dwindling winters, but because they call for specialized gear, transportation, and entry costs, these solutions are often financially inaccessible. Being able to get to local frozen lakes and snowy trails allows for everyone to be able to connect with their community and the outdoors.

One thing that makes midcoast Maine such a special place is the sense of community in these small towns. People here are often strongly connected to the land and each other, and winter activities are a big part of that. As we enjoy the many signs of spring that are here now, we can only hope for some frosty temps and snowy skies in the future– and wonder how winter culture will adapt to our changing climate.



A SNAPSHOT IN TIME

by Chris Schorn

CHANGE IS NOT THE ENEMY. TWELVE THOUSAND YEARS AGO, WHERE I'M SITTING RIGHT NOW, I WOULD HAVE BEEN WRITING THIS ARTICLE UNDERWATER. THE NEAREST FORESTS WOULD HAVE BEEN ROCKY, ICY, SPARSE WOODLANDS OF JACK PINES, WITH BIRCHES, POPLARS, AND NOT MUCH ELSE. OVER MILLENNIA, THE GLACIERS RETREATED, MAINE'S CONTINENTAL PLATE REBOUNDED ABOVE SEA LEVEL, AND NOW HERE WE ARE ON SOLID GROUND, AND WE'RE ALL HAPPY TO BE HERE. THE JACK PINE WOODLANDS OF TEN THOUSAND YEARS AGO NOW OCCUPY A SMALL AREA IN MAINE, LIMITED TO THE DOWNEAST COAST AND SOME MID-ELEVATION SUMMITS, AND THE HEART OF THEIR RANGE NOW LIES FURTHER NORTH IN CANADA. THEY HAVE TOTALLY VANISHED FROM OTHER NORTHERN NEW ENGLAND STATES WITHIN THE EUROPEAN COLONIALIST-RECORDED HISTORY, AND SOME DAY WILL VANISH FROM MAINE.

I repeat, change is not the enemy. The jack pines began their exodus long, long before the Industrial Revolution, chasing the edge of the glacial landscape to continue occupying a niche they are adapted to. Though I love their twisted scrubby forms and cute pinky-sized curled cones, I accept that we don't live in the Midcoast they once did. We exist—and always will—in a landscape that is a snapshot in time. The landscape moves much more slowly than we do,

defined by oaks, beech, and white pine, and perhaps less biodiverse as a whole. Ecosystems need time to adapt and shift, to "follow" their environmental niche as it shifts due to climate change. But on a geological time frame, the climate change we are experiencing is abrupt enough to be almost violent. Many species—rare ones, sensitive ones, wildflowers and trees and birds and insects alike—will not have time on their side to migrate and find suitable habitat.

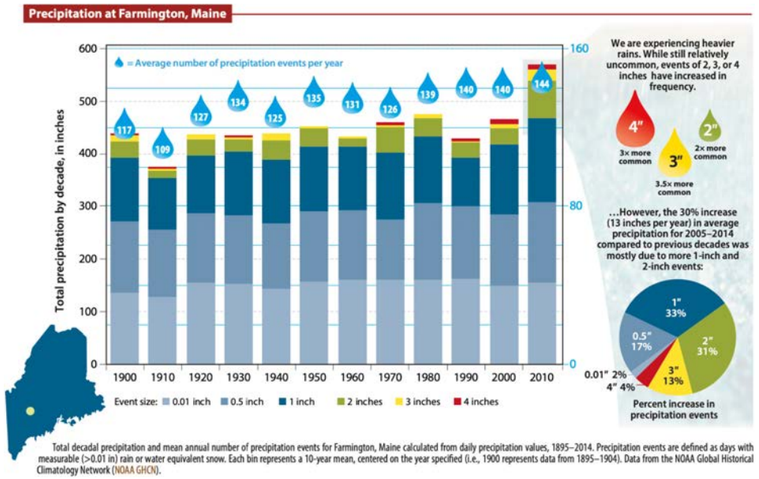
changing set pieces and cast members, slowly enough that we with our (relatively) short lifespans are not guaranteed to notice. **The issue is that this pace of change is picking up the tempo.**

The following forest canopy species are likely to lose significant ground in Maine if climate change proceeds as modeled: red spruce, balsam fir, sugar maple, red maple, yellow birch, paper birch, hemlock, ash. Our boreal and northern hardwood forests will one day—sooner and sooner—be a thing of the past, as distant as our jack pine woodlands. The North Woods of the next generations will be drier, warmer—

So things will be different. Maine will be different. I feel uncomfortable saying outright that it will be inherently "worse". But how do you feel when you consider that one day—sooner and sooner—Maine's forests will look like New Jersey's today? When moose are as much a relic as the jack pine? There is something of a tragedy there because of what the forests of Maine, and our understanding and appreciation of them, mean to us all.

THE LAZY PATH DOWNHILL

by Patricia Nease



Total decadal precipitation and mean annual number of precipitation events for Farmington, Maine calculated from daily precipitation values, 1895–2014. Precipitation events are defined as days with measurable (>0.01 in) rain or water equivalent snow. Each bin represents a 10-year mean, centered on the year specified (i.e., 1900 represents data from 1895–1904). Data from the NOAA Global Historical Climatology Network (NOAA GHCN).

CLIMATE CHANGE IS IMPACTING OUR WATERWAYS IN MANY WAYS. WARMING WATER TEMPERATURES INCREASE THE LIKELIHOOD OF ALGAE OR CYANOBACTERIA BLOOMS; ICE SEASONS ARE SHRINKING AT BOTH ENDS, WITH ICE-ON STARTING LATER AND ICE-OUT HAPPENING EARLIER; AND CLIMATE CHANGE IS EXPECTED TO BRING MORE RAIN, AND MORE EXTREME RAIN EVENTS, TO MAINE.

These more intense rain events increase erosion of sediment, and therefore have the potential to increase sediment and nutrient pollution if effective best management practices are not in place in developed areas. The coastal region of the state already experiences fewer precipitation events with more intensity than inland areas. This puts our critical waterways at risk.

Shorter but more extreme rainstorms have the potential to have a more erosive impact than longer rainstorms where the rainfall is slower. In intense rainstorms the rain may fall faster than the soil is able to absorb all the water leading to water moving downhill towards streams, rivers and lakes. As this water picks up speed, it also picks up the soil particles that cause erosion. Additionally, much of our infrastructure for moving water (think ditches and culverts) were designed for less powerful rain events than we are starting to see because of climate change. This can lead to more erosion as water forces its way downhill.

We are working with landowners in the Damariscotta Lake Watershed to address erosion in light of climate change, thanks to Section 319 of the Clean Water Act funding for our Youth Conservation Corps program as well as larger scale projects. However, you can make a difference wherever you live. Consider the watershed of your property. Where is water going to flow? How can you spread that water out and slow it down? Native plants are a great way to help prevent erosion. They tend to have much deeper root systems (especially compared to turf grass lawns) that will help soak up water. Also, think about how many layers of plants a raindrop has to pass through before hitting the ground. Leaves slow rainfall down and decrease the amount of force a raindrop has when it hits the ground.

Water will always take the lazy path downhill. Find ways to spread it out and slow it down and it will have less erosive power!

CONNECTING FOR RESILIENCE

by Ali Stevenson

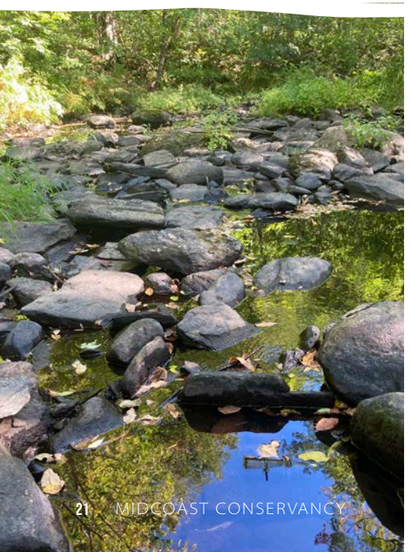
THE ANTICIPATED ACQUISITION OF A NEW PRESERVE CALLED THE CLARRY HILL HIGHLANDS REPRESENTS A MODEL EXPANDING PROTECTED LANDS TO SUPPORT RESILIENCE, AND SUSTAIN NATURAL ECOSYSTEMS THAT NURTURE WILDLIFE AND AGRICULTURAL HEALTH. WITH VIEWS OF THE WHITE MOUNTAINS, MUSCONGUS BAY, AND THE CAMDEN HILLS, THE PRESERVE IS AN ICONIC LANDSCAPE WHERE MAINE'S NATURAL SPLENDOR IS ON FULL DISPLAY.

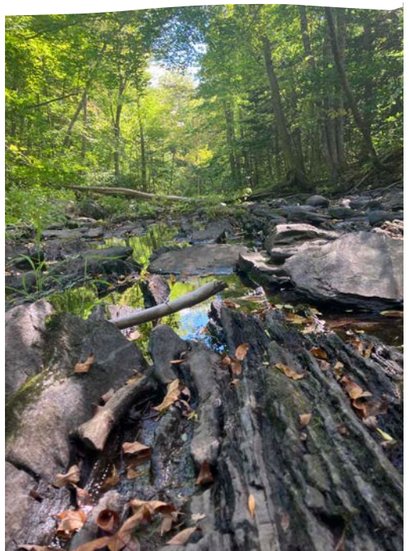
VISIT WWW.CLARRYHILL.ORG TO LEARN MORE ABOUT THE PROJECT.

The 263-acre property is located in Union and Waldoboro. Significantly, the property is adjacent to our existing 87-acre Clarry Hill Preserve, allowing us to better protect this special place for both its habitat value and to support working landscapes in the region.

Pete Nichols says, "Clarry Hill is a unique landscape that celebrates the best of Maine. A first-time visitor would immediately notice the incredible views, but more importantly, the property is lush with blueberry barrens that reflect our state's heritage crops, and it supports habitat for threatened bird species."

Partnerships are key to the scope and scale of climate resilience efforts and with this project we had the support of Maine Farmland Trust, who is contributing to the project by purchasing an agricultural easement. We are also working closely with Hog Island Audubon on this project, as they visit the site frequently as part of their nature programming. The area has long been a destination for bird enthusiasts from around the state and region. We encourage you to experience the Clarry Hill magic for yourself!





WHERE DID ALL THE WATER GO?

by Melissa Cote

THE MAJOR GOAL FOR MY FIRST YEAR AS THE SHEEPSCOT RIVER WATERSHED MANAGER WAS TO IMMERSE MYSELF IN THE SHEEPSCOT RIVER, NOT NECESSARILY PHYSICALLY, BUT TO SOAK UP AS MUCH ABOUT THE NATURAL HISTORY, WATER QUALITY, AND ECOLOGY AS I POSSIBLY COULD.

I wanted to truly KNOW the river, every bend and log jam, its seasonal fluctuations, the issues it is facing. To accomplish this, I dove into fieldwork, familiarizing myself with all of our water quality stations, deploying data loggers, engaging with landowners and volunteers, and working with partner organizations on restoration projects. Last summer, I spent more time in my waders than at the office. The biggest take-away from my time spent in the watershed was the lack of available water in the river during the summer when fish are the most stressed.

Drought conditions are impacting water levels in the Sheepscot River. For the past three years, most of the state of Maine has experienced moderate drought conditions. A US Geological Survey (USGS) gauge in Whitefield measures the total discharge, or flow rate, of the river. The data from the gauge showed that in 2022 the daily discharge of the Sheepscot River was below the calculated median discharge for the majority of May through September (Figure 1). The Sheepscot River is a low gradient river, meaning there is not a large vertical distance between the headwaters and the mouth of the river. The elevation of the Sheepscot headwaters in Montville is only 469 feet above sea level. Low gradient rivers are especially impacted by low flow conditions and result in puddles instead of pools. I saw this first-hand while electrofishing last summer.

As a part of a Rapid Stream Assessment project with the US Fish and Wildlife Service (USFWS) and the Department of Marine Resources (DMR) we collected geomorphic, water quality, and biological data in order to assess the Sheepscot River and target areas for restoration. We electrofished several sites to calculate relative abundance and biomass of each species. The water level at one of the sites on the West Branch was so low, I was sure we would not find any fish, but we did. They were tiny.

Specifically looking at Atlantic salmon, the target species for the project, I observed that the fish at the West Branch site were much smaller than the salmon at a site on the mainstem. This was confirmed by the data, which showed the average lengths and weights of juvenile salmon to be significantly smaller at the West Branch site than those at the mainstem site. We believe this is a result of the low water depth and a lack of deep pools at the West Branch site.

If you gave the Magic 8 Ball a shake, it would probably say "outlook not so good." However, the goal of the Rapid Stream Assessment is to assess the river, target areas for restoration, determine applicable restoration actions, and then implement them. We can't fix the problems without identifying them first, so we take our lead from the data!

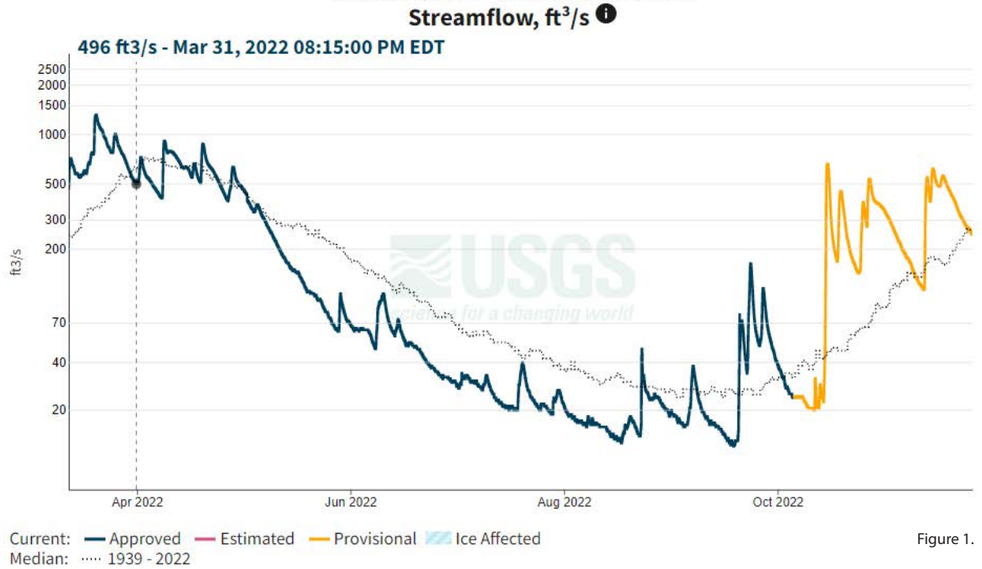


Figure 1.

Figure 1. USGS Stream gage at North Whitefild station showing daily discharge rates vs average (median) discharge rates from 1939 to 2022.

The water level at one of the sites on the West Branch was so low, I was sure we would not find any fish, but we did. They were tiny.

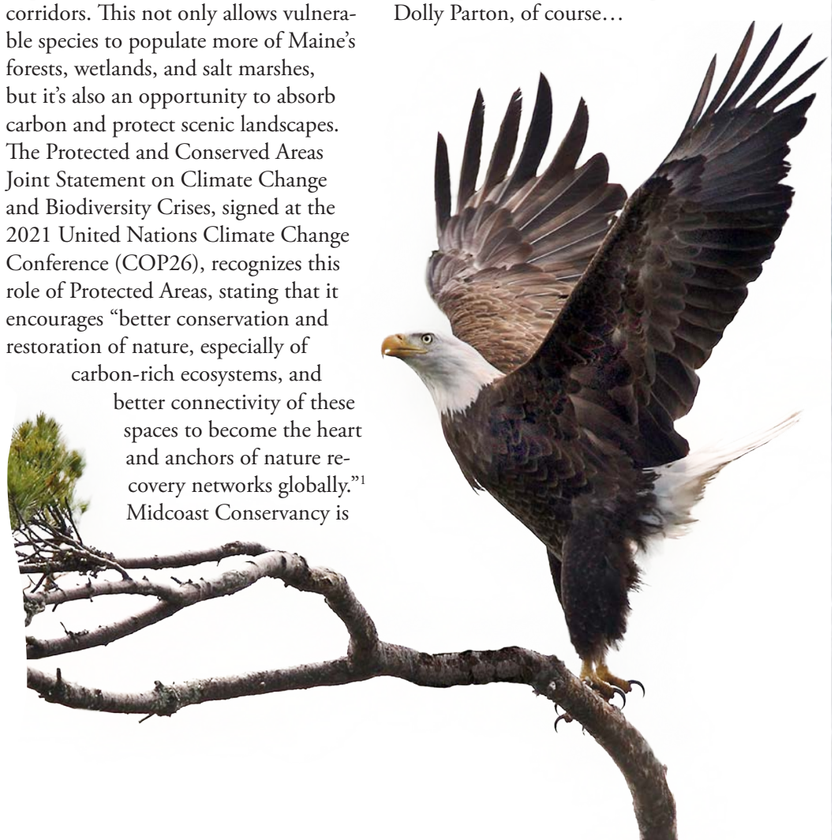
BOFFO BUFFERS: LAND PROTECTION AS A MITIGATION STRATEGY

by Anne Read

RISING SEA LEVELS, DROUGHT, FLOODING, NATURAL DISASTER. THE OVERWHELMING HUMAN-INFLICTED CLIMATE DISASTER CONTINUES TO REVERBERATE AMONG MEDIA OUTLETS AND OUR LOCAL COMMUNITIES, CONFRONTING US WITH OUR UNFORTUNATE AND DESTRUCTIVE PAST AS A SPECIES. AS YVON CHOUINARD REMINDS US, "THE CURE FOR DEPRESSION IS ACTION," AND I TRY TO KEEP THAT IN MY MIND WHEN THE STATE OF OUR CLIMATE SEEMS PARALYZING.

Acting on a local level can have impacts that fan out across the region, and a lot of that has to do with protecting the resources that are intact. I think of our Great Blue Heron and Salt Marsh Sparrow, our Sugar Maple and American Beech, a few of the many species that are directly affected by both a gradual change in Maine's climate and extreme weather events.

An essential step in mitigating devastating climate impacts is providing a buffer of protected land that connects habitat corridors. This not only allows vulnerable species to populate more of Maine's forests, wetlands, and salt marshes, but it's also an opportunity to absorb carbon and protect scenic landscapes. The Protected and Conserved Areas Joint Statement on Climate Change and Biodiversity Crises, signed at the 2021 United Nations Climate Change Conference (COP26), recognizes this role of Protected Areas, stating that it encourages "better conservation and restoration of nature, especially of carbon-rich ecosystems, and better connectivity of these spaces to become the heart and anchors of nature recovery networks globally."[1] Midcoast Conservancy is making efforts to apply this principle locally, through our 30x30 Land and Water Conservation Initiative. A key element of this effort is to connect with landowners and utilize Conservation Easements as a way to keep these buffers and wildlife corridors intact. With what we know now, we all have the potential to make a huge impact on climate change mitigation and habitat protection. Think of the Bald Eagle population recovery! That is directly related to the protection of land that provides key bald eagle habitat and nesting sites. And Dolly Parton, of course…



1 UNFCCC. Glasgow Climate Pact. Decisions 1/CMP.16. (2021)

OYSTERS AS CLIMATE CHANGE SUPERHEROES

by Melissa Cote

PICTURE A WARM SUMMER DAY BY THE OCEAN, A LIGHT SALTY SEA BREEZE ON YOUR FACE, AND A DOZEN FRESHLY SHUCKED OYSTERS BASKING ON A PLATE OF ICE. AS YOU ENJOY YOUR OYSTERS, PERHAPS YOU'RE THINKING ABOUT THE BRININESS OR WHICH ACCOUTREMENT YOU'RE GOING TO TRY NEXT—A SIMPLE SQUEEZE OF LEMON OR THE HORSERADISH SAUCE? NEXT TIME YOU FIND YOURSELF ENJOYING THE SELECTION FROM THE RAW BAR, I CHALLENGE YOU TO THINK ABOUT THE BENEFITS OF THE CHOICE YOU MADE.

Farmed oysters provide many ecosystem benefits to the estuaries in which they grow. They improve water quality, protect shorelines from erosion, and provide habitat structure for other organisms. More frequent and intense precipitation events resulting from climate change can increase surface runoff and flooding, negatively impacting water quality. A rise in surface runoff leads to a process called eutrophication, which occurs when higher than normal concentrations of nutrients (i.e., nitrogen and phosphorus) are present in the water. As filter feeders, oysters take in nitrogen as they feed to use in their bodies and shells.

A recent study estimated farmed oysters remove an average of 692.3 pounds of nitrogen per hectare per year (#N/ha/yr).[1] If we do some math, we can determine how much nitrogen our oysters in the Sheepscot estuary remove each year! Through our Heafitz Oyster Project, Midcoast Conservancy owns an oyster farm with a total area of 1,600 ft2 or 0.0149 ha. With those numbers we can estimate that our oysters are removing 10.3 #N/yr.[W1] So, while our farm is small, you can be confident our oysters are helping remove excess nitrogen from the estuary, benefiting the other species that live there. Farmed shellfish is one of the most sustainable ways of producing food because they don't require feed, fertilizer, or fresh water like other types of protein sources (think farmed fish or beef). Oysters are a nutrient-dense, high-protein food source (0.32oz of protein per 3.5oz of oyster meat!)[2] with low greenhouse gas (GHG) emissions compared to other seafood and land-based protein sources.[3, 4]

A study investigating the environmental performance of "blue foods" or aquatic-derived foods, estimated GHG emissions based on a kilogram of carbon dioxide equivalent per kilogram of edible weight (#CO2eq/#).[1] The study estimates that farmed shellfish produce 3.1 #CO2eq/# compared to farmed salmon/trout at 11.2 #CO2eq/#.[3] Another study analyzing the lowest carbon protein estimates beef generates 110# of CO2 per 3.5oz of protein, which is roughly the equivalent of four steaks.[4] If we do some more math, we can determine that aquacultured oysters produce 3.4# of CO2 per 3.5oz of protein, meaning beef produces roughly 32 times more GHG emissions per 3.5 ounces of protein than oyster meat.

So next time you're choosing between a burger and an oyster po-boy, think about the difference in GHG emissions it took to produce each one. What will you choose?

1 https://www.sciencedirect.com/science/article/pii/S2212041621001546?via%3Dihub# **2** https://fdc.nal.usda.gov/fdc-app.html#/food-details/175171/nutrients
3 https://www.nature.com/articles/s41586-021-03889-2 **4** https://www.bbc.com/future/article/20221214-what-is-the-lowest-carbon-protein
5 USGS 2002 study on nutrient loading
[1] To capture all greenhouse gas emissions, researchers express them in 'carbon dioxide-equivalents' (CO_2eq). This takes all greenhouse gases into account, not just CO_2.
[W1] To put that into context, a 2002 U.S. Geological Survey nutrient load survey estimates the total nitrogen input to Sheepscot Bay is 467,968.6 #N/yr.

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Cover Photo: Tim Trumbauer
Aerial of Muscongus Bay