Spring 2023

NEIWPCC

Interstate Waters

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Water Invaders

A Spotlight on Aquatic Invasive Species in the Northeast

ALSO:

Monitoring the Marshlands of Long Island

Interstate Waters

Volume 7, Number 1 • Spring 2023

Editor: Amy Magin
Contributing Editors: Cheyenne Ellis, Beth MacBlane, Denise McAllister
Contributor: Richard Lyons
Circulation: Denise McAllister
Graphic Design: Newcomb Studios

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NEIWPCC
650 Suffolk Street, Suite 410, Lowell, MA 01854
Tel: 978-323-7929
www.neiwpcc.org

FROM THE EXECUTIVE DIRECTOR

LEADERSHIP • COLLABORATION • EDUCATION • SERVICE • SCIENCE

NEIWPCC Key Values

NEIWPCC is a regional commission that helps the states of the Northeast preserve and advance water quality. We have been doing this for over 75 years—25 years prior to the authorization of the federal Clean Water Act. Established in 1947, NEIWPCC engages and convenes water quality professionals and other interested parties from New England and New York to collaborate on water, wastewater, and environmental science challenges across shared regions, ecosystems, and areas of expertise.

We are proud of our mission to advance clean water in the Northeast through collaboration with, and service to, our member states. You will see in this issue of Interstate Waters that much of the work NEIWPCC conducts centers around our place-based activities and the over 600 partners we work with in places like the Long Island Sound, Lake Champlain, the Hudson River and its estuary. We also collaborate with our state and federal partners advancing environmental matters through our 20+ issue-oriented workgroups, 500+ training programs and our social media efforts and communications.

In 2022-23, we hosted new water quality podcasts, self-paced and virtual water and wastewater training programs, and in-person events (including our National Tanks Conference and HAB Symposium). For those of you not as familiar with our work as you'd like, I urge you to check out our website and other publications! There is always something new to learn about NEIWPCC!

Moving forward, I encourage you to join us as we work toward our vision for clean and sustainable water throughout the Northeast.

Best regards,

Susan J. Sullivan
NEIWPCC Executive Director

Interstate Waters

Volume 7, Number 1

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Cover: Pulling European water chestnut (*Trapa natans*) from the Connecticut River. Photo by Judy Preston
Inset invasive species: Round Goby (*Neogobius melanostomus*), Zebra Mussel (*Dreissena polymorpha*) and Curly-leaf Pondweed (*Potamogeton crispus*). Photos courtesy Lake Champlain Basin Program.

Chloride Resources Clearinghouse Aims to Reduce Salt Concentrations in the Environment

In the Northeast, when snow and ice hit the ground, de-icing salts (comprised of chlorides) are scattered across roads, sidewalks and driveways to melt ice. Though useful for mitigating slippery conditions, chlorides can infiltrate groundwater and runoff into nearby waterbodies, posing a threat to aquatic species and drinking water supplies. Salt can also corrode infrastructure, buildings and vehicles.

In partnership with the Environmental Protection Agency (EPA), NEIWPCC created a nationwide chloride resources clearinghouse as a way to inform community decisions about innovative and alternative chloride reduction strategies. Defined as an information-sharing platform with a searchable database, the clearinghouse contains a growing collection of more than 100 chloride-related resources. The content covers a wide variety of topics including aquatic organism impacts, public outreach efforts and alternative de-icing techniques.

The chloride resources clearinghouse is housed and updated on the NEIWPCC website, and is also listed as a resource on the newly launched EPA webpage on the risks of overusing salt.

Webinar on Watershed Prioritization Tool

NEIWPCC, through a grant from the EPA, hosts a series of informational webinars exploring key topics for staff working on pollution budgets in impaired waterways under Section 303(d) of the Clean Water Act. The latest webinar focused on the enhanced Recovery Potential Screening (RPS) Tool. RPS is a comparative assessment for identifying differences among watersheds that inform the likelihood of a successful restoration. This flexible and highly customizable approach can be used to support a wide range of watershed comparisons. Recordings of the webinars are available on NEIWPCC's website for those who cannot join the live sessions.

Animated Website Aims at Reducing Phosphorus Pollution in Lake Champlain

The Lake Champlain Basin Program (LCBP) launched a new website dedicated to simplifying the complex topic of phosphorus reduction and making the information more accessible to the public. The "Clean Water Commitment" takes a user-friendly approach, with a series of animations and short videos exploring various strategies for phosphorus reduction and answering frequently asked questions. Phosphorus is the pollutant of primary concern in Lake Champlain, and excess amounts can result in cyanobacteria and algal blooms, causing beach closures and potential human health impacts. The website also offers solutions for those looking to help protect the lake, and includes strategies for helping soil absorb and filter water naturally, rather than letting it run into a storm drain.

Sludge Management Report Provides Data for Future Action

Sludge management infrastructure in the Northeast is experiencing significant challenges, such as aging incinerators, reduced landfill capacity, and emerging contaminants. The Northeast Regional Sludge End-Use and Disposal Estimate report documents how nearly 800,000 tons of sewage sludge were disposed of or beneficially reused in the region in 2018. This representative snapshot provides essential data to better understand the issues and to inform next steps. According to the report, sludge was primarily landfilled and incinerated, with biosolids beneficially reused (such as applied to agricultural and non-agricultural land) at a lower rate in the region. The study includes state-specific metrics and outlines key issues and pressures facing water resource recovery facilities regarding sludge or biosolids management.

Clean Water Timeline Documents NEIWPCC and Industry Milestones

Meander through decades of progress and key events charting the history of the nation's water pollution and clean-up efforts in a digital timeline created in honor of NEIWPCC's 75th anniversary and 50 years of the federal Clean Water Act. The "Clean Water Timeline" is found on NEIWPCC's website. Beginning in 1899 with the Rivers and Harbors Act, the timeline catalogs key water-related events, legislation, and milestones at the national and regional level that helped to shape the industry, as well as NEIWPCC specific achievements. Over the years, NEIWPCC's focus has shifted and evolved – from boat pollution control, radioactive waste, acid rain, nonpoint source pollution, to PFAS – but the commitment to clean and sustainable water for all has remained steadfast.

National Tanks Conference Provides Forum for Current and Emerging Regulatory Issues

The National Tanks Conference, held in Pittsburgh in September 2022, drew more than 600 attendees from all 50 states, Washington, D.C., Puerto Rico, Guam, 11 tribes, and two Canadian provinces. The event is primarily catered towards regulators who work to prevent or clean up the release of fuel and other chemicals from underground storage tanks. However, it is also an important knowledge-exchange and networking opportunity for tank owners and operators and for environmental consultants.

The conference was organized around the main programmatic divisions for tanks regulation: release prevention, release cleanup, the funding mechanisms behind tanks programs, and cross-program issues. Throughout the event, attendees could mingle in the exposition hall, where private industry representatives exhibited their research and technology. Many of the conference sessions focused on what has changed in the industry and what challenges lie ahead, such as knowledge transfer to new staff, climate change and natural disasters, aging tanks, supply chain issues, and environmental justice priorities.

NEIWPCC plans and hosts the National Tanks Conference and Exposition in partnership with the EPA Office of Underground Storage Tanks and with the Association of State and Territorial Solid Waste Management Officials.

NEIWPCC Launches Clean Water Success Story Project

Fifty years after the passage of the federal Clean Water Act (CWA) – and many successes later – a new EPA-funded grant is focused on sharing these accomplishments. NEIWPCC is collecting and producing stories highlighting program achievements covering a diverse array of CWA Section 303(d): Impaired Waters and Total Maximum Daily Load (TMDL) topics. The project is intended to inspire other programs, inform stakeholders and the public, and generate support for future work to advance clean water. Templates will be developed for select communications products to build capacity for 303(d) practitioners to effectively share their own clean water accomplishments. These will include a "how to" guide on best practices for content, layout, graphics, storytelling and more for the chosen communications product. NEIWPCC's e-newsletter, Streamlined, and social media will provide updates as the project progresses.

Improving Water Quality and Bolstering Flood Resiliency in New York

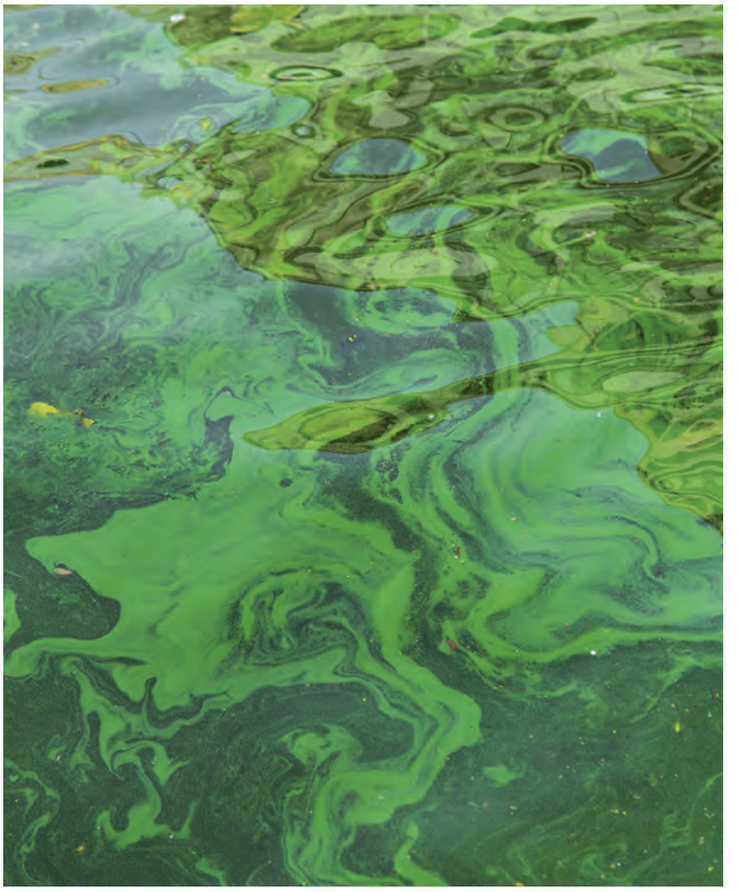
The New York State Department of Environmental Conservation (DEC) awarded $255,240 for two projects to improve water quality, increase flood resiliency, and conserve natural resources in Ulster and Rensselaer counties. The funding is provided by the state's Environmental Protection Fund and is administered by DEC's Hudson River Estuary Program in partnership with NEIWPCC.

Ulster County will develop an interactive map and prioritization web tool to support county and municipal decision-makers in addressing current and future inadequate road-stream crossings. Decision-makers can then prioritize replacements supporting transportation infrastructure, natural resource protection, highway department operations, and hazard mitigation. Additional funding is designated for Trout Unlimited to identify priority road-stream crossing replacement projects that reconnect high-quality aquatic habitat and improve community flood resiliency and road infrastructure conditions.

Reports Summarize NEIWPCC Projects and Programs by State

NEIWPCC's 2021-22 State Summaries, updated annually, are now available in print and online. These one-page handouts highlight how NEIWPCC helped each of the Northeast states — Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont — preserve and advance water quality. The reports feature support for source water protection programs in Maine and New York, and for program partners in the Lake Champlain basin, Hudson River estuary, and Long Island Sound watershed. They also highlight NEIWPCC's regional impact on the states, from providing training for environmental professionals, to coordinating across state lines on issues as diverse as per- and polyflouroalkyl substances (PFAS), leaking underground storage tanks and road salt pollution.

Harmful Algal Blooms Conference Focuses on Nationwide Solutions



In fall 2022, more than 450 participants from across the country traveled to Albany, New York to kick off the 11th U.S. Symposium on Harmful Algae. The six-day conference, "Science to Support Solutions from Shore to Shore," focused on how harmful algal blooms (HABs) present a nationwide challenge impacting a variety of ecosystems. The event featured more than 150 presentations, as well as poster sessions and social events for attendees.

Speakers included Basil Seggos, commissioner for the New York State Department of Environmental Conservation (NYSDEC), who discussed several strategies the state is implementing to prevent HABs; and Christopher Gobler, Ph.D., endowed chair and professor at Stony Brook University, explaining the complex relationship between macrophytes — or aquatic plants — and algal blooms. Thayne Yazzie, education outreach coordinator at Northwest Indian College in Washington, gave a live guitar performance to demonstrate how he uses the power of music to teach his students about the food web. Yazzie is a member of the Dine'/Navajo Nation and uses place-based indigenous knowledge to educate the community about the ecosystem, including how HABs present risks to the safe harvest of seafood and shellfish.

The symposium was hosted by NEIWPCC in partnership with NYSDEC and the U.S. Geological Survey; the U.S. National Office for Harmful Algal Blooms at the Woods Hole Oceanographic Institution provided additional support.

Women in Science Speaker Series

The Hudson River Estuary Program hosted a free virtual winter "Women in Science" speaker series in early 2023. The webinars provided attendees with the opportunity to meet and learn from scientists, community leaders, and environmental educators who work at the intersection of research, education, and environmental and social justice. Topics covered integrating data literacy into classrooms; how two youth programs are designed for the inclusion of historically underrepresented communities in environmental science; the role of mineral sediment accumulation in informing wetland restoration; and oyster restoration in New York Harbor.

For more information about these stories, go to the "News" page on NEIWPCC's website at www.neiwpcc.org, or subscribe to NEIWPCC's monthly e-newsletter, Streamlined, by emailing communications@neiwpcc.org.

Water Invaders

A Spotlight on Aquatic Invasive Species in the Northeast

Rhode Island Department of Environmental Management

By Beth MacBlane

On a humid July morning before the sun peaks, a duo of paddlers push off the sandy shore of Lake Washington in Rhode Island, slowly gliding in their canoe toward the lily pads and grassy reeds in search of ecologically disruptive non-native plants. These seasonal water quality technicians, with the state's Department of Environmental Management, travel to lakes and ponds over the course of the summer to survey for the presence or absence of the state's 17 most common aquatic invasive plants.

Beth MacBlane is an information officer in NEIWPCC's Communications and Outreach Division.

Their monitoring efforts have helped to assess the risks of the widespread problem of aquatic invasive species (AIS).

AIS are non-native plants, animals or other organisms that can cause harm to human health, the environment, and/or the economy. Invasive species are primarily spread to new ecosystems through human activities, often unintentionally, such as by boats traveling to a new waterbody with aquatic hitchhikers aboard.

Invasive species pose a major threat to both marine and freshwater environments across the globe. They can outcompete native species, decrease biodiversity, degrade water quality and habitat health, and disrupt the local food web. Recreational opportunities, such as swimming, boating and fishing, may be limited by AIS growth. From an economic standpoint, AIS can damage infrastructure, reduce waterfront property values and slow tourism due to decreased recreational opportunities.

Water resource professionals aim to reduce the risk of AIS by preventing their initial introduction to a waterbody. The first step is to monitor rivers, streams, lakes and ponds to understand what is already there through a baseline inventory of species present. Should an invader become an established population, there are several strategies to control the species, whether the goal is eradication, containment, reduction or maintenance to avoid uncontrolled growth.

"Lake Champlain is home to 51 known aquatic non-native and invasive species, and we know that many more could infest

the lake via a number of pathways, including connected waterways," said Meg Modley, NEIWPCC environmental analyst and aquatic invasive species management coordinator at the Lake Champlain Basin Program (LCBP). "These species, by design, are exceptional at overtaking new environments and in some cases, decimating native species. They are a huge threat to our aquatic ecosystems and a costly and challenging one to manage."

NHDES

Variable-leaved watermilfoil

The annual cost of invasive species prevention and management across the U.S. is estimated at $120 billion. Because humans often move AIS across state and international boundaries, a coordinated interstate – and often multi-agency – monitoring and management plan is frequently needed.

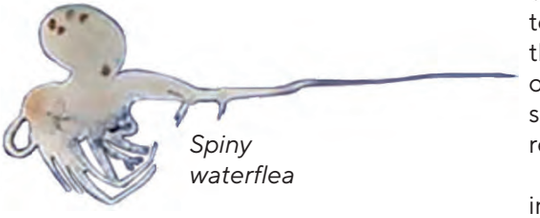
Management plans take into consideration the unique characteristics of the species at hand. This includes the growth rate, the success of control measures (such as herbicides), and the density and distribution of the population. Habitat is also a factor — the presence of sensitive areas, such as wetlands, threatened or endangered species, and adjacent land use can influence control strategies. Social and economic impacts, in addition to financial constraints, are also considered. Depending on these factors, the goal of a management plan may be to control the spread and limit the impact of the species rather than eradication.

"A challenge that is not unique to Rhode Island is having adequate resources available for AIS management," said Katie DeGoosh-DiMarzio, an environmental analyst with the Rhode Island Department of Environmental Management. "We have over 88 ponds with variable-leaf milfoil, for example, and we can't treat them all because we don't have the resources to do so."

AIS programs require a long-term approach, dedicated funding, and diligent staff to strategically address the issues. An infested area of water chestnut, for example, needs annual maintenance for 10 or more years as seeds can persist for more than a decade in the sediment. And, it comes at a cost: control at one 30-acre pond in Rhode Island was estimated at approximately $250,000 for the first five years. Another issue is the high demand for limited contractors who perform much of the management work in New England, such as herbicide application and mechanical harvesting.

"A painful part of this work is prioritizing species management," said Modley. "We can't do it all, and in some cases, with the spiny water-flea for example, there is no effective management option – it's all about containment and spread prevention."

Despite the resource gap, managing invasive species is not an impossible feat. For example, the hydrilla plant has been successfully managed in the Crotan River in New York via herbicide treatment, watercraft inspections, public education and the restoration of a native plant called wild celery. Across the Northeast, state and federal agencies, watershed organizations, marinas and lake associations work to address the various invasive species plaguing and threatening to invade our waters, beginning with preventative measures. These aim to prevent favorable conditions for the AIS to establish itself, such as by curbing the human transport and spread of invasive species. This includes, for example, watercraft, trailer and equipment washing to avoid the overland transport of AIS to new waterways.



Spiny waterflea

NEIWPCC staff work on various spread prevention strategies, from public outreach to regulation and policy. As part of the Lake Champlain AIS management plan, each summer boat launch stewards inspect watercraft launching and retrieving from public launches in both New York and Vermont. The surveillance is intended to intercept potential AIS and also provide education to the boaters on how best to protect the lake from these unwanted invaders, such as by draining boat bilges, motors, and livewells of all water before entering and after exiting the lake. In 2022 – the sixteenth season of the program – the stewards conducted 13,210 surveys for 13,629 watercraft and decontaminated 251 high-risk watercraft with high-pressure hot-water treatment, while speaking with 29,636 launch users about invasive species spread prevention measures.

Environmental agencies also use three other types of invasive species management strategies: mechanical, chemical and biological. Mechanical control methods include cutting or harvesting large infestations with machines; or hand-pulling, which is often best suited for small populations. Alternatively, agencies may opt for chemical methods to control the problem, applying federal and state approved herbicides, for example, to kill off the growth. Finally, organizations also employ biological control methods, which involves introducing species-specific predators from the AIS's native habitat to reduce the invading population. This method requires extensive study, time and travel to identify suitable organisms.

Another strong deterrent in the spread of AIS has been establishing state laws and regulations surrounding the transportation, sale and distribution of baitfish and invasive species. Invasive species lists, rules and regulations vary from state to state, presenting an opportunity for increased state collaboration to prevent the spread of invasive species at a regional level.

"A directive in the Rhode Island AIS Management Plan included review of current laws and regulations to identify gaps in our legislation," said DeGoosh-DiMarzio. "We have since passed a law to prohibit the transport of invasive plants and are in the process of writing the regulations and policy to ban their sale."

As Benjamin Franklin once said, "An ounce of prevention is worth a pound of cure," and in the case of AIS, these words are especially true. Prevention measures are much less costly than controlling an invading species and eliminates ecological impacts as well.

This is illustrated through the efforts of NEIWPCC staff and state agency partners to curb the spread of three of the most aggressive species threatening the region: hydrilla, round goby and the zebra mussel.

Hydrilla

Dubbed the "almost perfect weed" by the U.S. Army Corps of Engineers, hydrilla (*Hydrilla verticillata*) is a submersed perennial plant native to Africa and Southeast Asia. It first appeared in the Connecticut River in Glastonbury, Connecticut in 2016.

In Florida and other parts of the country, this federally listed noxious weed grows in dense beds, causing significant economic and ecological impacts. These include shading out native plants, slowing water flow, clogging flood-control canals and pump stations, impeding swimming and boating and impairing fish habitat by altering water chemistry and lowering oxygen levels.

Accidental spread can occur when small hydrilla fragments hitchhike on watercraft, trailers and other recreational equipment, including in bait buckets and motors, and on draglines and anchors to new waterbodies. In the Connecticut River, it took only three years for hydrilla to spread, covering more than 774 acres after it was first detected.

A regional effort to address this unwanted species launched in 2017 during a Northeast Aquatic Nuisance Species Panel meeting. Starting in 2018 and 2019, aquatic plant surveys were conducted in Connecticut, Massachusetts, New Hampshire and Vermont to assess presence or absence, finding infestations as far north as Agawam, Massachusetts.

Currently, the United States Fish and Wildlife Service, United States Army Corps of Engineers, Northeast Aquatic Nuisance Species Panel, Connecticut River Conservancy, Connecticut Sea Grant, Lower Connecticut River Valley Council of Governments, as well as the states of New York, Vermont, New Hampshire, Maine, Massachusetts, Connecticut and Rhode Island, and Canadian provinces are collaborating on the issue.

The Northeast Aquatic Nuisance Species Panel began the coordination for the Connecticut River Hydrilla Project, which published a five-year management plan in 2020. The plan reviews management options such as biocontrol, herbicides, harvesting, benthic barriers, watercraft inspections, and education and outreach. Also included are recommended best management practices for the watershed, relying heavily upon monitoring and adaptive management practices.

Hydrilla, a plant also commonly called water thyme, was imported to the United States in the early 1950s for use in aquariums.

Round Goby

Native to Eurasia, the round goby (*Neogobius melanostomus*) is a small bottom-dwelling fish first found in the U.S. in Michigan's St. Clair River in 1990. It was introduced by trans-Atlantic freight ships discharging ballast water – the water stored in a ship's hull to provide stability. Now established throughout the Great Lakes, the round goby expanded its range via the canal system to the Hudson River, where it now poses a threat to the Lake Champlain ecosystem.

Round gobies outcompete native fish for food and habitat, resulting in decreased fish biodiversity. They prey on invertebrates, small fish and fish eggs, as well as zebra mussels. While devouring large amounts of invasive mollusks reduces the population, the zebra mussels contain toxins; therefore, consuming them poses a risk of bioaccumulation further up the food chain.

The recreational fishing industry stands to be impacted by the round goby as well. They are aggressive bait-taking fish and can change the angling experience by dominating bites on the line. Gobies reproduce quickly and have voracious appetites – including for the eggs and fry of native bass and lake trout, both popular with anglers. Finally, they can also carry Viral Hemorrhagic Septicemia (VHS), a deadly fish disease affecting native species. While not yet present in Lake Champlain, VHS can affect over 25 species of freshwater fish.

A coordinated international response launched in 2021, following the U.S. Geological Survey (USGS) identification of gobies in the Champlain Canal of the Hudson River near Waterford, New York. Farther north, gobies are established in the Richelieu River downstream of the Saint-Ours Dam in Quebec.

The LCBP's AIS Rapid Response Task Force coordinated early detection monitoring and spread prevention education and outreach efforts with New York, Vermont and Quebec jurisdictions, including the USGS, U.S. Fish and Wildlife Service and Parcs Canada.

New York's Canal Corporation and Department of Environmental

The round goby is a splotched, brownish-gray fish that ranges from four to ten inches in length and has raised, frog-like eyes. They inhabit both fresh and saltwater and can survive in degraded water quality conditions.

Conservation (NYSDEC), with input from the Lake Champlain AIS Rapid Response Task Force, developed a Round Goby Rapid Response Plan. It outlines public education and outreach prevention strategies, as well as detailed early detection and response protocols based on specific scenarios.

2022 sampling results showed a slightly northward expansion of the gobies in the Hudson River. Intensive sampling will continue in 2023 and 2024 with U.S. and Canadian partners.

Monitoring efforts remain ongoing, and many state and federal agencies as well as nonprofits and community groups are working hard to spread the word about these harmful fish. NEIWPCC staff at the LCBP and NYSDEC continue to work with partner agencies on a coordinated response.

Stop the Spread

The Northeast is known for its rivers and lakes, and many are still free from invasive plants and animals. There are critical actions people can take to help prevent the spread and further impact of AIS:

Rhode Island Department of Environmental Management

- Clean, drain and dry all watercraft, trailers and fishing equipment to prevent the spread of aquatic hitchhikers.
- Dispose of unwanted bait, worms and fish parts in the trash.
- Don't dump bait buckets into the water – follow local baitfish regulations.
- Do not move live fish (including baitfish) from one waterbody to another.
- Report all sightings of AIS to relevant agencies, such as the state fish and wildlife department.
- Become familiar with how to identify common AIS in the area.
- Don't let it loose: do not dump aquarium pets into local waters.

Zebra Mussels

With black, zig-zag stripes, the aptly named zebra mussel (*Dreissena polymorpha*) is native to the Caspian and Black Seas of Eurasia. Likely transported via ballast water, they were first discovered in the U.S. in Michigan's Lake St. Clair in the late 1980s. Since then, populations have expanded to the Northeast, from Lake Champlain, to East Twin Lake, Connecticut, to northern Maine, and in the Berkshire region of Massachusetts.

Zebra mussels negatively impact ecosystems in a variety of ways. They are filter feeders, efficiently siphoning plankton from the water and outcompeting native species. An increase in water clarity is commonly associated with their establishment, which impacts water quality and can enable submerged vegetation growth – including that of invasive plants. Zebra mussels attach themselves to native mussels, eventually incapacitating them and overtaking their habitat. Additionally, females mature at one year of age and can release up to one million eggs per year. This high reproductive rate enables the mollusk to quickly overwhelm a water body.

Oregon Department of Fish and Wildlife

Zebra mussels are 'D'-shaped, allowing them to sit flat against a solid surface such as boat hulls and motors where they can cause serious damage.

Zebra mussels are adapted to spread easily and, for humans, unknowingly. Microscopic free-floating larval stage mussels, known as veligers, float downstream to expand their range. Because they are invisible to the naked eye, humans can unintentionally transport infected water to other rivers or lakes, such as in bait bucket water and boat engine cooling water. To prevent such spread, it is essential to drain boats, motors and all tanks and wells before leaving a lake or river, and to wash and dry boats and trailers thoroughly. They are also transported by waterfowl and can attach to boat hulls.

Once established, the fingernail-sized bivalves are nearly impossible to remove. They secrete strong bundles of filaments, called byssal fibers, that allow them to securely attach to nearly any surface. Zebra mussels are known to encrust boats and docks, clog residential, municipal and industrial water intake pipes – including those at drinking water and power generation facilities – causing economic impacts. If left unchecked, they also corrode steel and concrete and deteriorate dock pilings. Additionally, shells may cover beaches and lake bottoms in infested areas, cutting the feet of recreational users.

No large-scale effective zebra mussel control exists to date, making prevention the key approach to their management. Public education and outreach campaigns aimed at stopping the spread depends on the efforts of boaters, anglers and other outdoor enthusiasts.

Victoria O'Neill: Monitoring the Marshlands of Long Island

By Cheyenne Ellis

NEIWPCC Environmental Analyst Victoria O'Neill has dedicated her career to researching and protecting the diverse habitats of Long Island. For the past 10 years, she has worked on countless projects in the field, as well as community outreach efforts which, as a native of the island herself, have given her the chance to pass her appreciation for the local environment to others.

O'Neill's passion for restoration began in her childhood, exploring the marshes and beaches around her home in Suffolk County, New York. She developed a strong appreciation for nature and was devastated to learn how human actions threatened those ecosystems. Looking to protect the island where she was raised, O'Neill decided to major in biology at the State University of New York (SUNY) Geneseo; there, she fell in love with the field of ecology.

O'Neill spent her summers as an undergraduate working as a piping plover steward along the south shore of Long Island, where she monitored the nests of endangered shorebirds. In addition to keeping counts of adults, eggs and chicks using the site, she also informed the public about how to keep these birds safe. O'Neill enjoyed seeing her work reflected in the increasing nesting bird population counts.

She continued this line of research in her master's program in biology at the College of William and Mary, focusing her studies on the nesting success of diamondback terrapins in the Chesapeake Bay. After graduation, she joined the New York City Department of Parks and Recreation, later taking on the role of natural areas manager at Randall's Island Park in New York City.

"I admittedly knew very little about the field when I started," O'Neill said. "But I quickly learned how to restore habitat in one of the most urban environments in our country."

When O'Neill headed back to Long Island in 2013 to begin her current position with NEIWPCC, she noticed that the land had changed. The population had expanded substantially and areas that were once woodlands or farmland now contained large housing developments. The rapid expansion concerned O'Neill.

"With more people comes more pollution," she said. "We have seen dramatic changes over the last few decades including more harmful algal blooms, declining wetland habitat and more public beach closures."

O'Neill now spends most of her time working to reverse these changes. In her position, she assists in everything from tidal wetland restoration to community outreach efforts. She also coordinates with other environmental science professionals from across the region to prepare and implement habitat restoration work plans.

"The best part of my job is working with so many different partners — no matter the organization, institution or agency, everyone is working to improve environmental health and water quality," she said. "I feel that when I interact with other NEIWPCC employees across New England as well."

Currently, she is serving as the project lead in an ongoing effort that involves analyzing 50 marsh complexes across the New York portion of Long Island Sound. The project will develop projections for each complex's vulnerability to sea level rise, which is then stored on a mapping application called SLAMM (Sea Level Affecting Marshes Modeling).

Cheyenne Ellis is an information officer with NEIWPCC's Communications and Outreach Division.

Because of the uncertainty of sea level rise predictions, this program allows stakeholders to view each marshland under the lens of various scenarios — one filter shows the marsh under .43 meters of sea level rise by 2055; another shows the same marsh under 1.72 meters of sea level rise by 2100.

"The main users of the marsh viewer are municipal planners and environmental NGOs [non-governmental organizations]," said O'Neill. "Some of them have used the viewer to try and justify a marsh restoration. Others have used it to target land for conservation."

A similar project is in progress by the Connecticut Department of Energy and Environmental Protection (CT DEEP), which will complete the state's portion of the marsh data for Long Island Sound. Data analysis wrapped up at the end of 2022 and O'Neill has now moved on to the outreach portion of the project.

She plans to create factsheets for each marsh complex, featuring easy-to-follow instructions for using SLAMM which will be available both online and in print for stakeholders at various events. O'Neill will also lead a workshop for those who are unfamiliar with online mapping programs. Her goal is to work closely with interested communities to create long-lasting conservation plans.

"I learned very early on that you must include members of the community in your projects," she said. "People care about what is happening in their communities and they want to have a say in what their communities will look like in the future."

O'Neill is also involved with a newer coastal management strategy called living shorelines, which uses natural materials like vegetation, rocks, sand and aquatic organisms to protect coastal marshlands against the effects of sea level rise. Living shorelines have become more common in Connecticut following the successful completion of the Stratford Point Living Shoreline in 2014. The pace of restoration has been slower along the north shore of Long Island where O'Neill is assisting with the Edith Read Living Shoreline in Rye, one of the only projects under way in the area.

"People are hesitant to build living shorelines because there are limited examples available," O'Neill said. "They can also be quite difficult for the public to understand."

She hopes to change these perceptions by bringing education about living shorelines directly to communities.

O'Neill takes measurements at a field site.

Through webinars, interested parties can hear from experts, see examples of local projects and find resources to plan a living shoreline on their land. In addition, she works closely with five sustainable and resilient communities extension professionals. Long Island Sound Study (LISS) hired these specialists to help communicate climate change and mitigation strategies to those in their geographic area of service.

In addition to her efforts around habitat restoration, O'Neill frequently organizes field trips for groups of children, where she demonstrates water quality sampling techniques and introduces students to the field of ecology. She also runs a partnership with Seatuck Environmental Association, recruiting and training volunteers to monitor spawning alewife and eels. This program has led to the discovery of new fish runs.

Despite so many accomplishments, O'Neill is always eager to take on a new project. She is the co-chair of the Habitat Restoration and Stewardship Workgroup for LISS which meets four times per year and was recently appointed co-chair of the Dam Removal Internal Working Group at the New York State Department of Environmental Conservation (NYSDEC). She hopes to help organizations act quickly to take advantage of increased funding from the Bipartisan Infrastructure Law.

"Removing a dam is a very complex process that requires lots of guidance and resources," said O'Neill. "We hope to provide that support for the organizations we work with."

As for what's next, O'Neill is planning a new research project focused on eelgrass restoration, which will involve analyzing aerial footage of the Sound and the Peconic Estuary to establish a base map of eelgrass distribution. Eventually, this data will inform eelgrass management strategies and future research.

With increased interest in habitat restoration projects over the past few years, O'Neill is hopeful about the future of the field.

"Habitat restoration has come a long way in the 15 years that I have been in it," said O'Neill. "Now, people can take undergraduate and graduate courses dedicated to restoration, individuals can become certified restoration specialists and project examples are bountiful throughout the country."

But even with advancements and increased resources, the demand for habitat restoration work is increasing faster than staff members can keep up, especially as the impacts of climate change become more readily visible.

"It is still difficult to implement a habitat restoration project because they are costly and time-consuming," said O'Neill. "On top of this, the urgency to implement projects, in a post-Hurricane Sandy world, is prevalent for practitioners in the New York area — this urgency can be felt throughout all coastal communities."

Creating a New County Water Purification District

A Historical Perspective

By Richard Lyons

The Albany, New York County Water Purification District, (formerly Sewer District), was formed by the Albany County Legislature through resolution 45 of 1968, which defined all participating communities, boundaries and governance structure.

The District serves the cities of Albany, Cohoes and Watervliet, the villages of Green Island, Menands and Colonie, and parts of the towns of Guilderland and Colonie. This covers a total population of approximately 200,000 residents, with 11 significant industrial users.

A county sewerage study, completed in 1966, provided the blueprint for the creation of a regional district and was funded by the Rockefeller Pure Waters Bond Act of 1965.

The county constructed two treatment plants designated North (35 million gallons per day) and South (29 million gallons per day permitted), and more than 20 miles of intercepting trunk sewers. The District purchased the South Plant site and existing intercepting sewers for $1 from Albany. The South Plant site was the location of Albany's original primary treatment plant, which was constructed in 1913. Both treatment plants are conventional activated sludge with solids thickening, dewatering and the ultimate disposal method being multiple hearth incineration. The plants encompass approximately 35 acres each. Original construction costs were $71 million and were 87.5% grant funded (60% federal and 27.5% New York state). The federal money was from the 1972 Clean Water Act (CWA), which allocated $12 billion for treatment construction; and the 1965 New York State Pure Waters Bond Act, which provided a $1 billion investment.

I have a unique perspective of the District, as my father, Dr. John J. A. Lyons, was the deputy Albany County health commissioner from 1960-1967 and health commissioner from 1967-1982. He also served as chairman of the District Board of Commissioners from 1968-1985.

My father was heavily involved in advocating for the value of a regional district to vastly improve water quality in the Hudson River and protect public

All photos courtesy of Albany County Water Purification District

Timber pilings, South Plant.

Final clarifier and solids building, North Plant.

Richard (Rich) J. Lyons served the Albany County Water Purification District for more than 40 years and was executive director from 2005-2015. He has been a NEIWPCC commissioner since 2016.

Placing the mechanical aerator motor, South Plant.

The District was well conceived, designed and operated and has been virtually 100% compliant with all permits since 1974. Also, the clean water infrastructure constructed was affordable due to the CWA and the NYS Pure Waters Bond Act.

health. I remember seeing the plans for the District on the kitchen table, and how much time he spent going from community to community to garner support for a regional entity. This wasn't an easy task, as he was dealing with not only physical boundaries, but also those of politics.

Ultimately, the communities all came on board except for one, and municipal contracts were executed from 1968-1971. These contracts provided full cost pricing and defined apportionment of costs to each community for operation/maintenance and debt service. The apportionment for debt was not only for original construction, but also for future improvements. The District is a special one defined by New York state county law; and, as an enterprise fund, it is wholly funded by user fees and assessments.

All components of the District were designed, let for bid and constructed by early 1974. The total time from formation to completion was approximately 5.5 years.

After both plants commenced operating in April of 1974, the county needed to overcome the challenge of staffing the operation and maintenance departments. Albany historically had numerous breweries, including the Beverwyck Brewery (1878-1950), which later became Schaefer Brewery – "the one beer to have when you are having more than one" – in 1950. Unfortunately, Schaefer closed in 1972, which left numerous people unemployed. The District hired more than 40 of those laid-off employees, who became solids handling operators, shift supervisors, mechanics, chief operator, and chief of maintenance and instrumentation.

These men all had an unbelievable work character and ethics, with many being part of the "greatest generation," shaped by the hardships of the Great Depression and the battles of World War II. The staff included numerous veterans who served in the European theater of operations and were involved in the invasion of German-occupied Europe in Operation Overlord (Battle of Normandy) on D-Day, and in the Battle of the Bulge. They provided instantaneous experience in operating pumping, conveyance and equipment. With their brewery knowledge, they quickly adapted that factory setting to wastewater treatment. Also, two community colleges, Hudson Valley and Morrisville had associate degree programs in environmental science with a focus on wastewater operations and treatment. Several graduates of these programs were hired, and with the mix of young operators, experienced blue-collar staff, management and engineers administratively, the District was staffed to be successful.

The District was well conceived, designed and operated and has been virtually 100% compliant with all permits since 1974. Also, the clean water infrastructure constructed was affordable due to the CWA and the NYS Pure Waters Bond Act. The CWA provided national standards for treatment, receiving stream classification which required secondary treatment.

Mechicanical fine screen placement, North Plant.

Aeration tanks, North Plant.

Operating a secondary treatment process with the resulting production of biological sludge was an early challenge. The original solids dewatering equipment was rotary drum vacuum filters, which produced a very wet cake, causing inefficient solids handling costs. The vacuum filters were replaced in 1980 with belt filter presses which were a game changer for dewatering combined primary and secondary sludge.

The District has completed approximately $50 million in capital improvements in the past 25 years to insure continued compliance. Innovation has also been a key to success with the South Plant providing final effluent to a gas-fired turbine power plant on the east side of the river. This is one of the largest beneficial uses of secondary effluent in New York and provides annual revenue that can be invested in plant improvements.

The CWA, along with the 1965 NYS Pure Waters Bond act, has made a profound water quality improvement in the Albany pool area of the Hudson River (Troy dam to south of Albany). In the 1960s and early 1970s, the river in the Albany pool area was like an open sewer that was virtually devoid of dissolved oxygen to support aquatic life. Governor Nelson Rockefeller commented on the situation in 1965, saying "the river from Troy to the south of Albany is one great septic tank that has been rendered nearly useless for water supply, for swimming, or to support the rich life that abounded there."

After the Albany pool area treatment plants went online, the New York State Department of Environmental Conservation (NYSDEC) reported collecting 3,314 fish representing 27 species in the summer of 1975. The Albany pool communities are now in the middle of a 15-year Combined Sewer Overflow Long Term Control Plan. This program takes the next step in improving water quality by reducing overflows resulting in a major reduction of bacteria during large wet weather events.

Administration building, North Plant.

New Podcast Features Water Quality Experts Sharing Successes and Strategies

Launched on the 50th anniversary of the Clean Water Act in October 2022, the "Clean Water Pod" podcast explores the challenges and successes of restoring and protecting water quality, through conversations with environmental professionals from across the country. Hosted by Jeff Berckes, digital equity organizer for the State of Iowa, the program is currently running monthly through spring 2023, and then will resume in fall 2023. It is available on most podcast apps, including Spotify, Google and Apple podcasts.

The first season focuses on the fundamentals of the Clean Water Act and various related programs – what they do and how they intersect with each other. "This podcast shines a light on professionals in the water world and the conversations they are having every day," said Courtney Botelho, NEIWPCC environmental analyst and project manager. "It's a great opportunity to share success stories from people on the ground working to keep our waters clean."

In the premier episode, Berckes is joined by John Goodin, former director of the U.S. Environmental Protection Agency's Office of Wetlands, Oceans, and Watersheds, and Tom Stiles, director of the Bureau of Water for the Kansas Department of Health and Environment. They discuss their experiences working in clean water administration and reflect on the changes they have witnessed during their careers.

The second podcast features Jennifer Wigal, water quality administrator for the Oregon Department of Environmental Quality, and Thomas Mumley, assistant executive officer at the San Francisco Bay Regional Water Quality Control Board. Their conversation meanders from career paths, to the history and evolution of water quality standards, to specific case studies and experiences they've had with defining water quality uses and expectations.

"Water quality standards are essentially the foundation of what we strive to accomplish with implementing the Clean Water Act," said Mumley. "They are a way of stating what constitutes fishable, swimmable, drinkable waters."

In the third episode of the series, Berckes speaks with Monty Porter, who has 25 years of experience with the Oklahoma Water Resource Board, and Kellie Merrell, an aquatic biologist with the Vermont Department of Environmental Conservation. They share their field work history and success stories while reflecting upon the evolution of water quality monitoring methods and parameters over the decades. They also discuss what the field needs now and look to the future.

Dustin Shull and Miranda Nichols join Berckes for the latest podcast, exploring how the Clean Water Act Section 303(d) list of impaired waters connects the goals of water quality standards with monitoring data, helping states prioritize water quality improvement projects. A state will determine that a water body is impaired, or polluted, when it does not meet the designated use assigned to it, such as swimming or being fishable.

Shull has 13 years of experience with the Pennsylvania Department of Environmental Protection's Water Quality Division, and Nichols is the data analysis unit supervisor with the Minnesota Pollution Control Agency. They discuss how the list is created and used, communication strategies and public response, as well as the role and evolution of data collection and management.

"The impaired waters list has transitioned from sort of a lightning rod of people not liking getting on the list for various reasons into a communication piece," said Nichols. "Now when the impaired waters list goes out, we talk about it and about state water quality as a whole. That's much better than where we were 10 years ago."

The trio also spoke about successes resulting from the impaired waters list. "The effort to get a handle on measuring the state of our waters has produced some really incredible science," said Shull. "Journal article publications, expanding our understanding of freshwater biology and marine biology as well – it's an amazing accomplishment."

The episode concludes with tips for those looking to join the water quality field and reflections on new challenges such as PFAS facing the industry.

"For somebody getting into college, taking a couple of courses that are outside of the realm of biology is a good idea," said Shull. "It helped to solidify some of my experiences here. Take a hydrology course, take a statistics course, because it really is a multi-disciplinary field to be in."

The Clean Water Pod is funded by a grant through the U.S. EPA and produced by Flip the Field and NEIWPCC.

Richard Friesner (below), director of Water Quality Programs, was honored at the Association of Clean Water Administrators (ACWA) annual meeting with an Emerging Leaders Award.

Eric Howe, program director with the Lake Champlain Basin Program and Champlain Valley National Heritage Partnership, discussed concerns about the round goby, an invasive fish, entering Lake Champlain on WAMC Northeast Public Radio and Mountain Lake Journal PBS.

Sarita Croce is NEIWPCC's new director of the Water Resource Protection Programs Division, overseeing work related to source water protection, contaminants of emerging concern, and quality assurance. She serves as the project officer for the Lake Champlain Basin Program and supervises grants and funding for initiatives across Vermont, New York, and the province of Quebec; she also manages NEIWPCC's efforts in the Hudson River and its estuary.

Welcome to New NEIWPCC Commissioners

James Kelly (Rhode Island), manager of technical analysis and compliance for the Narragansett Bay Commission.

Angelo Liberti (Rhode Island) served for more than 30 years as the administrator of the Surface Water Protection Programs in the Rhode Island Department of Environmental Management.

Marc Nascarella (Massachusetts), state toxicologist and director of the Environmental Toxicology Program in the Bureau of Environmental Health at the Massachusetts Department of Public Health.

Macro Philippon (New Hampshire), water treatment superintendent for the city of Concord.

Lauren Jenness, environmental analyst with the Lake Champlain Basin Program, was featured on Vermont Edition speaking about lawns and healthy soils.

Brian Kavanah, NEIWPCC commissioner, and former NEIWPCC employee **Leeann Hanson** were both named as a Maine "Clean Water Champion" by the Natural Resources Council of Maine.

Melanie Loyzim, NEIWPCC commissioner, was honored by the U.S. EPA with the 2022 Ira Leighton "In Service to States" Annual Award, for her leadership over the past two decades in promoting environmental protection and maintaining a viable economy.

Anna Palmer, assistant environmental analyst, produced a video, "Where Does Our Water Come From and Where Does It Go," for the New York State Department of Environmental Conservation's YouTube channel.

Susan Sullivan (right), executive director, was recognized as a Water Environment Federation (WEF) Fellow 2022. She also received a WEF Volunteer Service Recognition Pin at WETEC in honor of her service as a member of the WEF Government Affairs Committee.

Martin Suuberg, former NEIWPCC commissioner, was honored by EPA New England with an Environmental Lifetime Achievement award for his work as commissioner of the Massachusetts Department of Environmental Protection.

Samantha Thompson, director of Business Operations, served as a panelist at the fall program of the New England Society of Association Executives.

Matthew Vaughan, environmental analyst, Lake Champlain Basin Program chief scientist, was part of a panel of scientists speaking about the water quality of Lake Champlain on Vermont Public Radio.

PARTING SHOT

Ryan Mitchell

This floating, orange and blue machine is used to combat large swaths of invasive European water chestnut (*Trapa natans*) in rivers, lakes and ponds throughout the Northeast. The mechanical harvester collects the unwanted plant via a ramp similar to a conveyor belt, depositing them on the bed of the machine to dewater before unloading them into a dumpster for removal. This control method is best suited for easily accessible and dense mats, whereas handpulling via canoe or kayak is preferred for smaller infestations or shallow areas.

Water chestnut was first identified in the U.S. in 1859 near Concord, Massachusetts. The rooted aquatic plant can form thick floating mats, which severely limits the passage of light and impacts the aquatic ecosystem. It can also reduce oxygen levels, harming habitat health and potentially leading to fish kills. The impenetrable growth can clog a waterway, making it inaccessible to boating, fishing and swimming. Finally, each plant produces up to 15 nuts per season. These spiky seeds can remain viable for up to 12 years in the sediment, requiring a consistent, long-term management approach.

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EVENTS

2023

April 5-6, **Maine Joint Environmental Training Coordinating Committee (JETCC) North Country Convention**, Presque Isle, Maine, www.jetcc.org

April 12-13, **Annual Nonpoint Source Conference**, Saratoga Springs, N.Y., www.neiwpcc.org

April 14, **New Hampshire Water Pollution Control Association Trade Fair**, Nashua, N.H., www.nhwpca.org

April 16-19, **American Water Works Association Sustainable Water Management Conference**, Minneapolis, Minn., www.awwa.org

April 24-28, **National Water Week**, Washington, D.C., www.waterweek.us

April 24-28, **North American Lake Management Society (NALMS) National Monitoring Conference**, Virginia Beach, Va., www.nalms.org

May 16-19, **WEF Residuals and Biosolids Conference**, Charlotte, N.C., www.wef.org

May 25, **Green Mountain Water Environment Association's Spring Meeting**, Killington, Vt., www.gmwea.org

June 6-9, **NYWEA/NEWEA Spring Meeting**, Saratoga Springs, N.Y., www.newea.org

June 11-14, **American Water Works Association, ACE23**, Toronto, Canada, www.awwa.org

June 27-29, **WEF Stormwater Summit**, Kansas City, Miss., www.wef.org

July 11-13, **National State Revolving Fund Workshop**, Raleigh, N.C., www.neiwpcc.org

Sept. 30-Oct. 4, **WEFTEC Technical Exhibition & Conference**, Chicago, Ill., www.weftec.org

Nov. 6-9, **National Nonpoint Source Workshop**, Minneapolis, Minn., www.neiwpcc.org