

Headwaters Flow from Stream to Bay: Connecting Healthy Environments, Communities and People

Narragansett Bay Watershed Counts 2016 Report



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**NARRAGANSETT BAY
ESTUARY PROGRAM**



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From the Co-coordinators

This edition of *Watershed Counts* features case studies highlighting success stories as well as challenges regarding headwater streams and their connection with Narragansett Bay. We also shed light on the people and the processes behind several success stories that have led to a healthier watershed system, which benefits all of its residents—plant or animal.

As with many natural features that define the majesty of a landscape, Narragansett Bay begins as little more than a trickle over rocks in the upper reaches of the watershed allowing emerging rivulets to form small streams and wetlands. Headwater streams then combine to form larger rivers that flow into the bay and eventually to the ocean. The health of these initial streams underlays the health of Narragansett Bay. Legions of fish such as herring and American eels spend their lives migrating from the salty bay water to the fresh river waters in a never-ending cycle. This cyclical connection of water is a driving force behind the health of the watershed. Moreover, it is a source of aesthetic value to people, fundamental to our well-being.

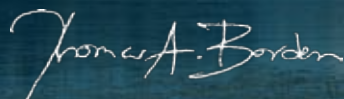
Protecting the waters of these habitats and promoting sustainable use is critical, requiring strong and creative collaborations. Behind every river protection success story, we found an individual, a community group, or a federal agency—often working in partnership—that identified a need, initiated a process, and brought about change. We hope you enjoy learning more about the changes that are occurring in the watershed to protect headwaters, the bay, and the connection between them.

For those of you who like to plan ahead, the 2017 edition of *Watershed Counts* will dovetail with the Narragansett Bay Estuary Program's report on the state of the Narragansett Bay watershed by providing an overall view of the status and trends of watershed health ranging from marine to freshwater, coasts to inland areas, and plants and animals to people and communities.

Let us hear from you at coastalinstitute@etal.uri.edu and look for announcements about meetings and opportunities to get involved at www.watershedcounts.org.



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Executive Summary

From Stream to Bay: Connecting Healthy Environments, Communities and People

The 2016 *Watershed Counts* Report focuses on the headwaters of Narragansett Bay—the small streams that flow from the inland forests, bogs, and lakes of Rhode Island and Massachusetts into larger rivers, which then flow into the Bay and eventually to the ocean.

The streams that flow into the bay provide critical freshwater but also carry with them all the pollutants they pick up during their journey. Protecting this connection to salty Narragansett Bay—and everything in between—is critical for a healthy watershed shared by two states.

As *Watershed Counts 2016* points out, protection of the waters does not spontaneously occur. It takes clear vision, hard work, and long-term dedication by individuals, communities, organizations, and agencies to initiate change to improve environmental health. The 2016 report cites the need for dedicated efforts on four specific fronts, which need to be constantly integrated to achieve the maximum benefits for people and the environment from land to sea.

- **INDIVIDUALS** can make small but important differences between a healthy Narragansett Bay and one that interferes with the natural passage of fish moving back and forth among rivers and streams and the bay.

- **COMMUNITIES** can implement “good neighbor” projects that can cross arbitrary municipal boundaries to help protect drinking water in the backyards of multiple towns and cities, and jointly send clean water down to the bay.

- **ORGANIZATIONS** can work together across an entire watershed to develop an environment that is ecologically healthy and nurtures an enhanced quality of everyday life.

- **STATE AND FEDERAL GOVERNMENT AGENCIES** can make commitments and establish programs dedicated to the ongoing protection and preservation of vital and valued lands and water. Once established, these can be a critical factor in helping the Narragansett Bay watershed remain productive.

In all cases, these efforts need to continually inform one another. Collaboration among partners at the local level must complement and, with its hands-on approach, strengthen programs at the state and federal levels. This proven strategy, known as the watershed approach, applies integrated management that benefits everyone.

The success stories in both Rhode Island and Massachusetts cited in the 2016 *Watershed Counts* report were compiled by the *Watershed Counts* partnership, a coalition of over 60 non-profit entities, government agencies, academic institutions, and other organizations that work together to report regularly on the land and water resources of the Narragansett Bay region. The annual *Watershed Counts* report highlights the important work that these many partners do every day to protect and restore the Narragansett Bay watershed to ensure enjoyment and use of these waters for generations to come.

*Fish ladder at Main Street Dam
on Saugatucket River, Wakefield, RI.*

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A photograph of three children, two boys and one girl, looking down at a stream. The boy in the foreground is wearing a red shirt. The girl behind him is also wearing a red shirt. The boy in the background is wearing a grey shirt. They are standing on a bank with trees and bushes. The water in the stream is clear and blue.

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An aerial photograph showing a wide river in the foreground, with a dense forest and several green agricultural fields along its banks. A few houses are visible among the trees. The sky is overcast.

Houses and agricultural fields along Taunton River near Berkley, MA.

*“Rivers are a reflection of
whatever happens upstream...”*



The Headwaters of the Narragansett Bay Region

Many residents of Rhode Island and Massachusetts are familiar with the Blackstone, Taunton, and Pawtuxet rivers, and other rivers that flow into Narragansett Bay. But these sizeable rivers begin as numerous small, nameless “headwater” streams many miles from the bay, bubbling up from groundwater or trickling out of wetlands, bogs, ponds, and lakes. Even the Mighty Mississippi begins with a barely noticeable stream. The connection of headwaters to the recognizable larger rivers and the estuary they empty into is an important chapter in the story of the Narragansett Bay watershed, both for the environment and people.

What are headwaters?

Headwaters are often tiny streams that mark the origin of a watershed and are many miles inland from the ocean or bay into which rivers empty. Headwater streams are often called “first-order streams.” When two first-order streams meet, they form a second-order stream; then two second-order streams meet and form a third-order stream, and so on. Fourth-order

and higher streams typically constitute a river. Headwater streams make up over 80 percent of the total length of earth’s waterways, and Narragansett Bay’s headwater streams are in keeping with this pattern.

What are the headwaters of the Narragansett Bay watershed?

The Blackstone River and the Taunton River contribute over 70 percent of the freshwater that flows into Narragansett Bay. The headwaters of the Blackstone River originate in and around Worcester, Massachusetts. Because they are situated in an urban environment, many of these waterways are now buried underground as part of the city’s stormwater management system. Other headwater streams in the watershed originate in well-protected parks and natural areas. The Taunton River’s headwaters originate in the wetlands and bogs of Southeast Massachusetts. This flat, wet, swampy environment contrasts with the Blackstone River’s origin in steep, rocky, forested terrain.

In Rhode Island, the Pawtuxet and Pawcatuck Rivers start as headwater streams in the central and western parts of the state before flowing into Narragansett Bay and Little Narragansett Bay. These streams, similar to many of the Blackstone River’s headwaters in Massachusetts, are often in forests.

What makes headwater stream ecosystems unique?

Because many of the tiny streams that make up the bay’s headwaters are in dense forests, they are covered by a canopy of leaves and branches that shade and cool the water during hot summer months. In the fall, these same trees create a drift of red and yellow leaves into the stream, which provides food for a variety of invertebrates, salamanders, and fish.

Headwater streams are also often fast-moving compared to the rivers into which they flow. These streams tend to be in hilly areas at a higher elevation than the higher-order rivers downstream. Many headwater areas are close to the drainage divide—the point at which water begins to move downhill, separating two watersheds. The elevation drop from the drainage divide creates fast-moving water and step pools, resulting in high levels of dissolved oxygen that are ideal for cold-water fish such as trout. The largest U.S. drainage divide is the Continental Divide in the Rocky Mountains, which separates water flowing to the Pacific Ocean from water flowing to the Mississippi River and into the Gulf of Mexico. Drainage divides occur between large watersheds as well as between smaller ones such as the Narragansett Bay watershed and the Buzzards Bay watershed.

Why are headwaters important?

Individual headwater streams are small, but they collectively make up over 80 percent of the stream length in most watersheds. They also tend to be sensitive environments that can be susceptible to land-use impacts, such as development and agriculture. Development along a headwater stream results in runoff

from parking lots and other impervious surfaces entering directly into the waterbody, while agriculture along a waterway can increase the amount of fertilizer and nutrients that enters the stream. When rainwater and run-off are allowed to soak into natural areas, the soil and plant root systems provide two major benefits: 1) many contaminants such as excess nitrogen, phosphorous, and sediments are filtered out, and 2) the water flow slows down before it enters the stream. Without natural areas to filter water before it enters these headwater streams and other waterways, the waters are inundated with pollution and unnaturally high flows, destroying these unique headwaters habitats.

In addition, first-order headwater streams also contribute more than half of the volume of water to major rivers. Consequently, whatever is in the first-order stream flows to the major rivers and then into Narragansett Bay and the ocean. So, if a headwater stream is contaminated with oil from a neighboring urban area or has a high level of nitrogen from manure (referred to as nutrients) used on an adjacent farm, then not only is the headwater stream impacted, but the problem flows downstream to other communities as well.

“Rivers are a reflection of whatever happens upstream,” said Dr. Arthur Gold, a watershed hydrology expert at the University of Rhode Island. “Whatever’s going on in the headwater streams—the extent of flooding that occurs, pollutants that they’re carrying, the temperature of those particular streams—that gets transmitted, merges with these other headwater streams, and begins to influence downstream sites.”

Headwater wetlands and bogs can also serve as nutrient sinks, absorbing nitrogen and other nutrients that would otherwise flow downstream into the bay and cause problems at high levels, such as algae blooms and low oxygen zones in the bay’s estuaries that can cause fish kills and negatively impact other marine life. Headwater ponds and lakes can serve as ideal habitat and spawning grounds for migratory species such as river herring and American eels. These fish spend part of their lives in the ocean before entering Narragansett Bay and then swimming upriver to the headwaters. These fish rely on a healthy habitat be it the ocean, the bay, or the headwaters and they require an unobstructed path that connects all three.

Humans also benefit from healthy headwater streams. These streams collect and channel rainwater to downstream ponds, lakes, reservoirs, and rivers, which often supply drinking water and are used for recreational activities such as swimming, fishing, and boating. Clean headwaters make it easier to keep downstream waters clean with attention to appropriate human use, preventing beach closures and warnings for consumption of harvested fish and seafood.



Does this mean that we should not use the land around headwaters?

The best-case scenario for streams, rivers, and Narragansett Bay would be for areas around headwaters to be free from any type of human activity. However, this is far from realistic. Many cities were built along rivers so fast-flowing waters could power mills during the Industrial Revolution. Now, being near waterways allows ships to easily transport cargo and people. Towns are often located close to headwaters so water can be drawn from natural aquifers and people can enjoy swimming and fishing as well as beautiful views. Crops are grown near streams to intercept the water that is flowing through the soil and make irrigation easier.

Along with the environmental roles described above, these community uses are also important roles of headwaters and rivers. Communities, states, and the federal government need to carefully consider the impact of development activities and take intentional, well-planned steps to protect headwaters and rivers so that we can use and enjoy headwaters without destroying their role in a healthy ecosystem.

How can we protect headwaters?

One of the best ways to protect watersheds is to preserve or re-establish riparian buffers—the vegetated land along the banks of streams and rivers. In addition to providing habitat for aquatic and land animals, the plants and microscopic organisms in the soil of the riparian zones filter rainfall and runoff before they enter the stream by using and storing nutrients and other contaminants.

Reducing impervious surfaces in neighboring cities and towns and leaving some land undeveloped allows rainwater and runoff to filter into the soil before flowing into the streams and rivers. The creation of greenways and rain gardens in these areas can help divert rainwater into the ground for natural filtering instead of funneling it directly into streams and rivers through

storm drains. The organic matter that makes its way into the streambed from trees and other plants in riparian zones also serves as an important food source for aquatic animals.

Upgrading wastewater treatment plants to reduce the volume of effluent discharged into headwater streams helps maintain the natural flow and temperature of the water, and helps keep nutrient and bacteria levels low. This benefits both headwater streams and areas downstream.

Limiting fertilizer use on farms, golf courses, and lawns also reduces runoff of excess nutrients to nearby waterways. Testing soils to see if your lawn needs fertilizer is important—and required in Massachusetts for phosphorus—before application, and closely following directions can help to reduce nutrient levels while still promoting optimal plant growth and health.

Limiting water use, especially during dry periods, can also help preserve headwater streams. Overuse of drinking water supplies, in particular excessive residential lawn irrigation, can dry up the natural wells and aquifers that feed headwater streams. One simple way to retain water for dry days is by installing a rain barrel or cistern. This allows homeowners to collect water during the wet season and save it for another time when streams need the most help, turning runoff into a resource. Even small things like turning off the water while you brush your teeth matters.

Significant populations live in and rely on the Narragansett Bay watershed for food, recreation, and tourism. The watershed stretches from the south shore of Rhode Island on the edge of the vast Atlantic Ocean to the narrow headwater streams in central Massachusetts. It is critical for communities and watershed residents to recognize that tiny streams are connected to larger rivers and Narragansett Bay. These headwaters are part of the same watershed and deserve the same respect and care as larger bodies of water.

How is climate change affecting headwaters?

Climate change impacts in the Narragansett Bay watershed include changing precipitation patterns and increasing air temperatures. In the last half century, New England has seen a 71% increase in very heavy precipitation events, which leads to higher water flows and flooding of headwater streams, increasing nutrient transfer to downstream waters and the bay, as well as erosion of stream and river banks.

Although it may seem counterintuitive, changing precipitation patterns are also expected to make droughts longer and more intense. This could dry up tiny headwater streams and vernal pools (temporary springtime pools), resulting in loss of habitat, decreased water flow to downstream rivers, and decreased drinking water supplies.

Increasing air temperatures also warms the water in the streams and rivers, which can impact the plants and animals that live there. Plants and animals may not be as healthy in warmer waters; they may not grow as big or may not successfully reproduce. If water temperatures get too high, they may not survive at all.

Communities can help mitigate the impacts of climate change on streams by making well-informed decisions about water use and land development.





Mural designed by high school student on dugout at Lee Romano Little League Field, North Providence, RI.

Change-makers in the Narragansett Bay Watershed

The rivers in the Narragansett Bay watershed are important for a variety of reasons. They supported the birthplace of the Industrial Revolution in America—the economic engine that gave rise to our nation's growth; they ensure communities have clean water; and they serve as vital connections to inland freshwater rivers and streams that flow into Narragansett Bay.

Unfortunately, rivers and streams that flow into Narragansett Bay face environmental threats ranging

from urban development to climate change. Luckily, there are passionate individuals, communities, organizations, and agencies that are committed to protecting these rivers and promoting their sustainable human use.

The impetus for change can come from a local individual who sees a problem and raises her concern or from a federal agency that offers an opportunity to highlight the uniqueness and value of a specific river;

however, deciding to make a change is the first—and often easiest—step in the long process of what the change should be, why it should be made, and how to make it a reality.

This report shares just some of the many examples from the Narragansett Bay watershed of the importance of our freshwater resources and their connection with the bay and ocean, and the outstanding individuals who work to protect them.



You Can Go Home Again: Volunteers give river herring a lift

CASE STUDY

PHOTO: Paul McDivitt

From time immemorial, when dams were the intellectual property of beavers, alewife and blueback herring (collectively known as river herring) made their way from the ocean into Narragansett Bay and up the Saugatucket River each spring to lay eggs in upstream ponds. These eggs then hatched, and the juvenile fish

swam back to the ocean to grow into adults before returning to the same birthplace, yet again, to spawn.

But, human innovation during the Industrial Revolution brought dams to the rivers to capitalize on flowing water for power. An unintended consequence was that these dams also blocked the fish migration cor-

ridors. For some time now, fish ladders have been installed at dam sites to help river herring navigate over the dams, but the fish sometimes reject or are unable to navigate these structures.

When Bill McWha moved to Wakefield, Rhode Island, in 2010, he noticed that the dam on the Saugatucket River prevented river herring from completing their journey from the ocean to the upper reaches of the Saugatucket to spawn. Once past the dam, blueback herring prefer to spawn in moving waters, such as streams and rivers, while alewife favor calm waters, such as ponds and lakes. If the fish can make it past the Wakefield dam, they have access to 20 acres of spawning habitat in Wakefield Pond. Although the Rhode Island Department of Environmental Management installed a fish ladder, the river herring were not using it to get around the dam, which remained a barrier. The natural cycle of migration and spawning was broken.

The river herring were prevented from reaching ideal spawning habitats with lower water temperatures, better river substrate, and slower water flows. Instead, the logjam of fish had no option but to spawn in less-than-ideal conditions at the base of the dam before returning to the sea.

“I could see that the fish couldn’t get past the dam using the fish ladder,” said McWha. “You couldn’t leave all those fish there and have them spawn at the base of the dam because once the eggs hatched, there would be too many young river herring and not enough food. They would starve to death, they’d eat themselves out of house and home.”

River herring are listed as a “species of concern” by the National Oceanic and Atmospheric Administration’s National Marine Fisheries Service, in part due to the spawning issue. The concern is great enough that fishing for river herring is prohibited in Rhode Island and Massachusetts to protect plummeting populations. These fish are a crucial food source for a variety of animals, from eagles and ospreys to seals and striped bass, as well as being an important species for

saltwater anglers and the associated tourist economy.

Fortunately, McWha decided to take action on behalf of the river herring, the striper, and the striper fishermen. He enlisted friends to catch river herring with nets and lift them over the dam. In 2010, McWha's volunteers transported nearly 20,000 fish.

This annual event became something of a community calling. Volunteers returned each year to physically carry the fish over the Wakefield dam. Then, last year, the Rhode Island Department of Environmental Management reconstructed the fish ladder, and McWha and the volunteers happily stepped back to watch the river herring navigate past the dam unassisted. According to McWha, "It's working well and volunteer services are no longer needed at that location." However, river herring at other locations along the Saugatucket River need the volunteers' help.

Just this past April, on a sunny Saturday morning, McWha and his crew of volunteers, the Saugatucket River Herring Association, were hard at work at the base of another problematic dam, the Palisades Mill in Peace Dale, one of some 667 dams in Rhode Island alone.

Lifting fish at the Peace Dale location required a more complicated operation than at the Wakefield dam—and more volunteers. A team used a "crowder fence" to herd the fish upstream towards the fish ladder entrance. Volunteers stood ready with nets to scoop up the fish and pass them on to the "bucket brigade," a chain of volunteers who hauled the nets above the dam and released the fish into the stream to continue their journey.

"A lot of these volunteers are avid [striped bass] fishermen," said volunteer Bob Cavanagh. "They're doing this because they know it's going to help preserve the striper population as well."

"I've been involved every year," adds volunteer Gerade Crute, a striper (striped bass) fisherman. "It's rewarding, I love it."

As the determined fish near their destination at Indian Lake, they face one last man-made challenge: small waterfalls created by the damming of the lake. But, McWha and volunteers were there once again to help the fish. They installed another ladder to assist the river herring to swim past the waterfalls.

Once past the dam at Palisades Mill, 45 acres of habitat opens up in Peace Dale Pond. If the river herring can make it all the way to the headwaters of the Saugatucket at Indian Lake, over 200 acres of pristine spawning habitat are available.

"The more habitat the better," said Jim Turek, a restoration ecologist for the National Oceanic and Atmospheric Administration. "And if it's good quality habitat

that's even better."

According to Turek, Indian Lake's size, shallowness, and clean, well-circulated water, devoid of the out-of-control aquatic plants in the two downstream ponds, make it an ideal spawning ground for alewife. This environment is conducive to higher dissolved oxygen levels, which help the fish to thrive.

"It's a great place for the newly hatched juvenile fish to live for anywhere from three to six months before they go out to sea," said Turek.

The Saugatucket River is not the only river where herring need a lift. On the nearby Pawcatuck River, recent dam removals established a herring run for first time in over a century. That run was aided by adding fish



"The volunteer list has grown and grown and grown over the years"
—Bill McWha, Volunteer Coordinator



Volunteers carry a fish ladder along Saugatucket River.

PHOTO: Paul McDivitt

trucked over from the Saugatucket River to the Pawcatuck's headwaters at Worden's Pond.

In Massachusetts, the Hopewell Mills Dam was removed in 2012 on the Mill River, part of the Taunton River watershed. The Massachusetts Division of Marine Fisheries installed an underwater camera just upstream from the former dam.

"Within hours, the camera recorded the arrival of river herring, the first to be documented since the dam was built in the early 1800s," said Beth Lambert, Aquatic Habitat Restoration Program Manager at the Massachusetts Division of Ecological Restoration.

"Every river on the whole East Coast had herring coming in, but we cut them all off with mill dams," McWha said. "Many of these mill dams are obsolete and can be removed so river herring can resume their annual journey."

McWha and volunteers recognized the important connection for river herring between the saltwater of the ocean, the mixed waters in the Narragansett Bay estuary, and the freshwater of rivers and streams, and they worked together to overcome barriers to river herring. Their efforts can bolster the river herring population and, in turn, promote a healthy ecosystem.

Freshwater eels in search of a home

River herring aren't the only fish impeded by dams. The mill dam on the Pettaquamscutt River (also known as the Narrow River) adjacent to the Gilbert Stuart Birthplace and Museum in Saunderstown, Rhode Island, features an eel ramp adjacent to a fish ladder.

"Eels at this stage are very, very small," said Kimberly Sullivan, Aquatic Resource Education Coordinator at the RIDEM Division of Fish and Wildlife. "They cannot jump up a fish ladder like the river herring, but they will slither up the eel ramp to reach the pond."

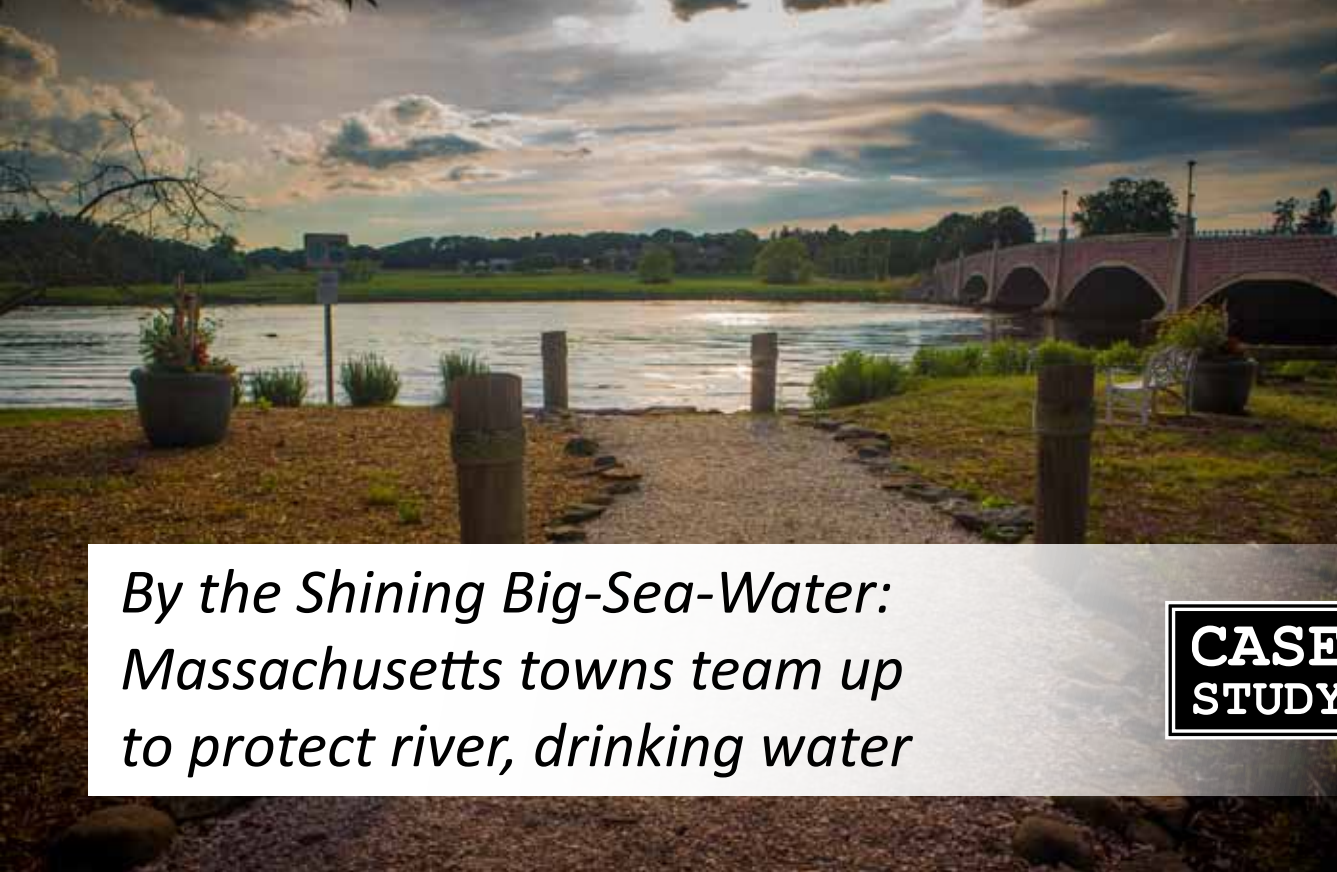
American eels, called glass eels when they are very small, join the river herring in their upstream journey each spring—but for a very different purpose. Instead of returning to their birthplace to spawn, these young eels are searching for a place to live.

The eels are born in the North Atlantic Ocean and ride ocean currents into rivers and streams on the East Coast. They live out their lives in freshwater ponds before returning to the sea to spawn and die.

The Narragansett Bay watershed's environmental health depends in part upon a careful assessment of old mill dams coupled with ongoing efforts to restore habitat critical to those species that travel from ocean to estuary to river pathways to the place they recognize as home.



PHOTO: US Fish and Wildlife Service



By the Shining Big-Sea-Water: Massachusetts towns team up to protect river, drinking water

CASE STUDY

For almost 30 years now, citizens of five Massachusetts towns have looked past their legal and political borders to come together and discuss how best to protect their shared drinking water supply: the Canoe River Aquifer.

“The water doesn’t end with your boundary,” said Janice Fowler, a resident of Easton and the committee’s secretary. “So it’s important to get together and understand what everyone else is doing.”

From such awareness came the Canoe River Aquifer Advisory Committee, which has three members from each of the five communities: Sharon, Foxborough, Mansfield, Easton, and Norton. Massachusetts’s state environmental officials praise the committee’s unique collaborative approach to watershed management as a model for a volunteer regional entity.

The aquifer receives water from the Canoe River watershed and is the primary drinking water source for over 50,000 people in the area. It has been designated as a Sole Source Aquifer by the U.S. Environmental Protection Agency, which means that it supplies at least 50 percent of the drinking water consumed in the area. This federal recognition is reserved for areas where an alternative drinking water source would be very difficult and expensive to implement if the aquifer were to become contaminated, underscoring the importance of protecting and managing the existing water supply.

“For many years we met once a month,” said committee chair Wayne Southworth, who has been with the organization since its inception in 1987. “There’s been a great sharing of information among the communities over the years.”

“Having monthly meetings where you see everybody really helps you understand who they are and where they’re coming from,” said Jennifer Carlino, conservation director for the town of Norton and a member of the committee. “We all have the same goal to ensure we have safe, reliable drinking water.” It is this cooperative spirit that has contributed to the advisory committee’s effectiveness.

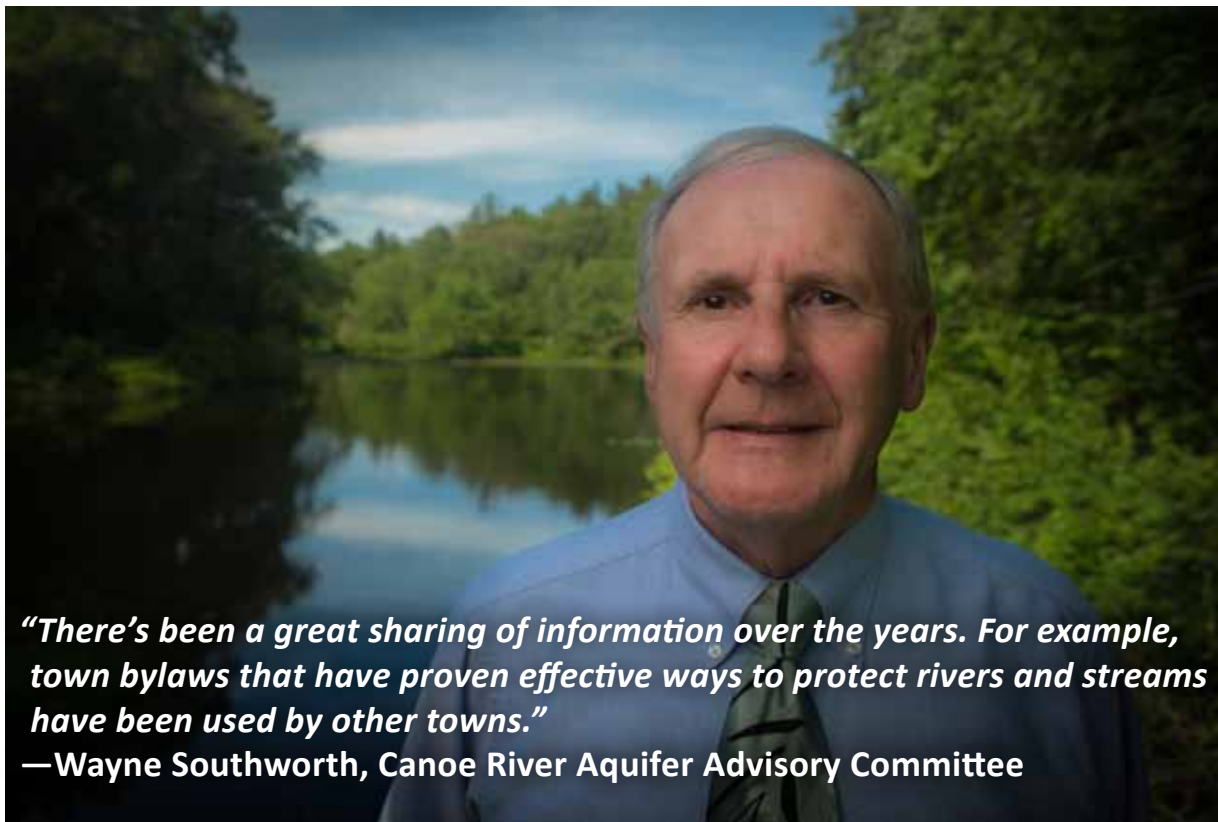
The committee’s primary goal is to be proactive in protecting the water. Too often the model is reactive once an aquifer is contaminated. One of the most effective ways to maintain river health and associated water quality is to protect the riparian zone, which encompasses the land on both sides of the river. A riparian zone with healthy plants and trees serves as a buffer between developed or agricultural areas and the Canoe River. This buffer filters rainwater and runoff as they flow toward the river, preventing contaminants from entering it and, subsequently, the drinking water supply as it flows downstream.

The headwaters of the 14-mile long river trickle out from wetlands near the recreationally popular Lake Massapoag in Sharon and travel southeast through all five communities on the way to Winnecunnet Pond in Norton. The water eventually flows into the Taunton River, crosses state borders, and empties into Narragansett Bay. Again, the river knows no political boundaries.

Recognizing the importance of a healthy buffer, one of the advisory committee’s main projects has been the Canoe River Greenbelt Project, an effort to protect the Canoe River’s riparian corridor. Over the years the committee has succeeded in building a patchwork of protected land along the river.

“We don’t have a budget, we don’t have any money, we don’t deal with any money,” said Southworth. “We work with the land preservation trusts, the conservation commissions, and the towns to seek grants or outright gifts from landowners along the river.”

The benefits of protecting the river’s riparian zones



extend beyond drinking water quality. The area was also designated as an Area of Critical Environmental Concern (ACEC) by the state of Massachusetts in recognition of the area's highly significant environmental resources. According to the committee, over 600 species of plants, fish, and invertebrates, including many rare and endangered species, live within the aquifer's watershed. A healthy riparian corridor also can shade the river to prevent the water from getting too hot for the animals that live there, and it can slow down water as it flows into and down the river as a means to prevent erosion of the riverbanks.

"Both of those designations [the Sole Source Aquifer and ACEC] have been great tools for the conservation agents in the five communities when they're consider-

ing and assessing development projects," said Southworth. "Those are the things that catch a developer's eye and makes them think about their project differently when they want to do a project that may impact the river. It makes them be sure to get all their ducks in a row for the project to ensure approval and success."

In addition to the riparian corridor project and reviewing development projects in the area, the committee also engages with the public. Examples include recreational and education events to inform even more people about the importance of a healthy Canoe River and aquifer, and educational seminars on land-use (limiting impervious surfaces) and lawn care (less watering and use of fertilizers) so individuals can also take action in their community or even on their own

property to help protect everyone's drinking water.

"It's very important for people to realize where their water comes from," said Southworth. "Anything that you do on the surface of the land is going to be reflected in the groundwater of the area."

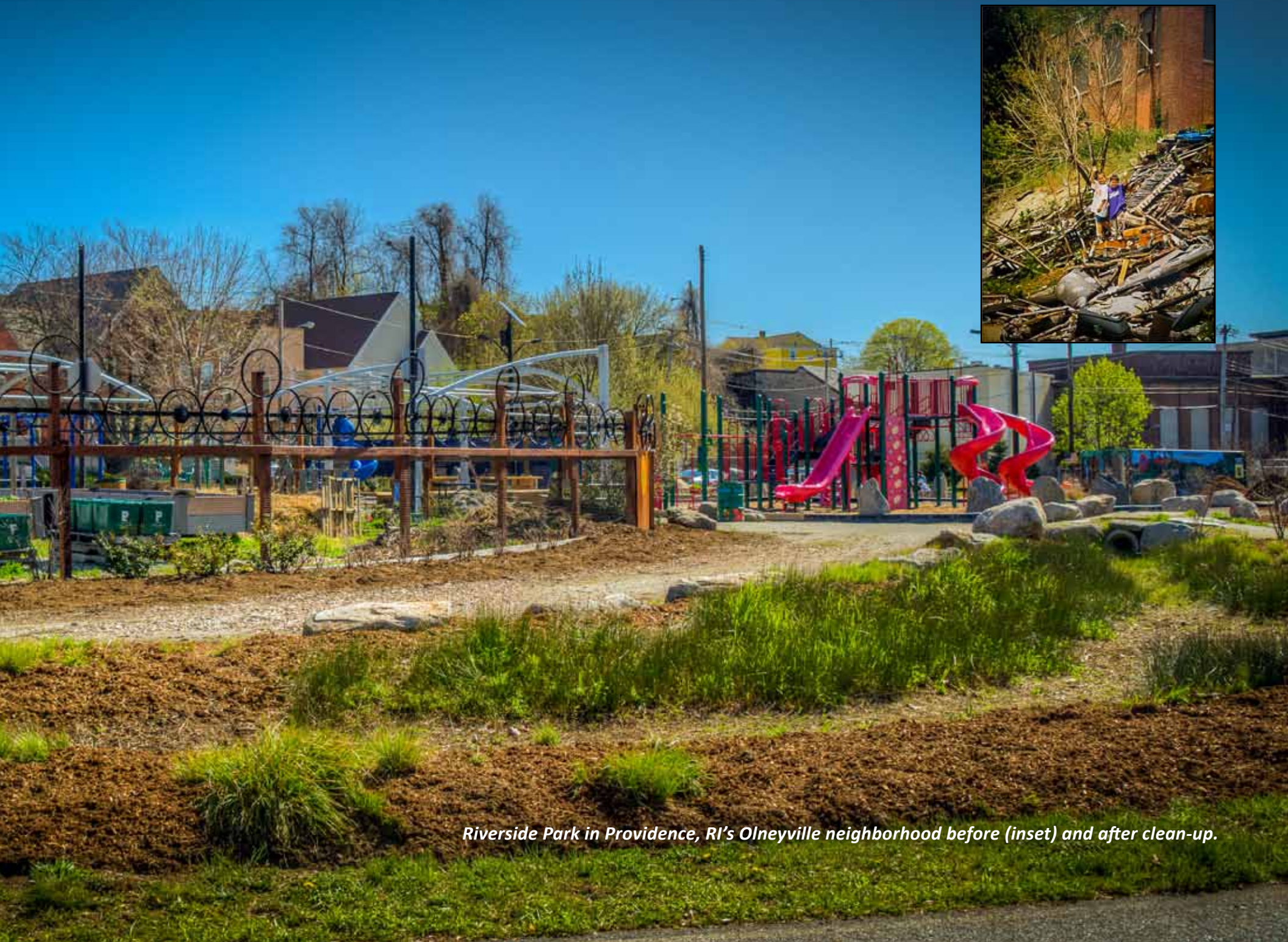
During a recent June meeting at the Sharon Community Center, Southworth was asked what he envisions for the next 30 years of the committee.

"The next 30 years? Well, I'm just getting started," said the retired Southworth, garnering chuckles from fellow committee members. "I'm very proud of this committee."

Whatever project is next for the advisory committee, its work protecting the Canoe River and the local drinking water supply will continue to benefit not only nearby communities, but also bi-state residents downstream along the Taunton River and in Narragansett Bay for years to come.







Riverside Park in Providence, RI's Olneyville neighborhood before (inset) and after clean-up.



Old Man River Regains His Voice: Cleaning rivers, fighting crime, building community

CASE STUDY

The Woonasquatucket River winds quietly through the Olneyville neighborhood in Providence, Rhode Island. Unless you are next to it, odds are you might not even know the river is there. But, it played an important role in the area's history and, following a period of abuse and neglect, it is making a comeback to play an important role in its present and future.

Industrial mills came to Olneyville in the mid-1800s, drawn to the banks of the Woonasquatucket River for hydropower and its access to railways and ports for convenient shipping. Olneyville enticed an eclectic mix of workers—many newly immigrated—to move to the area for jobs in the wool, textile, and paper mills. The neighborhood boomed. After World War II, however,

the mill industry collapsed, leaving behind pollution and unemployment.

The Woonasquatucket River fell into obscurity, meandering silently through Olneyville once again, but this time laden with industrial contaminants. The industrial mill-polluted soil threatened local public health, and rainwater runoff carried those pollutants into the river, which contaminated the water that then flowed into Narragansett Bay.

Thanks to the work of federal, state and nongovernmental agencies, in 1993 the river once again drew attention. The community came together to clean up the contaminants that now abandoned mills had left in the ground and water as a means to restore the lost

beauty of Olneyville's environment and to improve river health. Residents understood that river health was critical to human health.

Determined to improve the areas along the river to benefit both the environment and the community, the Woonasquatucket River Greenway Project, Olneyville Housing Corporation, the Providence Police Department, and others formed a partnership with financial support from the non-profit Providence Plan. This unique partnership envisioned clean, safe parks throughout Olneyville to filter rainwater before it reached the river and then flowed on to Narragansett Bay. Plans included a bike path that would connect neighborhoods to businesses. Riverside Park was the first park created under this new plan.

Providence Police Captain Dean Isabella was skeptical when he and his fellow officers first got involved with the project to clean up the Riverside Park area of Olneyville.

"At the time, we didn't think that was a great idea," said Capt. Isabella, who grew up in Olneyville. "Riverside Park was one of the worst crime areas in the city of Providence, and the plan was to put in a park and build housing. We thought it was a tall order."

The site of the future park, home to several abandoned mills, had become a dumping ground that then attracted crime. Despite making up only three percent of the geographical area in the district, it was responsible for about 30 percent of the area's 911 calls.

"There was all of this debris," said Jane Sherman, who headed up the Woonasquatucket River Greenway Project on behalf of the nonprofit Providence Plan. "It was this center of crime activity."

Due to its industrial history, the soil was contaminated, mostly with spilled oil and gas. In 1998, Sherman's team was successful in getting the site designated as a U.S. Environmental Protection Agency's Brownfields Showcase Community, which then funded the massive cleanup effort. The agency and the Rhode Island

Red Shed Bike Shop at Riverside Park in Olneyville neighborhood, Providence, RI.



Department of Environmental Management removed several feet of contaminated soil from 15 acres, put down a protective layer to form a barrier against contaminants that may remain deeper in the soil, and brought in new, clean soil to fill in the area.

“You have to remove all of the contamination,” said Sherman. “If it is going to be a park you have to make sure there are no remaining contaminants that will threaten human health.”

“Everything we did we did after consultation with the community.”

—Jane Sherman, Former Greenway Project Director

And a contaminant-free park it became. The site is now home to Riverside Park, featuring a state-of-the-art playground, community garden, bike shop, and several acres of green space. An off-road portion of the Woonasquatucket River Greenway bike path winds through the park as it follows the river into downtown Providence, where it eventually will be extended to join the East Bay Bike Path.

The community of Olneyville has been involved with

the process from the beginning and now actively participates in the upkeep and maintenance of Riverside Park and the surrounding greenway. Last year, more than 1,300 volunteers—many of them local residents—lent a hand at over 20 cleanup and community improvement events.

Capt. Isabella and the Providence Police Department were first pleasantly surprised and are now converts to what a community can accomplish. Cleaning up the environment and creating enjoyable, safe recreation areas resulted in a sense of accomplishment and pride that has reverberated throughout the community. Crime in the area plummeted over 80 percent, and the drop has been sustained for almost a decade. The population in the neighborhood increased tenfold, largely due to the creation of 126 units of affordable housing, built as part of the revitalization project by the Olneyville Housing Corporation.

“We addressed social issues in communities that were related to the crime problems,” Capt. Isabella said. “There was a high level of commitment to success, not only success with this project, but success with building the partnerships that we all knew were important.” This collaborative process led to many changes that likely wouldn’t have been adopted without such continued engagement of residents and ongoing input from community groups.

The long-silent waterway of the Olneyville community is now a beautiful backdrop for parks and housing and no longer delivers high levels of contaminants to Narragansett Bay. Supporting the cleanup of the Woonasquatucket River benefited both the environment and the residents. It is a big win for the people of Olneyville, who gained a healthier community and a place for safe and aesthetically pleasing recreation. It is a bonanza for the improved water quality of the river and the bay. And perhaps most importantly, it stands as a sterling example of what unique and collaborative partnerships can achieve, despite statistics and conditions that feed doubt.

Biking Toward Environmental Stewardship

The Woonasquatucket River Watershed Council, formerly the Woonasquatucket River Greenway Project, also organizes educational and recreational activities, environmental restoration projects, and more.

One of the organization's most popular programs is its summer bike camp at Riverside Park. Each year, nearly 100 kids get their own bike, lock, and helmet to keep. They learn how to ride safely and take care of their bike while exploring the park. They engage in an environmental education curriculum, participating in activities such as water quality testing and visiting the fish ladder at the nearby dam. More than half of the spots are reserved for neighborhood kids, and most of the families pay only five dollars for each child thanks to funding from grants and individual donations.

"Most of our work is focused in Providence because it's the area that's been most environmentally degraded, the people have the least access to natural resources," said Alicia Lehrer, executive director of the Woonasquatucket River Watershed Council. "One of the things that we really try to do is bring kids outside to use the resources in their neighborhood, to go for a bike ride, to learn about nature and wildlife in the communities, to have a healthy place to play."

Sherman agrees that seeing the community enjoy Riverside Park is one of the highlights of the completed project. "I go out and I see a kid learning how to ride their bike on the bike path or another kid kicking a soccer ball and I go, boy, that's it, that's why we did this."



"The project created a high level of commitment to success, not only for the project, but for building the partnerships we all knew were important."

**—Dean Isabella, Captain,
Providence Police Department**

Art Bridges the Gap Between People and Rivers

Woonasquatucket River Watershed Council educates the public about watershed health through art. The organization has partnered with local artists and schools to paint colorful signs in Riverside Park, expansive murals on walls along the bike path, and even artwork on and around neighborhood storm drains.

"Art is a great way to connect people to natural resources," said Executive Director Alicia Lehrer. "It's easily accessible, it's beautiful, it's fun. It really draws you in and you just start to ask the question, what's that all about?"


One program gives high school students the responsibility of designing a piece of storm drain artwork that shows how the drain connects to the river. Then, the student is tasked with coordinating a group of elementary school students to bring their design to life.

"Not only do you have a great picture to give people a much better understanding of the connection between what happens on the land and what happens in the river, but you've also just developed a leader with that high school student that now is passionate about protecting water quality," Lehrer said.

Storm drain art at Sawin Ave and Waterman Ave, North Providence, RI.







Aerial view of Taunton River.

Blackstone and Taunton Rivers: Preserving history and beauty for generations to come

CASE STUDY

Various federal recognitions have helped to preserve waterways across the country. In recent years, the two largest rivers that empty into Narragansett Bay—the Blackstone and Taunton rivers—received particularly noteworthy federal designations from the U.S. Department of the Interior.

In 2009, the Taunton River, in southeast Massachusetts, received the National Park Service Wild and Scenic River designation. Then in 2014, the Blackstone River Valley became a National Historical Park. Less than one-fourth of one percent of the country's rivers are protected under the National Wild and Scenic Rivers System, and only 50 National Historical Parks have been designated. These two designations were significant achievements for Rhode Island and Massachusetts.

The [Taunton Wild and Scenic River](#) and the [Blackstone River Valley National Historical Park](#) are recognized for very different reasons. The Taunton is an outstanding

natural river worthy of protection from future projects that could harm the diverse and intact ecosystem. It is the longest undammed coastal river in New England, over 37 miles without dams, and home to over 154 species of birds and 45 species of fish.

The Blackstone River played an important historical role as the birthplace of America's Industrial Revolution. Dams along the fast-flowing river powered the first successful textile mills in the United States, and allowed goods to travel to markets from the river's headwaters in Worcester, Massachusetts, to its mouth in Providence, Rhode Island, to Narragansett Bay and beyond.

Both rivers have one major thing in common: Neither of these important federal designations could have been achieved without the hard work of dedicated individuals and groups in the local communities.

"Right from the beginning there was a good mix of

people, and we had good representation and participation from all the towns too, which was key," said Bill Napolitano, Environmental Program Director at the Southeast Regional Planning and Economic Development District, the organization that spearheaded the effort to get the Taunton River's designation.

A similar coalition of individuals, nonprofits, and local, state, and federal government officials was instrumental in getting the Blackstone River's National Historical Park designation, and this group built upon their three decades of collaborative experience.

"Even 30 years ago we were setting the stage for the national park," said Donna Williams, a watershed advocate for the nonprofit Blackstone River Coalition. The Blackstone River Valley was named a National Heritage Corridor in 1986, and then became the second National Park Service American Heritage River in 1998.

"It's an incredibly strong partnership park because



the heritage corridor had already been here for 30 years,” said Meghan Kish, superintendent of the park. “There’s a web of partnerships, over 60 partners, engaged and connected.”

It took time, incremental progress, and substantial local efforts for both rivers to achieve their current status. After submitting an application, the river must be deemed worthy of study by the National Park Service. Then thorough studies must be conducted and public hearings held. Based on the findings, recognition may be recommended. If so, recognition is crafted into federal legislation and faces the final hurdle of being passed by the U.S. Congress, and signed by the president. Even after all of that work and celebration of success, yet another complicated process exists for the U.S. Congress to allocate funding to the National

Park Service to be available for the stewardship of these rivers.

Both rivers’ groups were also fortunate to have receptive elected officials in the U.S. House of Representatives and the U.S. Senate. Napolitano credits the leadership and perseverance of former Massachusetts Senators Edward Kennedy (D-MA) and John Kerry,

“We want to bring people into contact with the Taunton River, because this is what the river is all about, this is what brings life to the river, and this is how the river brought life to the region.”

**—Bill Napolitano, Environmental Program Director,
Southeast Regional Planning and Economic Development District**

(D-MA) current Rhode Island Senators Jack Reed (D-RI) and Sheldon Whitehouse (D-RI), and Representatives Barney Frank (D-MA), Jim McGovern (D-MA), Joe Moakley (D-MA), and Patrick Kennedy (D-RI) as essential to getting the Taunton River’s Wild and Scenic River legislation to President Obama’s desk. Williams singled out Senator Jack Reed and Representative David Cicilline (D-RI) for their sponsorship of the Blackstone River Valley National Historical Park Establishment Act.

Despite the numerous steps required, the benefits that accompany the designation are worth the hard work. Federal funds are more readily available for wild and scenic rivers and historical parks than other areas, and local management organizations have more say-so in the projects that occur along these rivers. In addition, the federal designation has the potential to increase the number of visitors to the rivers, which bolsters local economies and spreads the word on the historical importance and scenic beauty of the Narragansett Bay watershed.

“What the heritage corridor did is create this tremendous sense of pride in the Blackstone Valley,” Williams said. “Now people are proud to say they’re from the Blackstone Valley.”

Williams hopes that its designation as a National Park will continue this trend of local pride, while Napolitano is working hard to foster a similar sense of pride in the region around the Taunton River.

“We want to bring people to the river, we want people to understand the resources that they have,” he said. “The Taunton River is the backbone of everything that

exists on the river—the cities and towns that grew up around it. We don't have the textile mills anymore, we don't have the herring fishery, but we still have the river, and it's just such a great public resource."

In addition to public outreach, both groups have made the most of federal resources. The Taunton River Wild and Scenic Stewardship Council uses its federal funding to provide grants for a variety of projects, including land acquisitions to protect riparian zones along the river and projects to make open space accessible to the public for recreational purposes.

Congress also passed the Wood-Pawcatuck Watershed Protection Act in 2014, which initiated the process whereby the National Park Service will conduct a three-year study to assess whether the Wood-Pawca-

tuck watershed of southern Rhode Island and southeast Connecticut meets the standards to be included in the National Wild and Scenic Rivers System. With time, hard work, and a little bit of luck, this watershed could add itself to the growing list of federally recognized waterways in the Narragansett Bay region.

But federal designation is just the beginning, and all of these groups will have to continue to work together to preserve and protect the environmental, recreational, and historical resources that make them worthy of such national recognition.

"You can have dreams and you can have ideas, but you really can't do it without committed partners," said Napolitano. "It's that kind of dedication and passion for the river that really makes all of this click."



"It's an incredibly strong partnership with over 60 engaged and connected partners."

—Meghan Kisch, Superintendent,
Blackstone River Valley National Historical Park

Getting out on the River

In September 2000, 30 paddlers set out on a four-day expedition from Worcester, Massachusetts, to Pawtucket, Rhode Island, the entirety of the 48-mile Blackstone River. Along the way, they held events, inviting local politicians and the public to join them on land for campfires and stories about the importance of the river and its history.

"It's a beautiful river, we just really understood the majesty of the river," said Donna Williams, Blackstone River Coalition.

With a ground support team following along on land to help the group, the trip was a success.

"We felt very accomplished. It was life-changing for many of us," said Williams. "That trip helped us understand that there was so much interest throughout the watershed for the river, for improving the river."

The trip inspired the group to form the Blackstone River Coalition, a partnership of nonprofits, as well as state and federal agencies, local municipalities, and businesses.

For Williams, the trip underscored the importance of making the river accessible and getting members of the public out on the river as a key part of her work to protect the watershed. Nonprofits have since implemented programs to get kids and adults out on the water.

"It's really about getting people to the river, to the tributaries. Once they see it, they love it, they fall in love with it, and they become advocates," said Williams.





Watershed Counts 2016 Report Contributors

Watershed Counts *relies on the participation of the member organizations and the people who generously contribute their time and expertise to make sure the information is current, accurate, and understandable. We thank the partners who contributed to the 2016 Watershed Counts report as well as those who were involved in the prior updating of indicators.*

Fall Planning Meeting

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Courtney Schmidt, Narragansett Bay Estuary Program
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Caitlyn Whittle, USEPA Region 1

Advisory Panel

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Herring Fish Lift

Bill McWha, Saugatucket River Herring Association
James Turek, National Oceanic and Atmospheric Administration

Canoe River Aquifer Advisory Committee

Jennifer Carlino, Town of Norton, Massachusetts
Wayne Southworth, Canoe River Aquifer Advisory Committee

Woonasquatucket River Greenway Project

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Alicia Lehrer, Woonasquatucket River Watershed Council
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Taunton Wild and Scenic River

Bill Napolitano, Southeast Regional Planning and Economic Development District

Blackstone River Valley National Heritage Corridor

Peter Coffin, Blackstone River Coalition
Meghan Kish, National Park Service
Donna Williams, Blackstone River Coalition

Watershed Counts Partners

The following partners are critical to the success of Watershed Counts work. Please visit [partner websites](#) for more information.

Aquidneck Land Trust
Audubon Society of Rhode Island
Blackstone River Coalition
Blackstone River Watershed Council / Friends of the Blackstone
Brown University
Buckeye Brook Coalition
City of Pawtucket
Clean Ocean Access
Clean Water Action
Conservation Law Foundation
EcoAsset Inc.
ecoRI News
Environment Council of Rhode Island
Friends of the Moshassuck
Grow Smart Rhode Island
Kickemuit River Council
Mason & Associates, Inc.
Mass Audubon
Massachusetts Department of Environmental Protection
Massachusetts Department of Fish and Game's Division of Ecological Restoration
Massachusetts Department of Public Health
Narragansett Bay Commission

Narragansett Bay National Estuarine Research Reserve
Narragansett Bay Estuary Program
Narrow River Preservation Association
Pawtuxet River Authority & Watershed Council
RI Coastal Resources Management Council
RI Department of Administration
RI Department of Environmental Management
RI Department of Health
RI Department of Transportation
RI Environmental Monitoring Collaborative
RI Land Trust Council
RI Natural History Survey
RI Nursery and Landscape Association
RI Resource Conservation & Development Council, Inc.
RI Rivers Council
RI Sea Grant
RI Water Resources Board
Salt Ponds Coalition
Save The Bay
Save The Lakes
Surfrider Foundation
South Kingstown Land Trust
Taunton River Watershed Alliance
Ten Mile River Watershed Council
The Nature Conservancy

The Pawtucket Foundation
The Rhode Island Foundation
The Trust for Public Land
Town of North Kingstown, Dept. of Planning and Development
Upper Blackstone Water Pollution Abatement District
UPP Arts
URI Coastal Institute
URI Coastal Resources Center
URI College of the Environment and Life Sciences
URI Cooperative Extension
URI Environmental & Natural Resource Economics
URI Graduate School of Oceanography
URI Watershed Watch
USDA Natural Resources Conservation Service
U.S. Environmental Protection Agency, Atlantic Ecology Division
U.S. Environmental Protection Agency, Region 1
U.S. Fish and Wildlife Service
U.S. Geological Survey
Washington County Regional Planning Council
White Memorial Conservation Center
Wood-Pawcatuck Watershed Association
Woonasquatucket River Watershed Council
Worcester Tree Initiative

Thousands have lived without love, not one without water. —W. H. AUDEN



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