THE WATER AAS ISSUE

41°N

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ABOUT 41°N

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The URI Coastal Institute works in partnerships to provide a neutral setting where knowledge is advanced, issues discussed, information synthesized, and solutions developed for the sustainable use and management of coastal ecosystems. The Coastal Institute works across and beyond traditional structures to encourage new approaches to problem solving.

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RIVER RELATIONS

NARRAGANSETT BAY SPANS APPROXIMATELY 150 SQUARE MILES, most of them in Rhode Island. But the Narragansett Bay Estuary Program (NBEP) works across 2,000 square miles, which include not only the bay itself, but also Little Narragansett Bay and the coastal salt ponds and all their watersheds, extending into Massachusetts and Connecticut.

This issue of $41^{\circ}N$ is produced in partnership with NBEP, and we took this opportunity to explore these interconnected waters in places we don't often get to cover in this magazine.

Ellen Liberman looks at the growing battle to redirect, contain, clean, and otherwise manage stormwater along the Runnins, Blackstone, Woonasquatucket, and Pawcatuck rivers. We visit a homeowner in East Providence struggling to keep floodwaters at bay, a nonprofit leader who is treated to views of a storm-day "geyser" of sewage in a park outside her Olneyville, Providence office, and a furniture store owner in Westerly who is balancing parking needs versus absorbing runoff. And we meet the many people in local, state, and federal government who are working to make things better.

In a very different vein, Meredith Haas brings us to an Indigenous celebration of relationships with the Blackstone River (called Mishkittakooksepe by the Narragansett and Kittacuck by the Nipmuc), and a look at how the Narragansett Indian Tribe and the Hassanamisco Band of Nipmuc have come together with nonprofits, state agencies, and others to restore the river for the benefit of future generations.

We welcome writer Colleen Cronin of ecoRI News and her first story for $41^{\circ}N$ with yet another take on the Blackstone—how to find your way to an access area to enjoy its "bucolic" beauty without landing in a tangle of poison ivy.

The Clean Water Act (which birthed NBEP, by the way) led, over time, to dramatic improvements in water quality in Narragansett Bay. That should, one might imagine, lead to an abundance of healthy fish and plants calling that ecosystem home. But as the bay warms, some iconic species are declining while new species move in. Marybeth Reilly-McGreen introduces us to those who are studying these changing conditions.

The saltmarsh sparrow and the horseshoe crab are two other species that occupy particular ecological niches. They, too, are vulnerable to climate change, writes Sarah Francis. The Rhode Island Natural History Survey is updating a database of more than 500 rare and threatened species like them to support preservation efforts.

A project like that wouldn't be possible without the people to do the work, but many funders want to support "shovel-ready" projects, writes Annie Sherman in her story on how the unglamorous work of planning, professional development, and staff retention needs dollars—and, through NBEP, has found them—just as much as tangible products such as construction projects and tree plantings do.

We hope you enjoy this look at our local and regional watersheds and the communities that are connected to each other through these rivers that flow through them.

—MONICA ALLARD COX Editor

Narragansett Bay Estuary Program



ESTUARY PROGRAM

L-R: Darcy Young, NBEP executive director, works to create, sustain, and celebrate community partnerships to engage people in watershed restoration. Mariel Sorlien, NBEP's geospatial and design manager, works with partners to analyze data, make maps, and build story maps. Courtney Schmidt, staff scientist, manages scientific projects and programs, and collaborates with regional partners to synthesize data, fill data gaps, identify research needs, and manage the implementation of projects.

The Narragansett Bay Estuary Program (NBEP) The Narragansett Bay Estuary Program (NBEP) is a stakeholder-led nonprofit organization pursuing place-based conservation across the three-state Narragansett Bay region. With its 30-member partnership, NBEP catalyzes scientific inquiry and collective action to restore and protect the region's water quality, wildlife, and quality of life. This issue of *41°N* highlights several of the stories and partners that are driving development of the priority actions in the ongoing update to NBEP's Comprehensive





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LOCAL GROUPS SEEK TO DEMYSTIFY ACCESS TO THE RIVER TO HELP OTHERS ENJOY ITS HIDDEN BEAUTY

PROPERTY (

by Colleen Cronin Photographs by Jesse Burke

THE BLACKSTONE RIVER SOMETIMES GETS a bad rap.

Like for many New Englanders, natural beauty and majesty weren't the first things I thought of when I was first assigned to paddle the Blackstone River for a story two summers ago.

The birthplace of the American Industrial Revolution, the Blackstone was once famously known for changing colors depending on what dyes the mills that lined its banks were using at the time.

Today, efforts to restore the 48-mile river to its pre-Colonial conditions have made the river bucolic.

The problem is getting there. There are not many safe access points on the Blackstone where people can get to the water to fish or hop in a boat.

On a scale from one to 10, Blackstone Watershed Collaborative Program Manager Stefanie Covino says she'd rate access to the river at about a four.

"If you want to do it, you could do it," she explains. "But man, do we have a lot of room for improvement."

I set off with Covino and a group of river advocates to kayak the Blackstone again on a crisp September morning last fall to learn more about access challenges on the river and efforts to solve them.

We start at one of the best access points the Blackstone has: Sycamore Landing, the Blackstone River Watershed Council/Friends of the Blackstone property in Lincoln.

Arriving at the site early and a little sleepy, I don my urban sombrero and pick out a life vest. President and founder of Friends of the Blackstone John Marsland helps me choose a kayak from the boathouse on the property.

Walking down a little path from the building, pushing our boats on dollies, we see glimpses of the Blackstone peeking out from the trees. In this spot, it doesn't roar. It glides around a bend south towards Pawtucket and Central Falls.

It's the perfect place to launch a boat along the riverbank easily and safely. The organization runs a paddling program for the public, and the access point on the property is a better place to get folks with differing mobilities in the water than other spots along the river.

Heading south with the current, the group follows along the bank and the Friends of the Blackstone property, where benches and large trees, including a towering sycamore, line the river.

Marsland tells me that before the property became a nature preserve, it was a junkyard.

"A 20-year project," Marsland calls it, describing the people power it took to remove old piles of asphalt

Stefanie Covino, program manager for the Blackstone Watershed Collaborative, wants you to paddle the river. and trash. Then, there was the invasive knotweed they had to fight over and over until they'd beaten it down enough to plant pasture grass.

The stretch of the river after Sycamore Landing feels easy and peaceful. Going with the water flow, sometimes I pull my paddles up and sit back to watch the sparrows flit between riverbanks or turtles bask in the fallen limbs that drape over the Blackstone's edges.

The leaves turn autumn shades a little quicker near the water, so by our late September run, golden and reddish hues have started to appear in the foliage.

Dams like this one can be a challenge for paddlers on the Blackstone.



While we paddle, I catch up with Covino and Emily Vogler, an associate professor of landscape architecture at the Rhode Island School of Design and creator of the Blackstone River Commons, a project to support river stewardship.

All is well and good, until we hit the Albion Dam. About two miles down the river from Sycamore Landing, you may not realize the hydropower structure is there until you start to hear it, or you are already going over the dam.



I hear the story of how Friends of the Blackstone Restoration Coordinator Keith Hainley accidentally made it over the dam in a canoe. He'd been cleaning up some trash on the river, and suddenly found himself listing over.

Hainley was fine, but Covino and Vogler warn me not to get too close.

We need to get out of the water to continue our journey, and the access point by the dam and the Blackstone River Bikeway is more challenging than Sycamore Landing.

I scooch my kayak as close to the land as I can, wedging it in between some roots in the shallow water to try to moor my boat. I place my paddle inside the boat—I know I'll need both arms—before standing up very slowly, finding my balance, and finally working up my courage to leap onto the steep bank that is more washed-out gully than path.

Once Covino and I are out, we help each other haul the boats up to the parking lot of the bike path and into her truck.

Ironically, Covino says, "It's easier to drive over [the Blackstone] than it is to sit by the water."

About 20 minutes and a Dunkin Donuts stop later, we arrive at Elizabeth Webbing Mills Dam in Central Falls.

We start the process of lugging boats and paddles back out of Stefanie's truck bed and towards the water, and I feel nervous as I looked for where we could possibly plan to enter the river.

Although I've paddled the river before, I'd never managed to hop in Central Falls' portion.

Covino didn't hesitate as she marched over to the water's edge, where a sitting area with a bird feeder for the condo complex we'd parked in met riprap and at least a 10-foot drop into the river.

When Covino had paddled the Blackstone two years before, she'd had to porter their boats around the dam and down the rocky edge.

Avoiding poison ivy as best she can, Covino shows me how she had lowered herself and her boat, rock by rock, to finally start paddling.

Luckily for me, since I'm highly allergic to poison ivy, Covino doesn't expect me to follow her into the water; she only asks for a little help coming back up.

Back on dry land, I marvel at what she's just done and that it's the "best" option for getting into the area. Covino and I pack the canoes back in her truck, and as she closes the gate, she raises her eyebrows as if to say, "it's not great, right?"

Keith Hainley coordinates volunteers who remove trash from the Blackstone.



Since September, I've thought a lot about that paddle and how things could change for the better. So, I recently called Covino and Vogler to ask them what they think a more accessible Blackstone might look like.

With such varied access, Vogler and Covino say it makes a lot of sense that people don't always take advantage of the river—it's hard to know how to.

Vogler recently finished creating a map of 18 river access points. The majority of those spots are improved access points, she says, and include both Sycamore Landing and the entrance to the river just before the Albion Dam.

The Elizabeth Webbing spot, however, isn't on the map. Even though Vogler and Covino have used it before, along with several other unofficial access points, that doesn't mean they would recommend it.

"We wouldn't list that as a like, 'You should go to the back of this parking lot and put your boat in,' or, 'You should, you know, trek through this howeverlong, unmarked path of poison ivy and find your way down to a steep bank," Covino explains.

The listed access points are "more clear and permanent," she adds.

Vogler hopes people can use the map to help guide their own paddles or river visits. In addition to a printed version, she says they'll also put the map online and create a StoryMap version that is more A new map will help paddlers find river access sites that are easy to navigate.

interactive, "because there's only so much that you can include in a poster."

Covino wants to enable users to report things like where they found invasive water chestnuts on the river or unlisted access points.

In addition to the map, Covino would like to see better signage and improved accessibility for existing access points, as well as more signage and portages around dams.

The different parts of the river also offer different challenges. Rhode Island's portion has more access points than Massachusetts', Vogler says, but it also has more dams that force people out of the water.

When Covino and Vogler did a river-long paddle, they saw others on the water, but few people in stretches around Central Falls and other places where access issues and obstructions can make the river seem daunting.

The map will "demystify, hopefully, a little bit of those impediments that maybe are preventing people from feeling like they can access the river," Vogler says.

"Once you wrap your head around it, it's an amazing river to explore," she adds. "Next time we paddle, hopefully we'll see others out there as well, exploring."





Scientists and volunteers fight to save saltmarsh sparrows and horseshoe crabs, which inhabit that shrinking space between the sea and the land

by Sarah Francis

EVERY SUMMER MORNING BY 5:25 A.M., DEIRDRE Robinson climbs on her bicycle and pedals the mile from her home in Bristol to peaceful Jacob's Point Salt Marsh in Warren.

Owned by the Warren Land Conservation Trust, the marsh is 35 acres of feathery grasses and small, leafy bushes about 4 feet high, hemmed in by the East

LEFT

The saltmarsh sparrow is rapidly losing habitat to sea level rise. Science History Images / Alamy Stock Photo Bay Bike Path to the east. Channels of saltwater meander throughout like fingers from Narragansett Bay, which borders the marsh to the west.

This watery meadow is home to ospreys, who reside on a nesting platform, and purple martins, lured by a gourd nesting array, as well as to white-tailed deer. Robinson has been fascinated by birds from the

ABOVE Album / Alamy Stock Photo time she was 4 years old in Oklahoma and rescued a mourning dove on the sidewalk. "I knew to be gentle with it," she says.

But Robinson is not here to see the ospreys and martins. The object of her affection stands roughly 3 inches high, has orange eyebrows, an orange beard, and brown, mottled feathers. It is not especially monogamous and does not defend its turf. It does not sing. In fact, the sound that comes out is more like a whispery "screek." And it is very particular about where it lives—in fist-size nests built in grasses a mere inch or so above the marsh's waters.

There's no question, the saltmarsh sparrow is one unusual bird. "That's why I'm so passionate about it," Robinson says. "There's no other like it in the world."

But despite the saltmarsh sparrow's healthy population and charismatic personality, fate in the form of climate change is coming for it. Though it has lived in the marshes of the Eastern Seaboard for centuries, its numbers are dwindling by 9% a year, landing it on the Cornell Lab of Ornithology's Red Watch List. "This species is in very real danger of extinction in the next few decades," the list warns. By 2050, it could be wiped off the face of the planet, its habitat washed away by coastal erosion and rising ocean temperatures.

The National Oceanographic and Atmospheric Administration (NOAA) says the sea level measured in Newport has risen more than 9 inches since 1930. That's faster than the global average, and it could climb another 1 to 4 feet by 2100. Flooding and erosion have become commonplace for shoreline communities like Warren, and this region is undergoing intense saltmarsh loss. Jacob's Point is Exhibit A.

"WE'LL NEED EXTREME CONSERVATION MEASURES TO CHANGE ITS TRAJECTORY" On those early mornings from May through August, Robinson and her intrepid fellow volunteers visit the marsh's rich habitat. They're checking on the wellbeing of the roughly 60 sparrows and their nests, banding hatchlings, and scanning for predators like hawks.

By 8 a.m. at the latest, before the bugs come out, their work is done. "The heat becomes intolerable," Robinson says. "There's no shade, plus there's humidity."

As members of the Saltmarsh Sparrow Research Initiative (SALSRI), the volunteer researchers, ages 10 to their mid-70s, have studied the sparrow's breeding habits and life in the marsh since 2016.

"The greatest threat to the survival of this species is loss of critical habitat," the SALSRI website cautions. "Nests are flooding due to sea level rise, secondary to global warming. As the marshes experience more frequent and higher-elevation flooding events, these ground-nesting birds cannot possibly alter their genetic blueprint in time to evolve a new nest-building strategy. They don't even have the option to migrate to higher ground within the marsh, as marshes are disappearing at an alarming rate."

Salt marshes migrate to higher ground as sea level rises, but when this migration is blocked by infrastructure such as roads and sea walls, marshes succumb to higher water levels, essentially drowning in place.

The implications of the sparrow's plight are clear. "It didn't need to happen," Robinson says. "We

did this." Steve Reinert, another SALSRI volunteer, is equally emphatic. "The saltmarsh sparrow is an indicator species. It's not the only indicator of what's going on in the marsh, but it represents overall what's happening. If we lose this sparrow, we'll lose other creatures as we lose the marshes. Both globally and here, decision makers haven't responded adequately to warnings of sea level rise. I'm not going to say it's too late, but we'll need extreme conservation measures to change its trajectory. Land conservation is our best hope."

In what Robinson describes as a Hail Mary pass, SALSRI is awaiting permission from the state's Department of Environmental Management (DEM) and U.S. Fish and Wildlife Service to move roughly 20 sparrows' nests at the highest risk of flooding in the marsh. This summer, nests will be lifted a few centimeters above the point where they're at most risk of being inundated by high tides. Results will be shared with other stakeholders along the East Coast, and SALSRI volunteers will be assisted by a paid summer intern, funded by the Narragansett Bay Estuary Program. "Candidates should be willing to arrive at daybreak and work in a hot environment with many insects," the job description says, in part.

Robinson says she's optimistic about the commit-



ment she's seen in the teenage interns she's worked with, despite the early hours and the bugs. With their burgeoning interest in learning conservation skills, they are our scientific future, she notes.

Local efforts like this summer's nest relocation, plus encouraging younger participatory scientists to pursue their interests as a career, can make a long-term difference to the planet, she says.

As perilous as the future appears for the saltmarsh sparrow, it is even more complicated for horseshoe crabs—the weirdly prehistoric-looking, 2-foot marine arthropods with helmet-like shells and 12 legs—who are more directly related to spiders than shellfish.

The horseshoe crab population is threatened by climate change: Massachusetts Wildlife ranks them highly vulnerable. On top of that, they are harvested as bait food for the eel and conch industries. And their skyblue-colored blood, which contains a clotting agent, is

Horseshoe crabs like to spawn in the same place each year.

Photograph by Robin Chittenden / Alamy Stock Photo

used to test medical devices and injectable drugs for toxins. In those instances, crabs are caught, bled, and returned to the ocean—at a 30% mortality rate.

Like many states, Massachusetts and Rhode Island regulate their crab populations and conduct regular surveys to determine the best conservation policies. At times, the late-night setting for these assessments can seem a little surreal.

Lured from their estuary homes in the spring, the crabs lumber out of the ocean at high tide, looking for love on a moonlit night in May and June. They slowly make their way up the Napatree Point Beach by the hundreds, where they'll spawn multiple times in the next few hours and days. "It's pretty cool," says Katie Rodrigue, a DEM marine biologist, who sports a miner's headlamp on those late evenings. "You see the males first come onto the beach and wait for females to approach, then they latch on and mate." Hanging around on the fringes, the satellite males, as wingmen, take an opportunity to sneak in and spawn as well.

"One night I saw almost 1,200," Rodrigue says. "It was neat to see such a dense spot. They're almost in a pile, the females digging in to lay their eggs. It's not quite a carpet, but you have to be careful you don't step on them."

As the tide goes out, the spawning recedes as well. The females lay tens of thousands of eggs in little nests in the sand, five to 10 inches deep. Tiny juveniles emerge from the sand a few weeks later, then swim out to sea with the next moon's cycle.

Only a very small number will survive after they hatch. Burrowing animals can find and eat them, or waves can wash the larval crabs to the surface of the sand, leaving them vulnerable to other predators, like migratory birds. Grady also nods to how these crabs have hardly changed over millennia, but if their environment is altered, they may struggle to find suitable places to spawn. "They need to bury their eggs, so it can't be a place where there isn't sediment to dig into, but it has to be sediment where the eggs won't rot," she says. "If they're laying in a higher part of the beach at high tide, it's oxygenated, which is good."

Horseshoe crabs have survived 450 million years, she says, but humans have had a negative impact in the last few decades in a host of ways. Mass Audubon is pushing for stronger protections for horseshoe crabs, she says. "Bait harvest has been the predominant impact, and the lesser is in the biomedical application."

As for habitat loss, "we haven't quantified that effect yet," Grady says, but adds that climate change "will reduce their spawning habitats, and in some instances, there may not be any additional place to go because they run up the beach to a sea wall or someone's property. I noticed with my survey that wind speed and direction may affect how they spawn. If climate change alters wind speed, it could negatively

Whether or not there are fewer baby horseshoe crabs spawned to begin with, Rodrigue is unsure.

"We walked along the shoreline looking towards the water and counted to see how many there are, to see if there are trends in spawning densities. We don't have a lot of evidence that populations are going up or down," Rodrigue says.

A NOAA report, however, concludes that the effect of climate change on these crabs is likely to be high. "Sea level rise will reduce spawning habitat. Warming will negatively affect egg and larval survival and thereby reduce productivity."

Is it possible to get a better sense of the future of these Atlantic species of crabs, which have been around since before the dinosaurs?

"It's kind of hard to make predictions," says Rodrigue, who monitors both Napatree and Conimicut points. "We look at all the data sources we have to understand and make projections with. It's one of those species that seems to be declining. They like to come back to the same place to spawn ... That makes them more vulnerable if their habitat changes."

Sara Grady, a senior coastal ecologist at Mass Audubon, has also done a late-night survey watch, this one in Duxbury Bay on the South Shore. "Horseshoe crabs have very advanced vision for how prehistoric they are. It allows them to tell dark objects against a dark background, but they do try to latch onto your feet." affect spawning. They don't like choppy weather."

David Gregg is the executive director of the Rhode Island Natural History Survey. It's a small, membersupported nonprofit that has educated the public about the state's animals, plants, and the natural world since 1994.

From his modest office in South Kingstown, Gregg is overseeing the updating of a giant database of rare, local species, recently funded by the Rhode Island Foundation. A working prototype is expected to be completed later this year.

Originally managed a couple of decades ago by the DEM and The Nature Conservancy and sporadically updated since, the database, which includes a massive Excel spreadsheet, tracks more than 500 at-risk and rare native plants and animals, among them the ringed boghaunter dragonfly and the small whorled pogonia orchid. Once updating is finished, the nonprofit will be able to respond to questions from professionals and agencies. Also, staff will enter into the database the new rare species observations they receive each year. Eventually, the plan is to allow the public to have online access, although they will not have access to information on exactly where the species can be found, Gregg says. "We don't want to worry about poachers looking for box turtles."

Once it is up and running, the database will be an invaluable research tool for protecting vulnerable spe-

Horseshoe crabs have been around for millennia, but their future is uncertain.

Photograph by Judith Collins / Alamy Stock Photo

cies like the saltmarsh sparrow and horseshoe crab. It will provide information on the many local plants and animals that are threatened, if their numbers are changing, and how they can be protected. In a larger sense, it should prove critical in tracking the state's trends in biodiversity. As Gregg points out, widespread vigilance is key.

"Vanishing species are trying to tell us something," he says. "Once people notice a species isn't around, it's probably too late." RESTORING THE BLACKSTONE HAS BEEN A DECADES-LONG PROCESS, BUT THE COALITION IS GROWING

by Meredith Haas

Photographs by Jesse Burke

LEFT

Bruce Curliss, waterways advocate for the Hassanamisco Nipmuc Band and executive director of the Blackstone River Watershed Council, participates in the second Intertribal Gathering at the Blackstone Valley Visitor Center in Pawtucket.

RIGHT

Nancy Brown-Garcia is chief deputy historical preservation officer for the Narragansett Indian Tribe and a Traditional artist.



THE STEADY DRUMBEAT AND RHYTHMIC CHANT of Indigenous songs filled the hall of the Blackstone Valley Visitor Center in Pawtucket.

Members of the Narragansett and Nipmuc tribes gathered with the Wampanoag nations—whose ancestral territory encompasses the Blackstone River watershed—along with local groups dedicated to the protection of the river, to honor its history and recognize the efforts to revive what has been considered one of the most polluted and abused rivers in America.

Tribal dancers, some in richly colored and decorated ceremonial dress, and guests danced around the drummers in tribute to the river's importance for sustenance and spiritual connection.

"For us, [the river] is a sacred entity," says Nancy Brown-Garcia, chief deputy historic preservation officer of the Narragansett Indian Tribe, at the Second Intertribal Gathering at the visitor center hosted by the Narragansett Indian Tribe and the Hassanamisco Nipmuc Band this past fall. "It's a heartbreaking situation to see that the Blackstone River has been abused for this long."

Underfoot, a sprawling map painted across the floor of the visitor center's foyer shows the journey the 48-mile-long river travels from its northern headwaters in Worcester, Massachusetts, to its southern terminus in Narragansett Bay, highlighting the many communities interconnected with this body of water. "When we look at the past of this area, it's not good," says Hiawatha Brown, Narragansett tribal elder and master of ceremonies for the gathering. "When we look at the disturbance of the rich Native history of the people of this region, who lived here for tens of thousands of years ... I'm frightened to see what the future will bring. This is why these social community gatherings are important for us all to think about the protection of each other and the things that we value, what we continue to protect for our existence."

Brown-Garcia adds, "Singularly, we can't do anything. So it has to be an effort from everyone to change."

Across the street from the visitor center, the dark, rapidly churning waters of the Blackstone River rush over the historic Slater Mill Dam to the Main Street Dam built on top of the historic Pawtucket Falls, where the river flows under the Main Street Bridge. From here it joins the Seekonk River, which flows into the Providence River and on to Narragansett Bay. The Slater Mill, now a museum and educational center managed by the National Park Service, retains the Federal style architecture of the former water-powered textile mill built more than 200 years ago. It is a modest relic of the birthplace of the American Industrial

BELOW

Mishi Unnukquom Garcia, Narragansett dancer and artist, performs at the second Intertribal Gathering.





Revolution along a modest river that is neither very wide nor very long, but is ever a reminder of the beginnings of the industrial and urban pollution that has plagued rivers across the country.

Before it was called the Blackstone, it was known as Kittacuck, "the great tidal river," to the Nipmuc. The river weaved through thick forests and marshes that provided for a wealth of wildlife, including migratory fish such as shad, herring, and Atlantic salmon that would venture upriver from the ocean to spawn in freshwaters. It was essential for ceremonies, livelihood, and travel.

"The [Kittacuck] took us south into other parts of our homeland and northern Rhode Island, and even farther south into the areas of the Wampanoag and Narragansett for trade, as well as fishing and hunting. It was, like any body of water, multipurpose," says Bruce Curliss, a member of the Hassanamisco Nipmuc Band who grew up playing along the river in Woonsocket.

As colonists arrived in the 17th century, the river became known as the Blackstone after William Blackstone, who was one of the first Europeans to settle in the area. In 1793, the Old Slater Mill was built, bringing waterpowered cotton spinning technology to propel America's textile industry. By the mid-1800s, hundreds of mills and factories popped up along its banks, along with the construction of dams and unfettered dumping of heavy metals, dyes, trash, and sewage that led to the river's decline.

What is sometimes lost in the retelling of New England history is that the Native peoples continued to live alongside the newcomers.

Despite the tumultuous history of Indigenous tribes and settlers, "if you go back to colonial times, New England-based tribes made a decision to live ... in harmony with the [colonists] ... that has allowed us to continue to still be here. We were active participants in that, and I think that gets lost," notes Curliss. These tribes are now building partnerships with non-Native communities and organizations that are centered around sustainability and the Blackstone River. "There have been so many voices, now, screaming for years about the Blackstone. People are starting to recognize the importance of the river and not just historically."

That recognition began in many ways in the 1960s and 70s, when environmentalism was gaining mainstream traction. The pollution of the Blackstone River began to attract wider attention, prompting the largest one-day regional cleanup in the country's history known as Operation Zap. On September 9, 1972, more than 10,000 volunteers from more than 20 towns and communities gathered at the river to remove everything from small debris to washing machines and school buses that had to be retrieved using helicopters, cranes, and other heavy construction equipment.



"Back then, everyone was using the river as a dump. It was considered acceptable," says Donna Kaehler, director of Keep Blackstone Valley Beautiful, in an article by ecoRI News commemorating Operation Zap in 2022. "The river smelled, it was foamy, and the water quality was really bad. It's a lot better now, but it's still not one hundred percent."

While legislation such as the Clean Water Act has helped improve water quality to allow for canoeing and kayaking, swimming is still not advised. Fences and cement retaining walls that line the riverbanks in various places collect trash, some of it deposited by stormwater.

"We've taken maybe 25,000 tires out ... and other major cleanups removed appliances and furniture, junk cars, and things like that," says John Marsland, founder of Friends of the Blackstone, of earlier cleanup efforts. The Friends group launched in 1990, and during the past 30 years, Marsland has seen the sources of pollution shift. Now, he says, "It's mainly cleaning up stormwater runoff, like plastic bottles, which get broken down into smaller pieces and it's everywhere. Anytime there's a rainstorm, you wouldn't believe the amount of trash that's left behind by runoff."

Storm runoff also carries chemicals, oil, and nutrients from fertilizers from the streets into the river, and heavy rains are also linked to raw or partially treated sewage entering the river when sewer systems overflow. Heavy metals and industrial chemicals from more than 100 years of industrialization and urbanization still reside in the sediment and soil. Meanwhile, more recent sources have been added by companies like Schnitzer Steel, which last year was involved in a \$2.2 million settlement for violating the Clean Water Act and allowing contaminants to runoff from its facilities into several rivers, including the Blackstone. A portion of these settlement funds went to the Nipmuc Indian Development Corporation to fund water quality improvement projects in the river.

"Our council elders said, 'We need to know what's in the sediment and whether it can be cleaned up... Can it be abated so that we can go back to using this river?'" says Curliss, explaining how the funds will support research at Brown University to test the sediment at various points along the river. "We're going to work with them to take samples to see what types of pollutants there are. Then the next step is to figure out if we can get rid of it."

RIGHT

Max Brown-Garcia, Narragansett Traditional dancer and artist, creates ceremonial regalia and other wearable art.



Bring the Fish Back

As efforts continue to improve the water quality and reduce pollution along the river, the biggest restoration undertaking is focused on bringing back migratory fish species that have not been present in more than 200 years.

Around 20 years ago, the Friends of the Blackstone gave money to the Rhode Island Department of Environmental Management (DEM) to stock the river with trout, Marsland says. "But then we proceeded to try to see if we could get fish restoration on the river too," he adds.

Restoring fish to the Blackstone entails the use of fish ladders, which are essentially stepping stones that



allow anadromous fish such as herring, American eel, and American shad easier passage upstream over or around obstacles such as dams.

To do this, advocates launched the Lower Blackstone River Passage Project, a plan that has been several decades in the making and has brought together various tribes; organizations, such as Friends of the Blackstone, the Blackstone Watershed Collaborative, Save The Bay, the Narragansett Bay Estuary Program, and The Nature Conservancy of Rhode Island; and state and federal agencies like DEM, the National Park Service, and the Army Corps of Engineers.

The project is important not only for the fish, but for the river as a whole ecosystem, says Curliss. "We've seen it over and over again when you reintroduce the natural wildlife to certain rivers that haven't had it in hundreds of years. Those rivers start to come back to life in different ways and become reenergized. That nurturing really can revive something that's not there."

Jason McNamee, DEM deputy director for natural resources, agrees. "One way of configuring the fish passage design is we can provide public access with a walkway and viewing window to watch the fish swim by, and we'll use that for scientific purposes," he says. "It'll also increase flood resiliency by creating more storage for water. Not a lot, but it's not a negative ... It's more than just bringing the fish back to this river."

Emily Vogler, associate professor of landscape architecture at the Rhode Island School of Design, is co-founder of the Blackstone River Commons project that is aimed at supporting stewardship and protection of the river as a shared resource. She echoes Curliss and McNamee in viewing river restoration in ecological and community contexts.

"One of my goals with outreach and community engagement work is to say, 'How do we turn back to our rivers as a way of anchoring us and making people think about their connection to place, their connection to communities, and connection to each other?'" she says. "Where and how do we understand the river itself as a relation, which we all have to be respectful of, and not just for the human benefits but that of the river itself, as an entity that deserves respect?"

Despite all of these groups converging around improving the Blackstone, stubborn challenges to the fish passage project remain.

"We have so much support from the community, from all of these different tribes, from the nonprofits in the state and our senators, our Federal Congress folks. It's widespread ... Even the dam owners say they want it. There are questions on how to achieve it and

Landscape architect Emily Vogler is working on several community projects on the Blackstone.



pay for it, but everyone says this is a worthy cause to bring migratory species back to the river," says Stefanie Covino, program manager of the Blackstone Watershed Collaborative, an umbrella organization encompassing watershed associations, land trusts, universities, federal/state/local agencies, consultants, and others focused on the Blackstone River watershed and funded by the Narragansett Bay Estuary Program.

Although the project is ultimately intended to address the entire length of the river, it is being divided into phases. Phase I of the project is focused in Rhode Island on the first four dams—Main Street, Slater Mill, Elizabeth Webbing, and Valley Falls—between Pawtucket and the restored Lonsdale Marsh in Lincoln that was once the site of a drive-in movie theater and is now a potential spawning habitat for fish and other species.

Progress has been slow due to complications involving funding and getting buy-in from hydropower companies operating at the first and fourth dams, according to both McNamee and Covino. This is largely because the first dam was exempted in the 1980s from having to consider a fish passage or shoulder any financial responsibility. At the time, the ledge was seen as too steep for any fish to pass, says Covino. The Slater Mill Dam is one of four on the Blackstone eyed for fish passages.

Rhode Island Sea Grant photograph

And with dams dividing the river, each one must allow fish through for the project to succeed. "If the first dam doesn't provide fish passage, no one above it has to. Once the first one has it, the next one does, and when that one has it, the next one does. So it's a very long-term process," Covino says—one that must be funded by grants and other sources, which project partners are seeking.

But beyond the work of any one initiative, Native voices are crucial to stewardship of the river and the environment as a whole, Vogler believes.

"Having conversations with Nancy [Brown-Garcia] and Bruce [Curliss] ... and the events that they do, bring the conversation to a different level," Vogler explains, referring to the Intertribal Gathering and other events such as the Spring Migration Parade. "It's not just about finding solutions. It's going much deeper than that. It's trying to establish a different way of relating to the river and to one another. And, to me, that is actually the change we're going to need ... to make the kind of larger societal environmental changes ahead of us."



ACLEANER AND WARMER NARRAGANSETT by Marybeth Reilly-McGreen Photographs by Jesse Burke

WATER QUALITY IS IMPROVING EVEN AS WATER TEMPERATURES ARE INCREASING IN NARRAGANSETT BAY. SCIENTISTS ARE TRYING TO UNDERSTAND WHAT THESE AND OTHER CHANGES MEAN FOR BAY SPECIES. LOOKING DOWN AT NARRAGANSETT BAY FROM the footpath at the end of Narragansett's Bass Rock Road, rockweed and kelp gleam gold, olive, and amber in the early afternoon light of an unseasonably warm mid-November day.

University of Rhode Island Professor Carol Thornber, a marine ecologist, and URI Ph.D. candidate Rebecca Venezia study the seaweeds present in Narragansett Bay. Today the pair straddle tidal pools, which have the look of miniature forests upended, gathering fistfuls of seaweed for closer inspection. Aside from the occasional gull, the only sound is the ambient call-andresponse of wind and waves.

Narragansett Bay, with 146 miles of habitat supporting 60 species of fish and shellfish, is one of the most thoroughly studied ecosystems on the planet, and marine scientists have been monitoring its water quality, benthic habitats, and fish, phytoplankton, and zooplankton for decades. Thornber has chosen to look at seaweed—a focus of her research in the bay for more than 20 years—because it's considered a sentinel species whose sensitivity to changes in its habitat can raise the alarm for researchers.

Thornber hopes that by studying seaweed, scientists will have a clearer picture of what is happening in a changing bay—including temperature increases and other ecosystem-scale dynamics.

A 2021 report by the Narragansett Bay Estuary Program shared results of a survey of 26 commercial fishermen of their firsthand accounts of changes they noticed in the bay. The fishermen reported that in the 1990s, their traps and nets would be so overwhelmed by seaweed that individual lobster pots would be nearly as big as skiffs, and nets would rapidly fill with seaweed soon after sliding off the boat into the ocean.

But in the mid-1990s, fishermen began noting the abundance of kelp, a type of seaweed, was declining. Along with kelp, today, there is even less seaweed. Venezia is going through what Thornber calls "a massive data set" looking for trends of when people were seeing lots of drift algae in the 1990s and early 2000s versus the summer surveys just concluded.

What's going on?

"We know that kelps have declined, which is no big surprise given that they are cold water species and our waters are warming, but we know ... that the story is a little more complicated," Thornber says.

As a foundational ecosystem species, seaweed underpins other marine life. It is a food source, a transportation mechanism, and a habitat for other species. It functions as protection from predators for some species. Thornber has seen a decline in both the abun-

URI Professor Carol Thornber is a marine ecologist who studies seaweed.

dance and types of seaweed typically found in southern New England. Oarweed (*Laminaria digitata*) is largely absent from local waters, and sugar kelp (*Saccharina latissima*) isn't as abundant as it used to be. Warming waters and the introduction of marine invasive species, such as seaweeds that out-compete native species, are two likely reasons for the decline. A reduction in nutrients in the bay's waters could be a third. Since the 1990s, the state has been enforcing limits on the amount of pollutants (nitrogen, chlorine, phosphorus, and ammonia) wastewater treatment facilities are allowed to release into the bay.

Seaweeds aren't the only organisms in the bay that may be affected by these changes.

For the past six years, coastal restoration scientist Heather Kinney has been conducting seine surveys of juvenile sport fish in the Providence River Estuary as part of a joint study between The Nature Conservancy and the Rhode Island Department of Environmental Management's (DEM) Division of Marine Fisheries. A seine is a type of net capped with buoys on one edge and weighted at the other, allowing it to enclose fish in a circular area. Kinney is collecting information about scup, winter and summer flounder, tautog, and black sea bass, ascertaining how well these juvenile populations are faring in the Providence River and how they're changing over time.

An important part of Kinney's work is to identify areas where fish habitat enhancement projects could be established and do so in a way that both offers shoreline protection and nurtures an important food source. "Our goal is to support fish populations by rebuilding salt marshes or installing artificial reefs and improving access for people to get to the healthy sources of fish that aren't contaminated by pollution," Kinney says.

What she's finding through her surveys is that these restoration projects may be providing habitat for different species than in the past.

"We're seeing a lot more black sea bass, especially the juveniles—and not just in the Providence River but also off Block Island. They're everywhere," Kinney says, "Mid-Atlantic species seem to be shifting more north as the temperatures are changing. This may also be true for winter flounder, which are also shifting more north, up towards Maine and Canada."

The northward expansion of southern fish species is also of interest to David Taylor, professor of marine biology at Roger Williams University. Taylor studies the early life history of fishes and their use of Narragansett Bay as a nursery habitat.

"When we're examining the decline of one species, like winter flounder, for example, it's not a matter of pointing to one culprit, but trying to assign relative contributions of numerous kinds of stressors the species is facing," Taylor says.





In addition to being warmer, bay water is also cleaner. Professor of Oceanography Candace Oviatt has been studying Narragansett Bay since the 1960s, first as a graduate student in biological oceanography at the University of Rhode Island's Graduate School of Oceanography and later as a faculty member. Since the late 1990s, Oviatt and others have been monitoring the bay with a network of 13 buoys, gathering data and documenting water quality by surveilling water temperature, salinity, and oxygen levels, among other things.

Prior to the Clean Water Act of 1972, the waters of Narragansett Bay—especially the upper bay—received influxes of untreated sewage, hydrocarbons from storm drains, heavy metals, and chemicals. Source controls in the latter part of the 1900s dramatically reduced these pollutants. Improvements in the form of managed nutrient reduction, which began in Rhode Island in the early 2000s, followed by improvements to stormwater management, have dramatically improved water quality.

Nutrient reductions, which have led to a decrease in plankton in the water column, have made a visible difference. "I remember, in the case of the Providence River, you were lucky if you could see down half a meter," Oviatt recalls. "And one meter was absolute darkness. That's not the case anymore. In the upper or mid-bay, visibility used to be about three meters. Now you can often see to the bottom. So it's quite a remarkable change." Since the advent of the Narragansett Bay Commission's Combined Sewer Overflow abatement project, which further reduced the amount of bacteria and nutrients entering the bay, more areas of the bay have been open to shellfishing. However, some commercial fishers have publicly expressed fears that these nutrient reductions have caused species' decline by depriving plankton, which fish and shellfish feed on, of the nutrients that are their own food.

Oviatt cautions against tying species' biomass, production, or decline to clearer water.

"There are no species that I know of that have left on account of the managed nutrient reduction," Oviatt says. "I don't think that's changed the species presence a bit and barely changes the abundance insofar as we're able to measure it."

Professor Robinson W. 'Wally' Fulweiler, an ecosystems ecologist and biogeochemist at Boston University, has been working with Thornber, studying the changing nutrient dynamics of seaweed in Narragansett Bay. Fulweiler echoes Oviatt's observations.

"It's important to remember that the many changes observed in Narragansett Bay occurred well before the management intervention that removed nitrogen from the bay," Fulweiler says. "For example, long-term phytoplankton records—at least in mid-Narragansett Bay, where we have the most data from—show a decline starting in the late 1970s that continues today.



Heather Kinney, coastal restoration scientist, and Sarah Paulson, coastal restoration science technician, use fish trap and seine net surveys to assess coastal environments for The Nature Conservancy.



"Narragansett Bay has undergone a variety of major changes over the last 50-plus years—one of the largest has been an increase in water temperature."

Fulweiler likens anthropogenic effects, that is, outcomes of human activity such as climate change and nitrogen removal, to levers being pulled. In terms of human impact, climate change is a significant lever requiring long-term observation and data collection to understand its effects over time. Nitrogen removal is also a lever—one that is more local and newer. "We are still working out its impact—especially how it fits into the longer-term changes we continue to observe," Fulweiler says.

"As human beings, we want things clear and straightforward," Fulweiler adds, "and a natural system just doesn't function like that."

Conor McManus, former chief of DEM's Division of Marine Fisheries, oversaw scientific study and management of Rhode Island's marine resources.

McManus echoes the others in saying that the bay now favors warmer-water species, which is an ecological shift being seen all along the Atlantic seaboard. But "it's not clear if those new species fill the same void, fill the same role as the species that have now left," McManus says. "It's not clear also from a recreational or commercial or cultural side of things that those species hold the same value."

Scientists get skittish when asked to label change as "good" or "bad." They don't like portraying the bay

Rebecca Venezia, URI Ph.D. candidate, studies seaweed along the rocky shore in Narragansett.

as improving or worsening. And they aren't going to weigh in on whether the bay is too clean. Such characterizations are an oversimplification of the ebbs and flows of an ecosystem.

That doesn't mean there aren't things people can do to try to ensure a healthy ecosystem in the bay for existing species from seaweeds to fish, birds, and mammals.

Thornber points out that boaters can have a direct impact on preventing the transfer of invasive species to the bay's waters. Interventions such as cleaning boat hulls and dumping ballast water before moving boats to different regions would limit the introduction of invasive species into the ecosystem, which may help protect native species from displacement, Thornber says. Another strategy is protecting and preserving coastal habitats such as salt marshes and estuaries, which need higher areas to migrate to as sea level rise continues.

Everyone has a stake in the bay's future, Kinney, of The Nature Conservancy, says.

"We want to maintain the species that we have in this area; that's important, for sure," she says. "But the more dynamically we can be thinking about how all these changes are going to impact us and impact species, the better."

As part of her doctoral dissertation, Venezia has created an interactive story map. "Changes in Seaweeds in Narragansett Bay: How kelp and rockweed populations have changed from 1960s to 2010s" appeals to all ages, with ample video and photography supporting the science shared there. She hopes her work, presented in an accessible way, will motivate future generations of marine scientists.

"You do science, write a paper, publish it in this lingo that only other scientists understand, and it makes it very hard for someone who cares to understand it," Venezia says. "People go to the beach and they see the birds, the fish, all this life, and seaweed is integral to supporting all of that. We need to share what we're doing with people who use these environments either for work or recreation, whatever the purpose. People really do care when they know about the issues.

"So sharing this information is really important," Venezia says. "I'm about to reach out to Save The Bay, to schools. I think interacting with younger children and creating in them this love of the ocean will make them almost like warriors who stick up for it."

DONORS AND GRANT MAKERS WANT TO SUPPORT "SHOVEL-READY PROJECTS." BUT WHAT ABOUT THE PEOPLE WHO ARE KEY TO AN ENVIRONMENTAL PROJECT'S SUCCESS?

by Annie Sherman

Photographs by Cate Brown



ON A SUNNY SPRING DAY IN BROCKTON,

Massachusetts, D.W. Field Park is hopping with activity. Everyone from young families to retirees comes to spend an afternoon in the park's 650 verdant acres. On the National and State Registers of Historic Places, it straddles Brockton and Avon and is a singular green oasis for the region's 110,000 people. They are walking and biking its miles of paths, fishing its seven ponds and reservoirs, spotting flocks of birds flitting about its arboreal canopy, and otherwise simply enjoying its natural green space.

Ulisses Varela has enjoyed this park, in this way, since he was a kid. Now with a growing family, he knows the park is *the* environmental nucleus of a city that is rich with immigrants, multi-family housing, and concrete that traps heat and funnels floodwaters in storms.

"D.W. Field was designed originally as passive recreation and for motorists, for that Sunday drive to admire nature. For walking, fishing, biking, reading, bird watching—those were the main aims of the park,"



A family enjoys an afternoon at D.W. Field Park in Brockton, Massachusetts.

says Varela, a Brockton native, volunteer park commissioner, and head administrative assistant for Plymouth County Superior Court in Brockton. "But there is a growing appetite for updated uses of the park."

Managed by the city's Parks and Recreation Department, the historic park had fallen victim to municipal divestment. Erosion from flooding had undermined safety, the public complained of the park's deteriorating roads and pathways, and overgrowth prevented access to the water. But to fix all of this, municipal staff needed to conduct extensive planning and licensing work before completing any repairs—a behemoth multi-year undertaking for a small municipal departmement.

"As we move forward, that's going to be one of the biggest challenges—the original intended use, the growing needs of the community, and the ability of the Parks Department to be able to fulfill those needs and to maintain the park," Varela says.

This is a common dilemma in environmental initiatives, especially within nonprofit organizations that rely on grant funding or understaffed city offices with strict budgets. Grant applications often stipulate that any initiative—from restoration or preservation of an existing space to a completely new infrastructure—be "shovel-ready." This means funds support physical labor or construction exclusively, and that all plans, municipal agreements, and zoning authorization must be in place.

But getting a project to the shovel-ready stage requires months, if not years, of collaborative effort. So, leaders in this field argue that it is the people involved behind the scenes that warrant the funding because without them, any project on its own would not survive. The method of funding, leaders add, should support people first. But since that's not tangible, that's not sexy, and that's not a data-driven return on the funder's investment, many say, the funds are often restricted to the actual physical project.

"When it comes to grant programs, there often are stumbling blocks ... Some grant applications take weeks to actually put together. So, staff capacity can be a hindrance to going after money. A lot of grant programs require some sort of match commitment. So, it's not just 'apply for \$50,000 and get \$50,000.' You have to come up with 25% of that before you can even apply for the remaining. So that's often a big barrier," says Joanne Zygmunt, senior planner with Old Colony Planning Council, who is working with Brockton, Avon, Wildlands Trust, and other partners on the park's master plan and rejuvenation.

"That's hard, also, because [organizations are] looking for money to do stuff, and if they had it, they'd be doing it," she adds. "And there's a bias often in funding programs for actual shovel-ready projects, the physical



thing that you can see on the ground, that you can cut a ribbon for, that you can take pictures at. But in order to get to that point, there's so much work that needs to happen. And it's extremely difficult to find grants that will fund that portion."

Small and startup nonprofits, or those that support marginalized communities, suffer further staff funding challenges. But funding staff is the only way they remain viable, says April Brown of the Racial and Environmental Justice Committee (REJC). REJC was founded in 2017 to facilitate co-governance to share decision-



making between communities at the frontlines of environmental and racial injustices in Rhode Island and the institutions that hold decision-making power.

This work comes in weeks- or months-long chunks of time, not years, she laments, because she has no endowment to encourage future growth plans, upon which larger nonprofits often depend. So, the former Pentecostal preacher says she can't let herself dream too big or too far ahead.

"People call us the moving force in environmental justice, but we are vulnerable in so many ways because

D.W. Field Park encompasses 650 acres of fields, woodlands, lakes, streams, and ponds.

we don't have enough funding to complete projects. But we are the ones talking to legislators, talking to municipalities, putting forth praxes for municipalities to do what we do in community. We worked with the city of Providence to do a climate justice plan. We put together frameworks based on a just transition," Brown says of REJC's accomplishments amid the challenges.



She adds that the group could continue their efforts for another decade, "but no one has the capacity to do this work because we still have almost 100 years of lack of investment."

Groundwork Southcoast struggles with the same dilemmas. A member of the network of 21 organizations that work with communities to promote racial equity and improve environmental quality, Groundwork was established in 2017 with \$300,000 in seed funding. By 2023, its budget had grown by 400% to reach \$1 million, and its staff had grown by 300%.

That progress has been hard fought, says founding and current executive director Maura Valdez. Eighty percent of its funding is from federal, state, or municipal sources that require strict spending reports down to the penny, she says. But because she lacks enough staff—which consists almost entirely of low-income residents with significant experience living in the environmental justice communities they serve—the organization struggles to establish relationships with wealthy private donors. This limits their funding options. She adds that the organization cannot secure funds or manage them successfully without including overhead costs. But many grants allow for a maximum overhead of 10%, while Valdez's true staffing costs are more like 40% of the grant.

"There's a lot of funding focused on Justice40 communities from the federal government and a lot of other dollars that are theoretically flowing in to work in environmental justice communities," Valdez says, referring to President Joe Biden's 2022 goal to devote 40% of certain federal investments to marginalized communities that are overburdened by pollution. "But those dollars are often hard to access ... the grants are structured in a way that without significant capacity building components to it, you can't just magically have the money and what they call a shovel-ready project, or significant environmental transformation or restoration projects ready to go."

Blackstone Watershed Collaborative (BWC) program manager Stefanie Covino says her program was born after the Narragansett Bay Estuary Program (NBEP) spent two years embedded in the community connected to the Blackstone River—talking with citizens, businesses, universities, and nonprofits to learn what environmental issues were important, what those groups needed, and how NBEP could help.

The result was the Blackstone River Watershed Needs Assessment Report, released in 2021, that was a baseline status of the watershed, Covino says, and included 20 action items that various partners could tackle together to improve water quality and climate resilience within the region. The report highlighted the need to create a collaborative to continue fostering dialogue, especially with under-capacity organizations and underrepresented voices. The NBEP launched the BWC, a consortium of 125 diverse organizations based at Clark University in Worcester, Massachusetts.

"I've found that grants will often say that they want to fund capacity because it's becoming more popular, which is fantastic, and they're starting to see the importance of people working together on these issues, cross collaboratively and from different perspectives," Covino explains. "But a lot of times an application for capacity will be judged against other applications for implementation, and funders nearly always choose implementation."

Indeed, because the Rhode Island Department of Environmental Management (DEM) recognized the high value in merging talent development and community representation, it hired a climate justice specialist to liaise between the state agency and the people it serves. In that role, former Peace Corps volunteer Chris Gaynor bridges organizations and individuals with state resources—including advising DEM to incorporate justice and equity into policy and programs with the feedback he garners from impacted communities.

To do this, DEM utilizes a three-year Environmental Justice Government-to-Government grant from the Environmental Protection Agency to engage, educate, and empower seven community partners from Central Falls, Woonsocket, Providence, and Pawtucket of the harms perpetuated by unjust policies and equip them with tools, resources, and a network that would reduce the barriers of access to state resources, Gaynor explains. He's relying on the expertise of REJC to implement an environmental justice curriculum that informs future DEM policy and to break the literacy gap surrounding grant writing. That leads to boots-on-theground efforts, he says, including community members participating in park maintenance to foster attachment and education, maybe even a career path, he hopes. This parallels Valdez's efforts in the South Coast region and is a common theme among industry leaders.

"When it comes to these environmental justice comcommunity-based organizations, in order to receive any form of funding, they really need grant writers, folks that are able to take the time and focus on it. The smaller groups don't have a fundraising team or a communications team. They have Twitter, Instagram, and sometimes TikTok. That's great, but even with that level of engagement and ability to interact with your audience, the question that comes up is, 'Who is your





D.W. Field Park improvements included staff capacity, not just infrastructure.

funding audience?" Gaynor says. "At times, it might be the same audience. But in my experience, the funding comes from very passionate environmentalists who want to see the preservation of large green spaces. And because of various biases, it's not always targeted towards the green spaces that really need those funds. [Funding is] constantly being put into another specific space because its value is treasured by X funder or X entity. So, it biases the lens."

Meanwhile, planning for D.W. Field Park improvements moves ahead with capacity funding from NBEP along with a partnership with the land conservation and stewardship nonprofit Wildlands Trust, whose work on the park is supported by a private foundation. It successfully planned a public survey to engage members of the community on what they wanted the park to be and utilized that feedback to purchase land to expand park grounds; develop a park master plan to tackle erosion, water quality, and restoration; better manage parking and speeding; and create servicelearning opportunities for local students.

With these adjustments, many of which were funded by staff capacity grants, Varela and Zygmunt know D.W. Field Park will remain the green destination residents need.

"I recognize the value in parks, and I see how beneficial they are to a person's life. Families are the nucleus and the foundation, and anything we can do to support that is a win. And D.W. Field is the gel that kind of connects that nucleus," Varela says. "If we can introduce our children to some of these places, so they can experience what life is like—not just in the city, but in other green places—and learn, that's what the park can offer as well."



WATER IN CHECK

by Ellen Liberman

Portrait by Dana Smith

KATHY RIBEIRO CAN'T PINPOINT THE MOMENT she told herself: "I can't do this anymore," but she figures it was a rainy, windy night. Those were the worst. She'd have to pull an all-nighter, with multiple sump pumps going to keep pace with the water pouring in to her cellar "like a waterfall." Then she would drag out her portable generator.

"You have to be ready—you don't want to set it up in the middle of the night when it's dark. If the electricity blows out, I'd be in a bind," she says. "It was a battle in the basement."

A special education teacher in Providence, Ribeiro became a student of rainfall and wind strength, constantly weighing the possibility that she would have to take a day off to protect her house.

"I was like my own weather person," she says. The gray-shingled house on Abbott Street was built in 1900, just west of the Rhode Island-Massachusetts line in East Providence on a former wetland by the Runnins River. Over the next century, a neighborhood called Luther's Corner sprang up around it. Ribeiro and her husband Kenneth lived in Luther's Corner their whole lives and raised their four children in the Abbott Street house. Flooding was a some-time thing. There were the floods of 2005, when the remnants of Tropical Storm Tammy dropped almost 15 inches of rain in Rhode Island over three days. The last days of March 2010 brought a historic 500-year storm—9 inches of rain that capped a series of smaller, but significant rain events-turning the Ribeiro's yard, and much of the state, into a lake.

"We went out in dinghies and canoes and sailed our streets," she recalls. But in the last decade, there were too many battles in the basement to count. One sump pump became four sump pumps. Then, Kenneth passed away suddenly in 2017, and Kathy Ribeiro was managing the water by herself.

With 400 miles of coastline and 3,578 miles of streams and rivers, more than 33% of the state's land mass is water. Many of the more densely populated communities were developed in low-lying areas as mill towns, where a nascent Industrial Revolution harnessed the hydropower of rivers such as the Blackstone and Woonasquatucket. Over time, the natural landscape that aided the old drainage systems by absorbing rain were buried under asphalt and concrete.

Rhode Island has warmed about 3 degrees Fahrenheit since 1900, bringing hotter, drier summers and falls. The shifting rainfall patterns are producing wetter winters and springs, with more rain delivered in more intense, frequent storms. Precipitation in the area has increased an inch per decade since the late 1800s.

Water quality and water quantity are connected when stormwater systems are blocked or overloaded, the excess becomes a source of nonpoint pollution. The cities' and towns' sewer and drainage systems are connected—yet many municipalities do not know exactly what is underneath their streets. Rhode Island's state and municipal road systems, a sluiceway for uncaptured water, are also connected.

The fight to prevent chronic flooding is underway across the state, especially in urban areas.

"We had six flash-flooding events in 2023 alone certain neighborhoods and businesses flooded multiple times; we had to do water rescues from apartments the problems are multiple," says Sheila Dormody, chief of policy and resiliency for the city of Providence. "Some of it is related to elevations; some of it is that we have outdated, old infrastructure. Many of our stormwater pipes are more than 100 years old and not designed for the size of the storms we are having. We have a lot more impervious cover, so that means more stormwater runoff—it's the biggest source of unaddressed water pollution in the city's rivers, streams, and ponds. It's really come to a head all across the city."

There is a huge deep rock tunnel under Pawtucket and Central Falls. Here, the Narragansett Bay Commission's (NBC) combined sewer overflow (CSO) system holds overflow wastewater and stormwater until it can be treated at the Bucklin Point Wastewater Treatment Facility in East Providence. Every time the stormwater runoff exceeds the capacity of that tunnel, from her office in Providence's Olneyville neighborhood, Alicia Lehrer, executive director of the Woonasquatucket River Watershed Council (WRWC) gets a rancid reminder of how water quantity and quality are linked.

"There's an overflow release valve in a little park, and it overflows all the time," she says. "It's like a geyser popping out of this manhole ... and you have bits of toilet paper everywhere. It's pretty disgusting."

Yet, as Elizabeth Scott, a former longtime Rhode Island Department of Environmental Management (DEM) employee who now helps the state's cities and towns develop stormwater management plans as Rhode Island's liaison for the EPA-funded Southern New England Program network, observes, "There isn't one agency that oversees stormwater management from a holistic perspective to look at both water quality and flooding."

The Rhode Island Emergency Management Agency (RIEMA) is responsible for administering disaster relief after a flood. RIEMA handles the federal National Flood Insurance Program, which offers property owners policies to recoup flood losses if their municipality has enacted and enforces a floodplain ordinance that will reduce flooding risks.

DEM is responsible for monitoring water quality and enforcing violations to state-issued stormwater management permits. Many entities—large and small—have entered into consent agreements to make improvements to their systems. For example, the NBC has operated under several water quality consent agreements with the DEM since the 1990s to ensure that its two treatment facilities—the largest in the state—adhere to the requirements of their permits. One result is the NBC's Combined Sewer Overflow Program, the largest public works project in Rhode Island history, which includes the storage tunnel.

"Certainly, the DEM has lots of experts who understand hydrology and municipal drainage systems, but that's not really their mandate," says Scott. "So, there's a gap."

Nonetheless, there is a vast network of state and federal agencies, municipalities, universities, nonprofit environmental organizations, and citizens tackling the enormous challenge of flood mitigation and stormwater management.

"You really have to consider the entire watershed," says Stefanie Covino, program manager for the Blackstone Watershed Collaborative, at Clark University in Worcester, Massachusetts. "The climate effects are at the watershed scale, so it makes more sense to work together."

On a Sunday morning in February, Wayne Pauplis went fishing in the old Blackstone Canal. The channel was built in 1828, by Providence merchants who wanted a more efficient network to transport produce from farmers of Worcester and the Blackstone Valley to urban consumers. The canal functioned as a mill location and commercial waterway for two decades before the Providence and Worcester Railroad rendered the latter obsolete.

Much of the canal has been filled in, and the parts that remain are meant to be scenic companions to the river beside it. In Cumberland, it is part of the Blackstone River State Park, and lazes past the old Ashton Mill, once part of the Lonsdale Company textile empire, now apartments.

Pauplis, who lives at the converted mill, was using a 16-foot pool net to fish plastic bottles and beer cans caught in the fallen branches at the canal's edge. Nearby a volunteer crew from Cozy Rhody Litter Clean Up was doing the same, armed with plastic buckets and trash grabbers. Among them was the Markarian family, which was snagging lots of glass and dog poop bags. The January rainstorms had flooded the basement of the main apartment building and sent a torrent of trash down the Blackstone. John Marsland, president of the nonprofit Friends of the Blackstone (FOB), was there, too.

During the January storm, he was obsessively checking the U.S. Geological Survey's CFS (cubic feet of water per second) data, watching it rise from a

Alicia Lehrer, executive director of the Woonasquatucket River Watershed Council



normal 600 CFS to 35,000 CFS. Then he met fellow FOB member Keith Hainley to see what those numbers looked like on the ground. The river had risen 5 feet behind the building FOB shares with the Blackstone River Watershed Council in Lincoln, spilling its banks by 100 feet and trashing the docks at Central Falls Landing, where lots of river tours and canoe trips launch.

"We were like holy s---!," he recalls. "Once [the river] went down, it was like, look at the mess."

That February day, volunteers spent three hours trash-picking the area around the Ashton Mill. Marsland says they didn't even make a dent.

Trash is one of flooding's pollution byproducts; the distribution of surface and legacy pollution is another.

"A lot of our headwaters are urbanized," says Covino. "Some rivers start as stormwater, so urban waterways are often influenced by how much it's raining."

The Blackstone Watershed Collaborative, a coalition of 115 municipalities and other entities with a connection to or interest in the watershed, works on stormwater management and watershed restoration in 39 Massachusetts and Rhode Island communities. For example, the collaborative and students from Worcester Polytechnic Institute have been working with the town of Sutton to prioritize the repair and replacement of its 80-some-year-old rusting steel culverts, now heavily taxed by flooding. Tucked under roads, railroads, and bridges, culverts play a critical role in municipal drainage systems, creating stream continuity by channeling excess water into the watershed. Culvert failures can lead to catastrophic flooding and road collapses—a much more disruptive and expensive repair.

The collaborative is also working in the Green Island neighborhood in Worcester's city center. Fifteen percent of Green Island was built over the Blackstone Canal, which flows under shops and triple-deckers and serves as part of the combined stormwater and sewer system. If it rains enough, that system backs up.

"In Worcester, more than 20% of the area is impervious surface, and anything over 10% reduces water quality. We also have a lot of private unpaved roadways located near waterbodies, where the water washes off the dirt and funnels it into the river, causing sedimentation. At the receiving end, Woonsocket also has a lot of impervious surface, which creates flash flooding," Covino says. "When that water is directed from the ground to somewhere else, at the outfalls, you have big floods of dirty water."

The Woonasquatucket River is also beset by legacy pollution, which has rendered it unsafe for swimming or fishing. In floods, it becomes a circulator of nasty industrial chemicals. With headwaters in North Smithfield, the 19-mile river winds its way south through seven municipalities on its way to the Providence River. Historically, it has served as a dump for the textile, jewelry, and chemical industries.

One of the country's worst Superfund sites is in North Providence and Johnston. The Centredale Manor Restoration Project is removing a laundry list of the industrial pollutants left behind by chemical production and drum reconditioning businesses, which buried toxic waste or discharged it directly into the ground and the river in a 9-acre area, between the 1940s and 1970s. In 2012, the EPA created a clean-up plan; in July 2018, it reached a \$100 million settlement with Emhart Industries, Inc. and Black & Decker, Inc. to implement it. The majority of the contaminated river sediment and floodplain soil has been excavated, and now the project is seeking an offsite disposal and treatment facility.

The WRWC provides input to the cleanup and handles community outreach via a technical advisory group. It's one of its many projects the council works on toward its goal of "a swimmable, fishable" river and "climate resilience for the surrounding community," Lehrer says.

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After days of gray, the sun and the winds are up on a Saturday afternoon in January, and the Woonasquatucket speeds clear and free through Olneyville. You can see right through the sienna-colored water to the carpet of stones on the river bed, and the banks are remarkably clear of trash. María José Gutierrez gives a brief tour of the greenway. She is a graduate of the WRWC's Nuevas Voces, a program that taps community members for a leadership course on environmental justice and climate resilience. Gutierrez, now a co-facilitator of the project, points out the bank erosion, the rain gardens that flank the bicycle path, and the activities depicted on a WRWC banner, flapping against a chain-link fence. The WRWC organizes trash pickups, runs summer camps, and monitors fish migration to raise environmental literacy and engage the surrounding community as stewards of the Woonasquatucket. Since 40% of the river's neighbors are Latino, Nuevas Voces addresses cultural nuances, such as the tradition of kitchen gardens, advising residents not to grow vegetables in the ground without a soil test because it is likely contaminated.

"Our program makes people pay attention to all these natural phenomena and teaches them that they can be resilient to climate change," Gutierrez says. "And I am proud to be part of this organization because we have broken the language barrier and created the bond Market Street in Warren near the Palmer River frequently floods. Photo by Kate Michaud for MyCoast.

between Americans and the residents, who, regardless of their immigration status, are members of this community and have a right to have an active part."

The state's main stormwater management system focuses on water quality—not quantity—under the authority of the federal Clean Water Act and separate municipal stormwater management permits. The Rhode Island Pollutant Discharge Elimination System (RIPDES) requires cities and towns to map their drainage systems and inventory their components, such as catch basins and outfalls, and perform basic maintenance.

The first five-year RIPDES permits that were issued to 29 municipalities expired in 2008 and have not been updated. Joseph B. Haberek, administrator of the DEM's Surface Water Protection unit, wrote in an email that the agency expects to have a draft permit available for public comment by the end of 2024 or early 2025. While Haberek doesn't anticipate that the new permit will include a specific flood control requirement, he says the pollution control measures may have additional benefits, such as promotion of stormwater infiltration, that help with flooding.

On the state level, the Rhode Island Department of Transportation is in the sixth year of a 20-year plan to upgrade its stormwater management system after it was fined by the federal government for failing to meet its obligations under the Clean Water Act. The state agreed to fix the massive drainage system with 25,000 catch basins and 3,800 outfalls that serve more than 3,300 lane miles of divided highways and surface roads.

To date, it has spent more than \$70 million on watershed plans and stormwater treatment units that range from surface treatments such as bioswales (vegetated ditches) to subsurface devices such as hydrodynamic separators, which circulate incoming stormwater to remove the solids and allow clean water to move downstream.

Although the work addresses water quality, some of the improvements will also reduce stormwater flooding,

After what it termed "decades of neglect," the department wrote in an email, "RIDOT is now making the necessary investments in rebuilding our stormwater infrastructure to bring it into a state of good repair so it will be resilient, environmentally compliant, and sufficient to protect our roadways from flooding in the future. We also are making investments for the necessary maintenance, both in terms of equipment and personnel, to preserve these investments."



When the heavy rains come to Providence, Lindsay Dulude grabs her rain gear and an undersized dinosaur umbrella she appropriated from her son and heads out hunting for water—where it is flowing or pooling. Dulude, a project manager for a software company, is one of about 30 volunteers using the city's RainSnap app to take pictures and videos of storm drains, swales, and infiltration basins to be uploaded to the Stormwater Innovation Center's RainSnap website. Dulude documents areas in Roger Williams Park, near her house, where the city has installed about 40 green infrastructure projects to filter polluted stormwater overflow from Mashapaug Pond.

"Some structures in the park work really well, but in others, the water just bypasses the trench completely and floods somewhere else," says Dulude.

The vast majority of drainage networks is composed of aging gray infrastructure, such as pipes and tunnels. Increasingly, communities are retrofitting those systems with green infrastructure—a range of measures designed to reduce sewer flows by using



landscaping, ditches, permeable pavers, gravel substrates, and other elements that tie back to the existing system to capture runoff and allow it to filter into the ground.

Providence has embarked on a multipart plan to address the deficiencies in its stormwater management and flood controls. The city has hired a consultant to analyze the mitigation strategies and costs and to make recommendations. In addition, officials are using federal grants to better understand the city's hydrology and flood patterns and aligning proposed solutions with its capital improvements budget. In the short term, the city is planting trees, which naturally soak up the rain and slow the rate at which it hits the ground, installing green infrastructure on city land, and encouraging private citizens to capture water with rain barrels and gardens. "2023 was a case study of the consequences of inaction-failing infrastructure, sink holes, road damage," Dormody says. "The whole system suffered from decades of deferred maintenance, and the bill has come due."

In 2019, the city established the Stormwater Innovation Center to research and monitor the existing green infrastructure in Roger Williams Park, experiment with new filtration technologies, train officials from other cities and towns, and serve as a stormwater professional information exchange. The center also enlists participatory scientists, like Dulude, and educates residents.

"We try to teach the public that all stormwater starts on an impervious surface, so replacing a patio or a driveway with something where the water can soak

This swale, or depression, helps filter stormwater in Roger Williams Park.

Photograph courtesy of the Stormwater Innovation Center.

in—that's less water running off and contributing to that flooding," says center Director Ryan Kopp. "It's a balance between what the community can do and the load that the government has to carry."

That load can be heavy. Cranston, for example, spent \$131,000 in manpower alone to respond to the storm events in September, December, and January. But there is also lots of help. Cranston officials are working with the Stormwater Innovation Center and had applied to DEM for a \$300,000 grant to assist with site mapping, planning, and management of green infrastructure and tree planting, says spokesman Zachary DeLuca.

Central Falls, which suffers from street and riverine flooding, has neither a facilities plan nor a good inventory of the sewer and drainage system itself. Nonetheless, "stormwater management has just become an essential part of the planning process," says City Planner and Director of Economic Development Jim Vandermillen.

Macomber Stadium, a multi-sports complex, now boasts a permeable paver mezzanine, stormwater bioswales, and a state-of-the-art synthetic turf surface, covering an infiltration system and sand filter that captures runoff from more than 6 acres of surrounding hardscape. The field had been hosting Central Falls High School sports games since 1934, when Raymond Macomber bought the land from the Weyboset Mfg. Co. for \$10. By 2017, the field was worthless, sited on top of contaminated soil too unsafe for athletic play. The surrounding cityscape of abandoned mills was also plagued by stormwater runoff issues. With a \$6.5 million state loan and a \$800,000 DEM grant, Central Falls was able to remove or encapsulate thousands of tons of contaminated soil and piggyback on the NBC's CSO program and the stormwater tunnels running through the city. In 2020, officials cut the ribbon on the new Macomber Stadium.

"Now we have this beautiful new complex that sits on a combined sewer and stormwater chamber," he says.

Cities and towns also can get planning assistance from the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS). The agency, charged with watershed protection, conducts hydrologic investigations of trouble spots, and, if invited by a municipality, will work with the town to plan and design solutions. The NRCS is currently working on 14 different watershed projects statewide.

"One of my hopes is that we will start looking at the big picture. We are creating these hydrology models... so when a decision to grant a permit is made, they can consider the effects downstream," says Darrell Moore, state conservation engineer for the NRCS.

Another source of support is the Rhode Island Infrastructure Bank (RIIB). In 2022, Rhode Island voters passed a \$50 million green energy bond, which included a \$16 million Municipal Resilience Program, administered by the RIIB. In January, it awarded \$12 million to 19 communities. The demand outstripped the supply—the bank received \$52 million in requests from 30 communities.

"Up until five or 10 years ago, it wasn't on municipal officials' radar. But the frequency of the flooding has been a catalyst to people realizing that infrastructure has to change because it starts impacting property and commercial values and increasing other costs to cities and towns," says RIIB executive director William Fazioli. "A lot of municipalities have the ability to plan and conceive a solution, but at the end of the day it comes down to funding to make those plans a reality."

There was time when the water rolling down Cross Street in Westerly was caught by a wooded lot behind Sherry Hall's furniture store. But the parcel was sold, and in 1957, the Roman Catholic Diocese of Providence built St. Pius X, a beautiful stone-fronted church with a large asphalt parking lot in the back. Now there is nothing to stop a hard rain from ending up in the store's basement. The January storms left 10 inches of water in a small troublesome area by the shop's back door. In mid-February the water was still there. "I have to have the fire department pump it out it happens a couple of times a year," she says.

Hall took over the family business in 2000, when her parents retired. She changed the name to Hometown Furniture, picked up some more upscale furniture lines, and painted the exterior trim purple. She tried to address her water issues with a new roof and a rubber seal coat. But the cinderblock building sits low on Main Street, which runs parallel to the Pawcatuck River.

In the summer of 2023, a representative of the Southern Rhode Island Conservation District (SRICD) approached Hall about participating in the Westerly Resilient Riverfront Renewal project. The conservation district, in partnership with the town, has been working on a more than \$2 million redevelopment of Main Street with stormwater, traffic, and streetscape plans to beautify this industrial-looking commercial stretch, make it more pedestrian friendly, and control stormwater to protect the Pawcatuck, says District Manager Gina Fuller.

The SRICD has been recruiting property owners on Main Street to give up some of their hard surfaces mostly parking spaces—to allow the construction of grass strips, rain gardens, and other containment structures.

"I saw this as a perfect opportunity to incorporate the state's stormwater management goals with the town's goals of revitalizing the economic district on Main Street," Fuller says. "Our roads are so narrow and there really is no public property available for incorporating stormwater management best practices, so its critically important that we have the support of private landowners who are willing to house these components."

The SRICD has signed up eight property owners to work on specific design plans. Hall is trying to weigh her parking needs against her desire for low-maintenance greenery that will boost Hometown's curb appeal.

"It's not just going to be beautiful, it's going to be functional," Hall says.

Sometimes, the best intervention takes away, rather than adds. The NRCS's Emergency Watershed Protection Program buys private property at fair market value to remove structures and restore the land to its natural state. The program is now working with some Cranston property owners beset by chronic flooding. In July 2022, it secured \$9.65 million to buy flood-prone homes in Luther's Corner. Ribeiro was one of 18 who took advantage of the offer.

"I didn't have a lot of time to think about it," she says. "I just had to put my heart on the shelf."

When the sale closed in November, "I was holding back tears, because I have a lot of memories there," she says. "But I couldn't keep doing what I was doing."

Running Silver RESTORING ATLANTIC RIVERS AND THEIR GREAT FISH MIGRATIONS, John Waldman



"How do you unalter a landscape?"

That is the question at the heart of John Waldman's *Running Silver: Restoring Atlantic Rivers and their Great Fish Migrations.*

And the answer seems to be "usually very badly," according to Waldman's research. Published in 2013, *Running Silver* is not a new book, but seems appropriate to review, given the theme of this issue. And much of what Waldman finds with respect to river restoration remains true today.

He writes that as early as the 1700s, dams were recognized as a problem for anadromous fish, which spend most of their lives in saltwater but return to rivers to spawn. Massachusetts Bay Colony passed a law in 1735 requiring that new dams be built with passages for alewives and other anadromous fish.

It may not surprise you to learn that

such laws have rarely been enforced. Even when fish ladders or passages have been built into dams—including recently—they often don't work. When they do, they frequently leave fish stranded just above the dam, unable to go further or pass the next dam, but expending their energy trying. Even more elaborate efforts to mechanically shove fish upriver in elevators or transport them in trucks have also shown dismal results.

Dam removal is the ideal solution, but as Waldman writes, the logistics can be nearly insurmountable. "People get used to the changed conditions, building homes by the lake created by a dam. Even if people agree that restoration is necessary, they may disagree on what to do. Then there are the policies, law, and regulations ... that have grown up along with the altered landscape that make change difficult to achieve. And even then, once you have come to agreements and satisfied bureaucracies, there is the matter of paying for it all."

Waldman, a professor of biology, earth, and environmental sciences at the City University of New York, writes with an angler's love of fish, and thus we learn a great deal about anadromous fishes' biology, life cycle, and place in history, along with his despair over the conditions they presently face because of human greed. There are the hydropower plants that annually consume billions of fish and fish larvae in their machinery. There are the pressures from overfishing, from the caviar craze that decimated sturgeon populations in the late 19th century—something Waldman describes as "the piscine equivalent of clear-cutting an old-growth forest" to the 21st century eel "gold rush" that drew both legal fishers and poachers

Reviewed by Monica Allard Cox

to Maine for nightly catches worth \$30,000 to \$40,000 during eel season.

Waldman praises restoration efforts on the Blackstone River, however, singling out the Blackstone River Watershed Council/Friends of the Blackstone as a model organization. He recognizes John Marsland (see Colleen Cronin's article in this issue) and colleague Frank Geary for their attitude and aptitude that has made "the Blackstone restoration one of the most comprehensive in the nation."

Ironically, the fish passage plan that Waldman cites as imminent for the Blackstone—one that had been shelved since 1980 until the Friends revived it—still has not been realized. The group sought bids in 2012 for the work; the only company that responded came back at nearly double the cost expected. As Meredith Haas writes in her story in this issue, a coalition of organizations is working to revive the plan and fundraise for its implementation.

But logistics, politics, and even activism are not really what move Waldman's writing. The wonders of anadromous fish drive the story. Waldman marvels at the eels that travel 4,000 miles from the Sargasso Sea to spawn in the land-locked Caspian Sea, the gobies that climb waterfalls higher than 1,000 feet—more than 5,000 times their body length—and even the simple miracle of a shad hatching in an East Coast river, growing in an estuary, entering the Atlantic and surviving a "Murderer's Row" of predators along its migration, to finding along its route the faint smell of its natal river, calling it home to spawn. To all these fish, Waldman directs the last words of his book, a quote from Thoreau: "Keep a stiff fin then, and stem all the tides thou mayest meet."

UNIVERSITY OF RHODE ISLAND RESEARCH & SCHOLARSHIP PHOTO CONTEST



First Place:

Megan Gray, "Eastern Whip-poor-will and Chick"

URI graduate student Megan Gray took this photo in July 2023 of a female Eastern Whip-poor-will brooding her young chick. Eastern Whip-poor-wills lay two eggs directly on the ground, relying on their cryptic camouflage to blend into leaf litter to avoid predation. Gray's master's research in ecology and ecosystem sciences focuses on the nesting ecology of Eastern Towhees and Prairie Warblers, which, like Eastern Whip-poor-wills, nest in early successional habitat (open areas with grasses, shrubs, and young trees). Researchers visited nests every 2 to 3 days, weighed chicks, and took their measurements. They are trying to understand the nesting phases of these species as they face loss of breeding habitat and other challenges.

The 2024 URI Research & Scholarship Photo Contest is sponsored by *The University of Rhode Island Magazine, Momentum: Research & Innovation* magazine, and *41*°N magazine.

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