



A large wood restoration project on Griffin Brook in Deerfield, NH, taken in summer 2016 after installation (left; *photo by Samuel Burnham, TU*) and in spring 2019 with a developed backwater pool (right; *photo by Joel DeStasio, TU*).

Revisiting Large Wood Restorations on New Hampshire Rivers

As any angler will tell you, fish love a good “laydown”—a tree that has blown over into a stream or river. Large, instream wood produces complexity in a stream channel, providing refuge from predators, as well as excellent spawning habitat. In addition, these large wood features can dissipate energy during peak flows and redirect water into nearby floodplains, not only preventing bank and streambed erosion, but also reducing the amount of sediment and nutrients carried downstream.

Due to the abundant benefits, Trout Unlimited (TU) has been using large wood restoration techniques on NH rivers and streams for over a decade. With financial support in 2014 from the Natural

Resources Conservation Service (NRCS), TU was able to complete over 100 large wood installations on over 20 properties, restoring high-quality instream habitat for eastern brook trout and other native fish species.

In 2019, TU staff revisited these sites and found roughly 60% of them intact and 40% functioning above expectations, creating habitat diversity and capturing organic matter. These initial installations allowed the field team to “fine tune” their methods. And with the help of another NRCS grant, TU plans on restoring another 25 miles of NH streams over the next 5 years, benefiting native fish, invertebrates, and the health of our estuaries.

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EELGRASS

Eelgrass Distribution Increases by 8.5% Between 2017 & 2019

- ▶ Greatest gains are seen in Little Bay, which expands from 3 to 20 acres.
- ▶ Great Bay expands from 1,362 to 1,450 acres.
- ▶ Widgeon grass is mapped in Great Bay.

Based on the results of biannual aerial monitoring coordinated by PREP, eelgrass distribution increased between 2017 and 2019 from 1,547 to 1,678 acres, with increases in most assessment zones, with the exception of the Atlantic Coast, Spinney Creek, and Sagamore Creek. By far the biggest percentage increase was seen in Little Bay, which saw eelgrass acreage increase by 566%.

Compared with recent years, the amount of eelgrass in 2019 is close to what was reported in 2013 (1,684 acres) as well as 2016 (1,689 acres). The peak amount of eelgrass in recent years was in 1996 when 2,900 acres were mapped.

Another interesting observation is the significant amount of widgeon grass (*Ruppia maritima*) in the system. In total, 147 acres of widgeon grass were reported, most of it in the Great



Widgeon Grass. Photo by Steve Droter, Chesapeake Bay Program

Bay, with smaller amounts in Spinney Creek and the Winnicut River. In addition, 107 acres were mapped as both widgeon grass and eelgrass mixed together. Widgeon grass is similar to eelgrass but smaller, more branched, and does not have as much below ground biomass.

While widgeon grass has been reported previously, it has not been consistently mapped because it is more ephemeral (i.e., lasting for a short time) than eelgrass. However, widgeon grass is increasing in abundance and consistency in other estuaries on the East Coast, perhaps due to its higher tolerance of warmer waters and lower salinities. Therefore, future eelgrass mapping efforts will note widgeon grass distribution as well. The full 2019 Eelgrass Mapping Report can be found at: scholars.unh.edu/prep/438/.

According to data collected this summer from the SeagrassNet sites in Great Bay, eelgrass had, on average, grown taller and denser with more biomass per square meter than it had during the summer of 2019.

A Case for Restoration & Recovery

Eelgrass is a cornerstone species of healthy estuaries, providing habitat for fish and shellfish, and increasing estuarine resilience. Unfortunately, eelgrass beds in the Great Bay Estuary have suffered over 50% loss of acreage and a significant decline in density over the recent decades. There are, however, early indications that improving water quality may be creating more favorable conditions for eelgrass growth in some areas. In a white paper published this spring, local scientists and managers describe the state of eelgrass science in the Great Bay Estuary and establish a foundation to inform future restoration efforts to facilitate the long-term recovery of eelgrass. You can find the full publication at scholars.unh.edu/prep/441/.

SHELLFISH

To Grow an Oyster, It Takes a Village

The air smells salty and one can feel the heat from the sun as Brianna Group, coastal conservation coordinator for The Nature Conservancy (TNC), lifts cages of baby oyster spat off the dock at the University of New Hampshire's Jackson Estuarine Lab. It's tough work, but as Group will happily tell you, it's also incredibly rewarding. "TNC keeps cages filled with hundreds of recycled oyster shells covered in spat on this dock until they reach their next destination," she says. "Which are the homes of our dedicated

Oyster Conservationist (OC) volunteers." OC's have been caring for TNC's young oysters since 2006. For eight weeks each summer, these volunteers—including grandparents, young children, business owners, boaters, moms, dads, and even other oyster growers—care for their spat weekly by cleaning the cages, removing predators, and collecting data on their growth and survival. "Some of the volunteers get pretty competitive on who can grow the biggest oyster," notes Group. "It's fun to see how these little creatures foster a sense of healthy competition in the community."

This year there are 63 OC sites across Great Bay and its tributaries. Group collects the cages from the volunteers, who cared for them all summer, and helps



Photo by Joe Klementovich

deploy the much larger oysters onto one of TNC's reef restoration sites around the estuary. These new oysters are vital to building Great Bay's reef network and providing important habitat. OC volunteers play a critical role in ensuring the long-term health of Great Bay—helping TNC and partners reach important restoration goals while engaging with a dedicated and passionate group of community members across the New Hampshire seacoast. Check out [nature.org/nhoysters](https://www.nature.org/nhoysters) to explore this unique program.

Oyster Efforts

TNC and UNH have collaborated on restoring oysters in Great Bay since 2009. Since then, restoration has occurred in a 28-acre footprint and 2.5 million oysters have been added onto reefs for restoration with the help of our Oyster Conservationist volunteers and strong partnerships with local oyster farmers. In the summer of 2020, TNC is updating the native oyster reef maps and will incorporate the data into the "Restoration by Design" project, which will result in a spatial plan of where and how to best restore oyster reefs whilst balancing the need for eelgrass restoration.



Volunteers counting spat on shell. Photo by Taja Harper, TNC

A Mixed Bag for the 2020 River Herring Runs

River herring are migratory fish that travel from ocean waters to our freshwater streams and rivers to reproduce. They are an important source of food for wildlife and bait for commercial and recreational fisheries. This year, our annual returns of river herring (alewife and blueback herring) to New Hampshire's coastal rivers saw some positive signs for restoration, although total numbers were down compared to prior years.

Over the past few years, several NH state agencies, the U.S. Fish and Wildlife Service, and NOAA have been working together with the owners of the Sawyer Mill Dams in Dover, NH for their removal. The lower dam was removed in the fall of 2018 and the upper dam was removed in the fall of 2019, allowing for passage of river

herring up to the next barriers, 0.75 river miles upstream at the Bellamy Rd crossing. This year, NH Fish and Game biologists observed fish passing the uppermost dam location, indicating that the years of design and adaptive management used during the demolition phase were successful.

The Lamprey River was also a highlight of the 2020 fish run, with just over 56,000 river herring passing the first fish ladder in Newmarket, NH and nearly 97% of those passing the Wiswall Dam fish ladder further upstream in Durham, NH. However, the other coastal rivers in Great Bay had returns far below average. Counts at the Mill Pond Dam in the Oyster River have been historically low in recent years, with only 4,655 fish in 2020, and it is thought to

be related to poor water quality or lack of water flowing out of the impoundment during the hot summer months, depriving juvenile river herring of oxygen and an exit-strategy.

Similarly, the Cocheco River in downtown Dover only passed 3,832 fish, well below the 10 year average of 34,188. The fish ladder on the Cocheco River was modified in 2015 to allow for a swim-through design based on full impoundment height. However, in the years following, constant fluctuations in impoundment height have made ladder operation very challenging, with flow at times insufficient for river herring to ascend the ladder. Further modifications to the ladder are planned for spring 2021 in an effort to improve passage numbers moving forward.



River herrings making their way up a fish ladder. *Photo by Ian MacLellan*

SALT MARSH

Corrected Culvert Provides Convenient Critter Crossing

A new culvert on Lubberland Creek provides flood resilience for infrastructure, migration potential for the salt marsh, and a safer crossing for wildlife.

Culverts that are not properly sized, and restrict tidal flow or flood water, not only cause the failure of roadways, but also pose significant challenges to estuarine habitats and wildlife. Identifying and replacing these undersized culverts improves public safety and infrastructure resilience, while also benefiting our coastal critters.

Completed in the fall of 2019, the Lubberland Creek tidal culvert restoration on Bay Road in Newmarket, NH was a collaborative project between The Nature Conservancy (TNC) and the town that replaced a

perched, three-foot-wide pipe culvert with a 16-foot-wide box culvert. The undersized pipe was a serious tidal restriction, which could not adequately pass water between the creek and the downstream salt marsh and created dangerous flood conditions that often washed out the road during heavy rains. In addition, the old culvert prevented the passage of fish and aquatic organisms. For example, during 2019 pre-construction sampling, over 1,300 glass eels were caught with only 2 eels (0.2%) caught upstream of the culvert.



American eels stuck on the downstream side of the old culvert.

Photo by Myrilla Hartkopf, TNC

Along with mitigating flood hazards and providing a salt marsh migration pathway, the new culvert has unlocked the previously inaccessible habitat of Lubberland Creek to migrating fish for the first time in decades. And fish are not the only critters that utilize the new crossing. While before, only beavers were observed passing under the road, now a number of animals, including bobcats, otters, raccoons, fox, and deer, have been seen using the new structure as safer passage to get to the other side.

To learn more about this project, you can contact Peter Steckler at TNC by email at psteckler@tnc.org.



Bobcat passing under Bay Road in Newmarket. *Photo by Charlotte Harding, TNC*

How New England Marshes Are Changing

Salt marshes are critical habitats, supporting marine and estuarine ecosystems, while storing carbon and protecting our coastlines from erosion and storm surge. Marshes naturally elevate by accreting sediments. But are they keeping pace with rapidly rising sea levels? To find out, Dr. David Burdick from UNH and Chris Peter from the Great Bay Reserve led a project that synthesized years of salt marsh data from four New England Reserves. Their findings indicate that New England marshes are shifting toward wetter plant communities and are not building fast enough to keep up with sea-level rise. These results should serve as a call-to-action to those looking to protect our salt marshes. To learn more, visit www.nerrsciencecollaborative.org/project/Burdick18 to view project resources and read the full report.



If You Can't Beat 'Em, Eat 'Em

Green Crab Fishery and Market Development in New Hampshire

The European green crab, *Carcinus maenas*, is an invasive crab species that has been impacting the east coast for decades, devastating shellfish populations, and threatening estuarine and marine ecosystems. In New Hampshire, green crabs are seen mostly as a nuisance species, and are not utilized in any significant way. Because the green crab invasion continues to wreak economic and ecological havoc in New England, and NH fisheries are becoming more regulated, exploring alternative sources of income for the fishermen has become an important need in this region. Since 2015, NH Sea Grant has been researching and working on the development of a green crab

fishery and a soft-shell green crab food market. After discovering potential morphological indicators for male and female crabs in 2017, the ability to produce soft-shell green crabs has enabled NH Sea Grant and partners to expand their crab market development, and has increased the interest of fishermen to begin targeting green crabs to pursue market opportunities and consumer awareness outreach. For more information on these initiatives, be sure to watch the recent webinar "Soft-shell Green Crabs 101," hosted by NH Sea Grant and Manomet, which can be found at youtu.be/bbuEU1sEp6c, or email Dr. Gabriela Bradt at Gabriela.Bradt@unh.edu.



Green crabs are damaging to our estuaries, preying on native clams and oysters, and digging burrows that destabilize the edges of salt marshes. Unfortunately, 2019 green crab densities in the Hampton-Seabrook Estuary were the highest recorded since 2006.

A PUBLICATION FOR HABITATS

Our estuaries are such dynamic systems whose health so greatly benefits from the efforts of partnered organizations and agencies monitoring, protecting, and restoring our estuarine habitats. In order to give you a preview into the latest habitat data and trends and to help highlight some of the projects of PREP and its partners, we are proud to share our first annual Habitat Spotlight report. Our hope for this report is to provide a valuable glimpse into the condition of our many estuarine habitats, as well as the work taking place in our watershed to keep our estuaries healthy and resilient. But let us know what you think!

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