

ABSTRACTS

33RD ANNUAL NONPOINT SOURCE CONFERENCE

SARATOGA SPRINGS, NY | APRIL 12 & 13, 2023

Nathan Baker | *Cornell University*

Improving Private Water Well Maintenance, Stewardship, & Knowledge: Recommendations for Revisions and Additions to the Tompkins County Sanitary Code

Presented: Wednesday, April 12, 2023 | 4:30 pm - 5:30 pm

Private water well users incur a higher risk of water contamination compared to public water supplies. Organic waste, pathogens, chemicals from agricultural runoff, heavy metals, and mineral deposits are common contaminants found in water from private wells. Despite these risks, county sanitary codes across New York provide little to no regulations for private wells. This lack of oversight and authority of local agencies to ensure access to clean drinking water can have adverse impacts on public health and water quality. This report recommends revisions and additions to the Tompkins County Sanitary Code (TCSC) that address these risks during the construction, permitting, and ownership transfer of private wells. The recommendations inform the Environmental Protection Division of the Tompkins County Department of Health through a review of pertinent literature, analysis of peer county sanitary codes, spatial data, statistics on private wells, and previous efforts to amend the TCSC. Since ensuring water quality of private wells is not the sole responsibility of any one actor, the report also offers community and educational resources aimed at improving private well maintenance, stewardship, and knowledge throughout Tompkins County. This report was completed in conjunction with the New York State Water Resources Institute (WRI).

Rebecca Balke | *City of Manchester*

A Holistic Approach to a Sustainable Stormwater Program

Presented: Wednesday, April 12, 2023 | 1:15 pm - 2:15 pm

Since the re-issuance of the MS4 stormwater permit in 2017, the City of Manchester, NH has developed a comprehensive and sustainable stormwater management program that addresses operations, maintenance, upgrades, and permit compliance to improve water quality and flooding conditions in the City. The City of Manchester owns and operates both a separate stormwater system and combined system totaling approximately 190 miles of closed drainage and over 12,000 catch basins. About 25% of this infrastructure is over 100 years old and was not designed for today's population, impervious area, permit compliance, and climate change rain events. As with many other large New England cities, Manchester has a sizeable economically disadvantaged population and must take special care when undertaking large-scale capital improvement projects. In response, using the MS4 permit as a catalyst, the city has established several initiatives that collectively comprise a fiscally responsible comprehensive and sustainable stormwater management program that addresses the aging infrastructure.

The program expands on the requirements of the MS4 permit to collect and assess information on the condition and capacity of the City's stormwater infrastructure including closed pipe drainage, open drainage channels and culverts. A streamlined, web-based field data collection system is used and combined with other initiatives such as catch basin cleaning and drainage outfall screening, providing an efficient, consistent and cost-effective approach to data collection. The data is used to identify and prioritize needed maintenance, repairs, and upgrades based on level of blockage, capacity issues for future anticipated rainfall conditions, structural condition, criticality, and water quality, while coordinating these improvements with other programs such as the City's repaving program. The result is a proactive versus reactive stormwater program, where funds are spent where they are needed most – to address issues within the system while mitigating the effects of ongoing climate change.

Annie Bastoni | VHB

Are Illicit Discharges an EJ Issue? A Discussion of Disparities between IDDE Programs and Approaches to Level the Playing Field

Presented: Wednesday, April 12, 2023 | 1:15 pm - 2:15 pm

As municipalities and agencies across New England implement illicit discharge detection and elimination (IDDE) programs, it is becoming clear that not all programs are created equal, despite similar requirements and goals. Compared to more affluent communities, disadvantaged communities (DACs) can have a higher risk of illicit discharges due to many factors including more commercial and industrial land uses, less funds for infrastructure maintenance (both private and public), and residents who may be hesitant to report issues. Further, DACs rely more on public beaches than communities with other recreational opportunities and are therefore more susceptible to being impacted by illicit discharges. If illicit discharges are identified, DACs may have a more difficult time implementing remediation measures due to limited staff to conduct enforcement efforts and limited budgets to fund improvements. This presentation will review successful case studies in which illicit discharges were found and removed to identify lessons learned and tools that may be adopted to improve all IDDE programs. The presentation will focus on the “low-hanging fruit” of illicit discharge identification, common hurdles to illicit discharge removal, and strategies that state or regional organizations could undertake to aid IDDE efforts. As watershed boundaries do not follow the boundaries of EJ communities, leveling the playing field for IDDE program implementation should be a priority for us all.

Renee Bourdeau | Geosyntec Consultants

Julia Keay | Geosyntec Consultants

Tools For Flood Risk Management & Increased Resiliency in New York City

Presented: Wednesday, April 12, 2023 | 1:15 pm - 2:15 pm

Hurricane Sandy caused an estimated \$19 billion in damages in New York City (NYC) alone. Damage from the storm affected tens of thousands of small businesses, and most of these businesses still remain vulnerable to future storms. This presentation will provide an overview of a project aimed at increasing NYC small businesses' resiliency to impacts from flooding and future storm surges. As part of the project, “flood risk resiliency audits” were conducted at 15 NYC small businesses that were affected by Superstorm Sandy. Findings from the audits,

along with results of regional flood and storm surge modeling, were included in flood resiliency audit reports. The flood resiliency audit reports were used to help improve businesses' understanding of their potential risk of flooding and flood-induced damage and also identified potential flood protection measures that the business could implement to mitigate their flood risk. Each of the 15 small business sites also received an "active floodproofing" internet-hosted dashboard, which consisted of an adaptive system capable of autonomously monitoring storm surge conditions and providing warnings. Small business owners are able to access their active floodproofing dashboard remotely to help inform in real-time when flood protection measures should be activated. The 15 small business sites were also ranked, and the highest ranked sites were those that would have the greatest realized benefit from active floodproofing implementation from a feasibility, damage avoidance, and overall potential impact perspective. The highest ranked small business site is currently in the process of receiving flood protection measures including a removable flood panel barrier system and installation of a sewer backflow preventer.

Samantha Brewer | *University of Vermont*

The Inclusion of Woodchips and Drinking Water Treatment Residuals in Vegetated Bioretention Planters: How Do They Stack up to Conventional Soil Media Recommendations?

Presented: Thursday, April 13, 2023 | 11:00 am - 12:00 pm

Bioretention systems, a form of green stormwater infrastructure (GSI) is a nature-mimicking solution to water quality issues facing developed landscapes that utilizes engineered soil media to capture and convert pollutants found in stormwater before they reach downstream water bodies. This research explores the use of woodchips and drinking water treatment residuals (DWTR) as soil media amendments in bioretention systems for the removal of nutrients and metals in stormwater runoff. This poster will share two years of mesocosm study sampling data from a partner project between the University of Vermont and Stone Environmental as part of the Lake Champlain Basin Program. Twelve bioretention mesocosms, with three replicates of four treatments (sand, topsoil, topsoil with woodchips, and topsoil with DWTR), were evaluated for pollutant reductions following simulated stormwater events. The different treatments were also evaluated on their ability to support plant health. Cells containing woodchips, intended to reduce nitrate output, yielded lower nitrate and total nitrogen (TN) values in the systems' effluent compared to the conventional soil media control cells with top soil [sub for 'conventional soil for consistent language]. The bioretention cells containing DWTR, intended to capture and reduce phosphorus loads, yielded lower total phosphorus (TP) and soluble reactive phosphorus (SRP) levels than the control. There were no differences in plant growth and survival between the amended bioretention systems and the controls, but there was a difference between the topsoil-amended and sand-only bioretention systems.

Julianne Busa | *Fuss & O'Neill*

Restoring Titus Pond: Community Co-benefits, Resilience, and Water Quality in South Hadley, MA

Presented: Wednesday, April 12, 2023 | 11:15 am - 12:15 pm

The BATTERY Brook watershed is South Hadley's most heavily developed watershed, with a high degree of impervious area and several stretches where the stream is buried. Titus Pond is the

headwaters of the system, and therefore a natural place to begin improving conditions in the watershed and manage upstream stormwater contributions that ultimately make their way through dense, low-income neighborhoods before Buttery Brook discharges to the Connecticut River. The Titus Pond impoundment is part of an underutilized conservation area and is impaired by significant algal blooms during much of the season—conditions which are expected to worsen as temperatures and precipitation-driven nutrient inputs increase with climate change. The dam which creates Titus Pond has been rated in poor condition and is in need of substantial repairs. Rather than spend money on perpetual upkeep of the dam, the Town decided to remove the potential liability associated with the dam and restore the surrounding ecosystem. This will result in improved stormwater retention capacity to mitigate flooding, erosion, and other storm impacts in densely populated downstream neighborhoods and simultaneously improve water quality and alleviate potential public health concerns associated with nutrient and bacteria water quality impairments. The Town has had two rounds of funding from Massachusetts' climate resilience program to support design, permitting, and robust public engagement of the EJ and climate vulnerable populations in the surrounding neighborhood. Focused workshops with seniors, students, and neighbors have helped shape accessible community spaces to be integrated into the restored wetland system. Ultimately, the constructed project will reduce downstream flooding, in addition to providing higher quality habitat, decreased nutrient loading, and benefits for climate vulnerable populations by providing better access to walkable and accessible open space within the watershed, as well as potential positive impacts in reducing urban heat island effects and buffering extreme temperatures.

Deb Caraco | *Center for Watershed Protection*

Advancing the State of Professional Training for Watershed Planners and Coordinators

Presented: Thursday, April 13, 2023 | 11:00 am - 12:00 pm

Watershed professionals require a solid understanding of the science behind this multi-disciplinary field as well as a diverse array of skills to successfully apply the watershed approach in their unique watersheds, but the existing national guidance and training on watershed planning is more than a decade old. Updated materials are needed to reflect lessons learned over the past decade, new technology and data sources, emerging pollutants, climate change, and more. The Center for Watershed Protection (CWP) is leading an EPA-funded project to advance the state of training for watershed professionals. The first phase of the project is to better understand the current status of watershed training in the U.S. and identify training needs, gaps and lessons learned. CWP will present the results of a review of existing trainings on watershed management and a series of listening sessions with watershed professionals from different types of organizations and regions of the country. The results will be used to develop the foundational elements of a national training curricula for watershed professionals that will ultimately lead to more effective watershed management at the local level.

Karina Dailey | Vermont Natural Resources Council
Dana Allen | FluidState Consulting

Using Drones and Online Maps to Track and Promote Dam Removal in Vermont - A Case Study.

Presented: Wednesday, April 12, 2023 | 11:15 am - 12:15 pm

Vermont has more than 1,000 dams, of which hundreds are estimated to serve no useful purpose. Instead, they degrade water quality and aquatic habitat, restrict the movement of fish and other wildlife, increase maintenance and liability costs, and pose significant risks to public safety.

The FreeVTRivers initiative of the Vermont Dam Task Force seeks to promote public awareness of the benefits of dam removal using the Vermont Dam Mapper, an ArcGIS Online Story Map and Information Dashboard that maps the status of dams and highlights dam removal projects. The use of pre- and post-removal drone imagery shows the public what the river systems look like before and after removal and provides a means by which river channel morphology and restoration can be tracked over time. Integrating narrative text, imagery, video, and other assets creates a dynamic, engaging information portal to showcase the value of removing dams and reconnecting the tributaries of the Lake Champlain Basin.

The platform seeks to put valuable environmental information within reach of the public in a way that they've never had access before. The more citizens that are educated regarding the importance of removing dams to benefit public safety, fish and wildlife, water quality, and flood resilience, the more projects the Vermont Dam Task Force can accomplish and thereby improve the overall health of the Lake Champlain Basin.

Our presentation will focus on the use on online mapping and the acquisition of drone data in dam removal projects and how the platform and data can be used both qualitatively and quantitatively to track and promote dam removal projects.

Padmini Das | MassDEP

Meghan Selby | MassDEP

MassDEP's Strategies to meet EPA's Justice40 requirements by Leveraging Existing Resources

Presented: Wednesday, April 12, 2023 | 11:15 am - 12:15 pm

To meet EPA's Justice40 goal, the Massachusetts Department of Environmental Protection (MassDEP) has considered multiple strategies to increase Clean Water Act (CWA) §319 investments to 40 percent across the Commonwealth; these investments benefit disadvantaged communities (DACs). Strategies considered by nonpoint source program staff in MassDEP's Watershed Planning Program include prioritization of EPA-recommended new projects by leveraging existing resources, tools, and current initiatives that invest in or benefit Environmental Justice (EJ) communities in Massachusetts. For instance, MassDEP has prioritized five project areas under Justice40 as part of the CWA §319 grant workplan for the upcoming year, such as preliminary assessments, watershed planning, capacity building, technical support, and innovative finance partnerships to address match requirements. MassDEP is using its existing EJ mapping tool to identify DACs; conducting a CWA §319 equity assessment using the nonpoint source grant viewer combined with a few community needs assessments; building capacity by launching an Environmental Justice Coordination program based upon the existing regional nonpoint source coordinator program; providing technical

support using the existing watershed-based planning tool and recovery potential screening tool; and developing partnerships with state-funded grant programs to waive match requirements for EJ communities.

Presenters: Dr. Padmini Das, NPS Section Chief; and Meghan Selby, 604(b) Program Coordinator

Other Contributing Authors: Judy Rondeau, NPS Watershed Specialist & Outreach Coordinator; Malcolm Harper, 319 Program Coordinator; Meghan Selby, 604(b) Program Coordinator; and Richard Carey, Watershed Planning Program Director.

Geoff Glover | *Horsley Witten Group, Inc.*

Matthew Alford | Pare Corporation

Narragansett Bay Commission and Central Falls tackle stormwater at Macomber Stadium!

Presented: Wednesday, April 12, 2023 | 1:15 pm - 2:15 pm

As part of the Phase III Combined Sewer Overflow (CSO) Program, NBC is using Green Stormwater Infrastructure (GSI) to lower CSO volumes to reduce annual shellfish bed closures in accordance with a Consent Agreement with the RI Department of Environmental Management (RIDEM). Phase III focuses on CSO abatement in the Bucklin Point Service Area in Pawtucket and Central Falls, RI. The program uses GSI to capture and divert stormwater from the combined sewer collection system. These GSI systems reduce the volume and frequency of overflows to the Blackstone and Seekonk Rivers, leading to water quality improvements in Narragansett Bay.

Using a collaborative approach, NBC partnered with the city of Central Falls to locate GSI retrofit sites in their community. Central Falls is a dense, urban municipality with a large population of underserved residents and is designated as an Environmental Justice (EJ) community. Both the city and NBC worked together to identify locations to both disconnect large volumes of runoff and provide additional benefits to the surrounding community.

The city and NBC identified Macomber Stadium as a potential GSI retrofit site. The former stadium was in poor condition and ultimately closed following the discovery of contaminated soils in 2017. A larger partnership was then formed led by NBC (design and construction) between the City of Central Falls (maintenance), the Rhode Island Infrastructure Bank (funding), and State regulatory agencies (permitting). This partnership allowed an innovative idea to put stormwater under a restored sports facility to become a reality. The project simultaneously accomplishes both stormwater and environmental cleanup goals while also renovating this degraded site into a multisport facility for the entire community. Due to this innovative approach, the project has received a 2020 Stormy Award from NEWEA for Best Stormwater Idea in New England as well as a 2022 ACEC Gold Anchor Award.

Kyle Gray | *Throwe Environmental, LLC*

Courtney Greene | Throwe Environmental, LLC

Pursuing Long Island Sound Futures Fund Dollars to Enhance Environmental Justice

Presented: Wednesday, April 12, 2023 | 3:45 pm- 4:30 pm

There are a lot of funding opportunities currently available. With historic investments in environmental justice, communities and organizations across New England must quickly put together competitive applications when time, resources, and capacity are limited. In this

session, participants will learn about the Long Island Sound Futures Fund (LISFF) and how it can be leveraged to advance environmental justice across the Sound's watershed. LISFF Field Liaisons will share program information and guidance on how to build a competitive proposal that meets program goals and enhances EJ. Presenters will share examples, tools, and resources to support applicants as they incorporate DEIJ and EJ into LISFF applications. This 45min session (25min presentation + 20min Q&A) will include time for audience feedback to guide how LISFF can better serve EJ communities.

This session is intended for staff of Tribal, state, and municipal governments; non-profit and watershed organizations; and colleges/universities. This introductory session will provide basic programmatic information and supplementary guidance for applicants seeking to build a competitive proposal. Attendees of all backgrounds are welcome. Attending this session does not guarantee funding.

The LISFF supports projects to restore the health and living resources of Long Island Sound. Since 2005, LISFF has invested \$42M in projects to improve water quality, restore the natural environment, and engage and inform communities about the importance of a healthy Sound. Proposals with benefits to environmental justice, diversity, equity, and inclusion are encouraged. Throwe Environmental, LLC contracts with the National Fish and Wildlife Foundation to support applicants as they develop competitive LISFF proposals. Throwe's work as LISFF Field Liaisons focuses on priority geographies, including non-coastal CT and the Sound's Upper Basin (areas of MA, NH, and VT). Throwe supports LISFF by promoting awareness of the funding opportunity and providing guidance and technical assistance to potential applicants as they pursue funding.

James Houle | *University of New Hampshire*

Nonpoint Source Tracking and Accounting for Adaptive Management

Presented: Wednesday, April 12, 2023 | 3:45 pm- 4:30 pm

The Great Bay estuary exhibits symptoms of pollution: low dissolved oxygen in tidal rivers, increased macroalgae, and declining eelgrass. Most pollution originates from sources spread across the watershed including septic systems, fertilizers and air pollution. Stormwater runoff from developed areas is a major pathway for pollutants. Watershed communities are facing increasing regulatory measures to improve water quality in Great Bay and its tributaries. These requirements include implementation and tracking of pollution control activities; however, tracking and quantifying project success is challenging and expensive, particularly if everyone is doing it differently. Communities have agreed that regional coordination is needed to leverage scarce financial resources and develop a consistent, effective tracking system.

The Pollution Tracking and Accounting Project (PTAP) is an online database and cooperative forum for communities to work toward successful implementation of a consistent regional approach toward crediting adaptive management pollutant control measures. In 2021 the Great Bay total nitrogen general permit began necessitating broad participation in tracking and accounting efforts to demonstrate nitrogen reductions in the watershed. Since then, PTAP has not only become a consistent reporting tool but has been innovatively incorporated into municipal permitting processes.

This presentation will introduce the tool, its reporting products and discuss lessons learned and strategies to further municipal tracking and accounting of non-point source pollution.

Amir Johnson | *University of Vermont*

Spatial Analysis of Equity in Green Stormwater Infrastructure Distribution in Northeastern Cities

Presented: Wednesday, April 12, 2023 | 4:30 pm - 5:30 pm

Green stormwater infrastructure (GSI) is increasingly used in cities for flood mitigation and water quality management. Beyond water management, advantages of GSI include social benefits ranging from an enhanced sense of place to the stimulation of local economies, as well as ecological benefits such as climate resilience. We hypothesize that in cities where GSI has been implemented as a mechanism for stormwater management, less affluent neighborhoods and/or those populated by BIPOC (black, indigenous, and people of color) residents are less likely to be served by GSI compared with neighborhoods composed of more affluent and/or predominantly white residents. Using Geographic Information Systems (GIS) this project explores the equity of GSI distribution across several northeastern U.S. cities. Spatial and statistical analysis will be used to compare GSI implementation in the urban landscape with sociodemographic compositions at the neighborhood level. This research aims to shed light on potential inequities in GSI distribution within US cities, such that said inequities can be addressed in an informed manner.

Elizabeth Marks | *USDA Natural Resources Conservation Service*

Co-benefits of Climate Smart Agriculture and Forestry to Water Quality

Presented: Thursday, April 13, 2023 | 9:30am - 10:45 am

Reducing greenhouse gases and implementing climate smart conservation practices in agriculture and forestry has many co-benefits with protecting water quality. We can apply much of what we have accomplished under the Clean Water Act to addressing climate change. In this presentation, you will learn how the climate is changing in the Northeast and where greenhouse gases are coming from in agriculture. The specific water quality co-benefits of reducing greenhouse gases and improving climate resilience will be identified.

Erik Mas | *Fuss & O'Neill, Inc.*

Ashley Fisher | Town of Mashpee, MA

Climate Change, Water Quality, and Municipal-Tribal Partnership: Reducing the Occurrence of Harmful Algal Blooms in Santuit Pond, Mashpee, MA

Presented: Wednesday, April 12, 2023 | 2:15 pm - 3:15 pm

Santuit Pond is a 170-acre freshwater pond in Mashpee, Massachusetts. The pond is an important recreational resource for the Town of Mashpee and the region, but also has cultural significance and is a food source for the Mashpee Wampanoag Tribe. Harmful algal blooms (HABs) have affected water quality in Santuit Pond for over a decade, limiting safe recreational use of the pond for fishing, swimming, and boating. A decline in water quality coincided with a period of rapid residential growth in the 1980s, which introduced substantial nutrient loadings to the pond. The pond experiences internal recycling of nutrients from phosphorus-rich bottom sediments, along with external inputs from stormwater runoff and inadequate or failing septic systems. The pond is one of the most severely HABs-impacted ponds in Massachusetts, a condition which is expected to worsen with projected climate change.

The Town of Mashpee, working with the Mashpee Wampanoag Tribe and other partners (Friends of Santuit Pond, Association to Preserve Cape Cod, Army Corps of Engineers, and Southeast New England Program) is pursuing a variety of short- and long-term actions consistent with the recommendations of a 2010 diagnostic study to reduce nutrient loadings to Santuit Pond. These include in-pond aeration, alum treatment, fertilizer restrictions, stormwater improvements, enforcement of septic system maintenance, sanitary sewerage, and others. The Town received funding through the Massachusetts Municipal Vulnerability Preparedness (MVP) grant program to begin addressing stormwater sediment and nutrient loads, and the Tribe has partnered with the Southeast New England Program Network to conduct watershed-based planning, in-pond assessments, and stakeholder engagement.

This presentation highlights the ongoing actions (including successes and challenges) of the Town and Tribe including the design and construction of stormwater retrofits, dredging and alum feasibility assessments, efforts to strengthen municipal bylaws regarding fertilizer use and recreational boating, and innovative community and stakeholder engagement.

Nisha Nadkarni | *Watershed Consulting Associates*
Kerrie Garvey | *Watershed Consulting Associates*

Allen (Petty) Brook Stormwater/Watershed Assessment

Presented: Thursday, April 13, 2023 | 11:00 am - 12:00 pm

The Allen (Petty) Brook watershed is a 4.77 mi² watershed with its headwaters in Milton, Vermont. The stream then flows through Colchester and discharges to Malletts Bay, a sheltered bay along eastern Lake Champlain. Allen Brook is at risk of impairment when measured by its biological community and chemical parameters. Stormwater discharges from existing and active development have degraded water quality. A watershed assessment was recently completed by Watershed Consulting Associates, LLC and funded by the Chittenden County Regional Planning Commission (CCRPC) with a focus on protecting and improving water quality in this threatened stream within Milton.

This study included a preliminary water quality assessment to identify and determine the sources of elevated nutrients, sediment, and chloride within the stream via targeted synoptic sampling and visual monitoring via game cameras. This was coupled with a desktop and field assessment of sites for potential stormwater best management practice (BMP) implementation. Community education on watershed stewardship was also an important study objective. The project team targeted outreach to community members including residents, business owners, and a manufactured home community via mailings and social media and Front Porch Forum posts. Local, state, and regional representatives were also invited to a virtual meeting. The group collectively discussed feasible stormwater management solutions. A community survey was shared with all stakeholders to understand water quality concerns and community priorities. The results of the water quality assessment, community engagement process, and desktop and field assessments were used to identify and rank BMPs in key areas. The overarching goal of the study is to better understand water quality stressors, recommend a suite of structural and non-structural BMPs to build climate resiliency, and educate the community about improving their watershed's health. Conceptual designs were completed for five priority stormwater BMPs, which were recommended for further design and implementation.

Sarah Nalven | VHB

Retrofitting the Massachusetts Department of Conservation and Recreation's Properties to Improve Stormwater and Equity

Presented: Thursday, April 13, 2023 | 12:00 pm - 1:00 pm

As the largest landowner in Massachusetts, the state's Department of Conservation and Recreation (DCR) owns not only state parks and forests, but thousands of acres of more urbanized properties, including parkways, skating arenas, swimming pools, etc. Many of these properties are located within or serve environmental justice communities. Many also generate stormwater runoff and carry pollutants to nearby waterbodies. To better serve the communities utilizing these properties and to steward the land and waterbodies affected by runoff from these properties, DCR is developing and implementing several stormwater treatment plans. This presentation will discuss DCR's cost-effective approach to these plans, which involves both planned and opportunistic siting of stormwater treatment and uses the best available data to guide choices. Strategies that will be highlighted include:

- Using GIS to systematically identify pollution hotspots
- Prioritizing pollution source control, such as street sweeping, which has been shown to remove phosphorus from stormwater for as little as \$100/lb.
- Understanding that small retrofit opportunities can have large impacts (e.g., installing curb cuts to allow for impervious cover disconnection, adding check dams to a swale to increase retention time, amending soil to increase pollutant removal capacity)
- Understanding that any water quality improvement is better than none and that specs don't need to meet state stormwater standards to provide benefit (e.g., designing "undersized" basins, increasing tree canopy)
- Coordinating treatment installation to coincide with planned redevelopment projects
- Optimizing size of treatment structures using empirically established relationships between design storage volume and percent pollutant reduction to maximize cost-effectiveness
- Leveraging stormwater treatment projects for public education

This approach allows DCR to make the most impact possible, improving both stormwater quality and equity, one project at a time.

Cody Obropta | *Maine Department of Environmental Protection*

Soil Erosion Challenges with Expanding Renewable Energy Capacity

Presented: Thursday, April 13, 2023 | 12:00 pm - 1:00 pm

Expanding renewable energy capacity is a critical step in achieving climate goals outlined by the federal government. The science is clear, we must work to decarbonize our energy production. But can we accomplish this important goal without creating additional sources of pollution? Preventing soil erosion and stopping sediment from entering our waterways are primary goals during the construction phase of any project. Suspended solids and sediment are primary carriers of pollutants and negatively impact aquatic plants and wildlife in our delicate river and lake ecosystems.

This presentation shares lessons learned from Maine's solar boom and explains some of the common challenges the Maine Department of Environmental Protection faces when permitting solar projects and overseeing their construction. Whether it was poor inventory planning, improper installation of soil erosion and sediment controls, or blatantly ignoring important regulations, the enforcement team at the Maine Department of Environmental Protection has been at the forefront of protecting natural resources from large pollutant loads resulting from bad construction practices.

This presentation discusses not only the common problems witnessed on these solar array construction sites but also examines the success stories. The main takeaway from these case studies will be a series of measures and best management practices that regulators can use to prevent some of the serious challenges associated with constructing large-scale solar projects. An additional goal is to better equip engineers to provide technical guidance to ensure solar projects are being constructed in ways that limit the impact to surrounding natural resources and prevent pollution to nearby waterways.

Christopher Obropta | *Rutgers Cooperative Extension*

Addressing Climate Change and Flooding Issues in Watershed Restoration and Protection Plans for Underserved Communities

Presented: Wednesday, April 12, 2023 | 2:15 pm - 3:15 pm

The purpose of watershed restoration and protection plans is to create a blueprint to restore or protect the water quality of local waterways. In New Jersey, these plans are used as a total maximum daily load (TMDL) implementation guide for impaired waterways. These plans basically incorporate some level of modeling to locate and quantify pollutant sources, identify potential actions that could be taken to reduce or eliminate these sources, and determine load reductions for these interventions. At a stakeholder meeting in New Jersey, it was recommended that these plans should also address climate change and flooding issues. Over the last 15 years, the Rutgers Cooperative Extension (RCE) Water Resources Program has prepared ten watershed restoration and protection plans that focused solely on addressing water quality issues. Currently, we are preparing seven additional plans and incorporating increases in rainfall intensity due to climate change. Also, where we are also identifying green infrastructure practices to address water quality issues, we are identifying which of these practices can also be designed to address extreme weather events that may be caused by climate change.

This presentation will focus on the Royce Brook Watershed, which is 16.8 square miles and has 20% impervious cover. The watershed contains portions of two municipalities, Hillsborough Township and Manville Borough, Somerset County, New Jersey. The Royce Brook flows from Hillsborough, a more affluent community, into Manville, a less affluent community, causing severe flooding. Hillsborough contains approximately 92% of the watershed. The plan focuses on identifying locations where green infrastructure can be installed to reduce severe flooding in Manville and designing these practices for the increased rainfall intensities predicted for climate change.

Christopher Obropta | Rutgers Cooperative Extension

The Role of Municipal Action Teams to Advocate for Green Infrastructure in Environmental Justice Communities

Presented: Thursday, April 13, 2023 | 11:00 am - 12:00 pm

Twenty-one communities in New Jersey, all environmental justice communities, rely on combined sewers for stormwater and wastewater management. These are the very urban centers of our state and have an average impervious cover of 55%. When it rains in these communities, the aged infrastructure of the combined sewer systems often cannot handle the runoff volumes; this results in combined sewer overflows (CSOs) of a slurry of human sewerage and stormwater to local waterways, streets, and basements of the community.

The Rutgers Cooperative Extension (RCE) Water Resources Program partnered with the Camden County Municipal Utilities Authority to create the first municipal action team (MAT) in New Jersey called Camden SMART (Stormwater Management and Resource Training). This team was designed to foster community engagement and serve as an advocate for green infrastructure in their city. A municipal action team was established to bring together local government, utility authorities, and community organizations. The team members worked together to set an agenda for a community-based green infrastructure initiative. Members of the municipal action team worked together to define the need and opportunities for green infrastructure, educate residents and community leaders, and leverage funding to design and implement demonstration projects.

While Camden SMART met monthly to strategize on how to advocate for green infrastructure in Camden, the RCE Water Resources Program developed a green infrastructure feasibility study for the city that identified sites where green infrastructure could be applied throughout the twenty neighborhoods in Camden. Within the first seven years, 50 green infrastructure projects were installed and over 1,700 trees were planted, which managed over 62 million gallons of stormwater per year.

This presentation will discuss the various MATs created in New Jersey, their composition of partners, their level of success, and lessons learned.

Morgan Reilly | Oak Ridge Associated Universities (ORAU)

Kaytee Canfield | U.S. Environmental Protection Agency, Office of Research and Development

Changing Environments, Changing Perspectives: Examining the Green Infrastructure, Climate Change, and Equity Implications of Changing New England Recreational Sites

Presented: Wednesday, April 12, 2023 | 2:15 pm - 3:15 pm

Environmental changes impact people's perceptions, values, and uses of waterbodies. Understanding the impacts of environmental changes can help improve governance, practitioner engagement, and user education. We will discuss the green infrastructure (GI) possibilities of cranberry bog restoration and the potential climate change and equity implications of harmful algal blooms (HABs) based on results from key informant and intercept interviews with visitors to southern New England sites.

As cranberry yields and prices are falling, many New England cranberry growers to seek other options for their land. One option is to retire farms and restore them to naturally functioning wetlands using GI techniques. These low-lying bogs are close to coastal waters in densely populated areas, give GI the potential to address nutrient pollution, coastal storm surges, and urban flooding. Perceptions supportive of this conversion include increased value of the land to the community and wildlife, and of a healthier environment than previous generations. Concerns about bog restoration include the lack of tree canopy, extended time of construction, and sympathy for the cranberry industry.

HABs can be caused by excess nutrients, primarily from anthropogenic sources, and are a consistent summer challenge in New England. With lasting reliance on reactive identification of toxicity; limited monitoring funding; and potential increase in blooms with climate change, there are human health and equity concerns that communication can improve. We selected some of our sites based on accessibility for environmental justice communities. We found awareness of persistent poor water quality in these communities and limited understanding of HABs. Improving an equitable response to HABs will require strategic communication and targeted management efforts in environmental justice communities.

Together, these social studies of environmental changes demonstrate opportunities to achieve goals of increasing environmental equity, managing nutrient pollution, preparing for continued climate change, and improving users' awareness of nutrient pollution.

Judy Rondeau | *MassDEP*

Padmini Das | MassDEP

Nonpoint Source Regional Coordinators – Developing a Regional Approach to Nonpoint Source Management

Presented: Wednesday, April 12, 2023 | 11:15 am - 12:15 pm

In 2020, the Massachusetts Department of Environmental Protection (MassDEP) launched a new initiative funded through the Clean Water Act §319 Competitive Grants Program to establish contractual agreements with regional planning agencies to serve as regional nonpoint source coordinators (RCs). The RCs provide services that further the nonpoint source management goals of MassDEP's Watershed Planning Program, including objectives and milestones identified in the 2020-2024 Massachusetts Nonpoint Source Management Program Plan. Services provided by the RCs include identification and expansion of opportunities to accomplish and leverage work by private, state, local, and federal partners; reduction of nonpoint source pollutants, restoration of impaired waters, protection of unimpaired/high quality and threatened waters through planning, education, program coordination, and implementation of climate-ready best management practices; and actions to instill, encourage, and nurture a passion for restoring water quality through education, capacity building, and the development of new partnerships.

Presenter: Judy Rondeau, NPS Watershed Specialist & Outreach Coordinator

Other Contributing Authors: Dr. Padmini Das, NPS Section Chief; Meghan Selby, 604(b) Program Coordinator ; Malcolm Harper, 319 Program Coordinator; and Richard Carey, Watershed Planning Program Director.

Micayla Schambura | *University of Vermont*

Advancing the Use of DWTRs in Stormwater Sand Filters to Enhance Phosphorus Removal for Transportation Projects

Presented: Wednesday, April 12, 2023 | 4:30 pm - 5:30 pm

Phosphorus pollution from stormwater runoff, accelerated by climate change, threatens the water quality of Lake Champlain through harmful algal blooms. The Vermont Agency of Transportation (VTrans) has only reached 5.8% of its target to reduce its P load to Lake Champlain. With many extensive efforts already put forth to reduce P, creative efforts are necessary to treat stormwater runoff, a nonpoint source pollutant. Typical stormwater sand filter systems treat runoff from impervious surfaces by passing the flow through a sedimentation chamber and filter bed of sand prior to releasing a treated effluent. VTrans has constructed new stormwater treatment systems that offer a novel addition to standard sand filter designs: aluminum-based Drinking Water Treatment Residuals (DWTRs). DWTRs are the waste byproduct of the coagulation process in typical drinking water treatment processes, often containing natural organic matter, trace amounts of chemicals, and a metal hydroxide, such as iron or aluminum, are shown to have an affinity for anionic species, and can immobilize P bound to its surface. In this project, we will be investigating phosphorus retention within these stormwater sand filters and quantifying the TP, SRP, DOP, PP, and Cl⁻ in the influent and effluent. Results from this study can provide a framework for enhancing phosphorus retention in stormwater treatment systems in a way that is sustainable, low-cost, and requires no additional maintenance.

Val Schull | *New York State Water Resources Institute*

Evie Brahmstedt | New York State Water Resources Institute

Developing a Water Justice Fact Sheet for New York State

Presented: Thursday, April 13, 2023 | 12:00 pm - 1:00 pm

Development of informative material for research and outreach water professionals is one of many ways which the New York State Water Resources Institute (NYSWRI) supports robust science and dialogue amongst research and outreach specialists to improve water management in NYS. The purpose of the water justice fact sheet is to provide a document that can be a resource to introduce water professionals to the concept of water justice, provide examples of ongoing research and outreach efforts, and indicate areas of improvement in the NYS water sector. The framework approach to developing the fact sheet captured three dimensions to achieving water equity: redistribution, recognition and participation, and socio-natural integrity. Work in water justice is both about recognizing and understanding existing inequities and moving toward correcting them. This fact sheet focuses on how issues of water justice relate to the NYS Water Resources Institute four main themes: water quality, climate resilience, ecosystem health, and water infrastructure. In compiling the fact sheet, a preliminary exploratory review of scientific, outreach, and educational materials related to the WRI themes was conducted. The review is not necessarily comprehensive, but aims to provide key examples of work focused in NYS and how it is related to water justice. Overall outcomes of the fact sheet are to initiate a conversation on water justice, as well as developing a methodology and

template for other organizations interested in addressing water justice when considering their research and outreach objectives.

Mary Tchamkina | *Raftelis*

How Do Utility Sustainability Policies and ESG Framework Intersect and Differ?

Presented: Thursday, April 13, 2023 | 12:00 pm - 1:00 pm

The environmental, social, and governance (ESG) framework helps stormwater utilities to focus on environmental justice and equity while addressing climate change. It also can become a valuable risk mitigation tool. Credit rating agencies have begun to incorporate ESG-related risks into evaluations of utilities' creditworthiness. As maturing stormwater utilities look to utilize debt financing strategies, this credit rating incorporation of ESG risk factors becomes important. This presentation will define the ESG framework and explore sustainability policies among stormwater programs in the Northeast and how they intersect with ESG risk mitigation. For example, a climate-driven flood mitigation program increases the long-term sustainability of all regional infrastructure. If it includes green infrastructure, this program can provide added benefits of heat island attenuation, habitat restoration, and recreational space. Prioritizing such projects in previously underserved communities can help to build trust with ratepayers. By reducing climate and social risk, these policies can make stormwater utilities safer for investors by promoting community longevity and bolstering the revenue stream.

Stormwater utilities already may be engaging in projects related to ESG risk mitigation in alignment with their sustainability policies, but adopting a formal framework allows enterprises to look at – and report on – these practices comprehensively. Utilities can incorporate ESG criteria into their strategic planning efforts by identifying current practices, assessing their effectiveness, and building a more robust risk mitigation strategy along environmental, social, and governance dimensions. This presentation will discuss how some stormwater programs are already incorporating ESG elements and highlight opportunities on the horizon.

This discussion will also consider challenges related to the ESG framework, such as the lack of a distinct standard to enable evaluation of one utility progress compared to others, possibility of using ESG label for “greenwashing,” and variable uptake across the U.S. and its potential policy and economic drivers.

Michelle Vuto | *USEPA Region 1*

Newton Tedder | EPA

Khalid Alvi | *Paradigm Environmental*

Development, Application and Implication of Flow Duration Curves for Achieving Pre-Development Hydrological Condition

Presented: Wednesday, April 12, 2023 | 4:30 pm - 5:30 pm

This presentation will discuss the development, application and implication of flow duration curves (FDC) and related runoff duration curves (RDC) as important next-generation watershed optimization management tools for qualifying and quantifying the impacts from converting vegetated permeable land cover to impervious cover (IC conversion) and for developing

watershed stormwater management and conservation strategies and for quantifying associated benefits. Impacts from changes to water quality, flooding frequency and duration, channel stability, ecohydrological function, and hydrogeomorphology. FDCs will also be used to assess impacts and inform on potential management actions needed related to development activities under existing and future climate change, such as flooding risks, stream-channel stability, increased pollutant export and reduced base flows.

Julie Wood | Charles River Watershed Association

Leigh Meunier | Communities Responding to Extreme Weather (CREW)

Claire Rundelli | Natick Community and Economic Development

Engaging Residents in Watershed-scale Planning

Presented: Wednesday, April 12, 2023 | 2:15 pm - 3:15 pm

Since November 2020, Charles River Watershed Association (CRWA) and Communities Responding to Extreme Weather (CREW) have joined forces with twenty communities in the Charles River Watershed to understand and address flooding across the region. Through this project, the team developed a flood forecasting model to predict where and when precipitation-based flooding will occur in various climate change scenarios. While municipal-scale flood models are becoming common, this project is unique in that residents, with a focus on climate vulnerable communities, were engaged at every step of the process. Residents were engaged in selecting climate modeling scenarios and flood mitigation practices, and all modeling results were made public via an interactive online map. The project study area covers multiple cities and towns and a highly developed area of nearly 300 square miles, including multiple environmental justice communities. Close to a dozen flood mitigation scenarios were identified and tested in the model. Most scenarios used nature-based solutions; for select scenarios, the team documented potential co-benefits, such as pollution reduction and groundwater recharge.

Over the past two years, our team found creative ways to engage people despite the challenges of the ongoing pandemic, and we successfully engaged hundreds of people throughout the project. In this presentation, project team members will discuss various tools and techniques used for both in person and online engagement such as presenting information in various languages and formats, connecting with community groups and seniors, and quality engagement at in person events.
