


Water Quality

GOALS, OBJECTIVES, *and* PRIORITY ACTIONS

WATER QUALITY WORK GROUP

Phil DeGaetano, WQWG (Chair)
Greg Alber, NJHDG
Marzooq Al-Ebus, NJDEP
Kate Anderson, USEPA
Francisco Artigas, Meadowlands Environmental
Research Institute (MERI)
Pinar Balci, NYCDEP
Rick Balla, USEPA
Rob Buchanan, NYC Water Trail Association
Kimberly Cenno, NJDEP
Shino Tanikawa, NYSWCD
Mick DeGraeve, Great Lakes Environmental Center
(GLEC)/NJHDG
Michael Dulong, Riverkeeper
Brent Gaylord, USEPA
Biswarup Guha, NJDEP
Wayne Jackson, USEPA
Josh Kogan, USEPA

Jim Lodge, HRF
Keith Mahoney, NYCDEP
Michele Langa, NYNJ Baykeeper
Bridget McKenna, NJHDG
Jeff Myers, NYSDEC
Rosella O'Connor, USEPA
Lisa Oberreiter, NJHDG
Evelyn Powers, IEC
Michele Putnam, NJDEP
Susan Rosenwinkel, NJDEP
Clay Sherman, NJDEP
Stan Stephansen, USEPA
Chris Sturm, NJ Future
Dennis Suszkowski, HRF, STAC Co-Chair
Dan Van Abs, Rutgers/Jersey Water Works
Judith Weis, Rutgers, STAC Co-Chair
Rick Winfield, USEPA
Steve Zahn, NYSDEC



Reduce the sources of pollution so that the waters of the Harbor Estuary will meet the fishable/swimmable goal of the Clean Water Act, where attainable.

Water quality affects everything that HEP and our partners strive for. It is key to healthy habitats and biodiversity, safe public recreation, sustainable sediment management, and long-lasting public stewardship. Indeed, thanks to committed public leadership and billions of dollars in investments, the region has made great strides in attaining the goals of the Clean Water Act. The region's stakeholders have reaped many ongoing benefits from this work, most notably the transformation of the waterfront as a driving amenity for urban living.

But many challenges lie ahead if this progress is to be sustained. Primary issues include pathogen contamination, excessive levels of nutrients and low dissolved oxygen, legacy toxic pollution, floatable debris, and microplastics and other contaminants that are of emerging concern. In addition, the likely effect of climate change on future water quality, especially impacts of higher temperatures, sea level rise and shifting precipitation patterns, is unknown.

Over the next five years, HEP seeks to make substantial progress on achieving the visionary goal of the Clean Water Act: opening more waters to primary contact recreation and shell-fishing, making them suitable for fish survival and reproduction, and eliminating the impacts of toxic contamination and floatable debris on community and ecosystem health. HEP plays an important role in helping public agencies, scientific community, and the civic organizations define what “where attainable” means for these bi-state waters, and communicating that understanding to the public.

HEP will continue to convene stakeholders through technical workgroups and workshops to ensure that open dialogue is maintained across jurisdictions and agencies and promote data sharing. Fostering stewardship through targeted project opportunities such as pathogen monitoring and trash reduction will also continue to be a main focus. HEP will also work with HRF to prioritize funding for specific research projects through the Hudson River Fund that will help advance these goals.

The New York – New Jersey Harbor Estuary lies at the heart of the largest and most densely populated urban area in the country. While considerable investments have been made in upgraded systems and newer technology, the region is also served by wastewater collection and treatment systems and stormwater management provided by older and sometimes outdated infrastructure that is expensive and technically difficult to upgrade and maintain. Responsibility is fragmented across

political jurisdictions and agency responsibilities. The region's long history of industrial activities left a legacy of toxic contamination. Continued poor water quality, especially in smaller bays and tributaries, limits public access and awareness in many communities.

Major sources of pollutants in the region include discharges from wastewater treatment plants (WWTPs), legacy industrial contamination, combined sewer overflows (CSOs) and stormwater. Government, utilities, and landowners have invested billions of dollars in an attempt to minimize and control these sources and will continue to do so for the foreseeable future. WWTPs are being upgraded to address nutrient pollution. Gray and green infrastructure is being planned and implemented to address pathogens from CSOs and stormwater runoff through Long Term Control Plans (LTCPs) and Municipal Separate Storm Sewer System (MS4) Permits, and sediment dredging has begun in some Superfund and other hotspot locations to reduce legacy toxics.

Although these efforts have significantly improved water quality over the years, the cost for the remaining work will be significant and the timelines are long. Upgrades through new capital investments must be balanced with the general need for improved asset management of an aging water infrastructure system. There is a clear need for additional support, financially and through coordination, collaboration, research and communication with the numerous stakeholders to address the four pollutants that currently limit public use and ecological health of the Estuary—pathogens, nutrients, toxics, and floatable debris—as well as the likely impacts of emerging contaminants and climate change.

The presence of pathogenic bacteria in both marine and freshwaters is the result of fecal contamination from untreated waste and stormwater. State and federal agencies use these indicators to determine whether waters are safe for primary contact recreation (swimming) and consuming shellfish. Generally, water quality in the Harbor has improved with regards to swimming and other contact recreation, with impacts limited primarily by wet-weather events that result in stormwater discharges and CSOs. This is not the case in all waters of the Harbor however, because of either dry-weather contamination or the limited dilution and flushing in smaller bays and tributaries. Pathogen levels still severely limit shellfish consumption, as the shellfish standard is more stringent than the swimming standard.

While nutrients such as nitrogen are essential to plant growth, excessive amounts can cause a number of issues such as low dissolved oxygen and algal blooms, which can result in fish kills. Much has been done in the Harbor to reduce nutrient loads. However, some waterbodies are still lagging behind in terms of dissolved oxygen levels and cannot currently support fish reproduction and survival.

Toxic contamination—from both legacy and more recent sources—remains a significant and challenging issue to address in the region's water, soil and air. It affects wildlife and is the reason that many fish species are unsafe to consume. Toxic contaminants include heavy metals, persistent pollutants such as PCBs and dioxins, as well as a variety of pharmaceuticals and chemicals found in personal care products. Microplastics have become a new concern, as they can be harmful to wildlife and human health.

Floatable debris includes any man-made materials originating from deliberate littering, decaying shoreline structures, vessel discharges, CSOs and other sources. This debris is unsightly and negatively impacts our economy, and can also be hazardous to boaters and wildlife. The quantity of debris in the Harbor has been greatly reduced since the 1980s, when floatables caused

many beach closures, but there are still areas where persistent trash remains a problem. Addressing floatable debris at the source is key to the Estuary's health.

One of the great challenges of this generation is understanding and adapting to climate change. In this Estuary, warmer air and water temperatures, shifting precipitation patterns, and sea level rise will be major stressors affecting ecosystem and community health. Increased precipitation and high volume storms will increase the stress on sewage and wastewater infrastructure, leading to increased combined sewer overflow events, increased floatable debris, and difficulty in treating water. In addition to causing more severe droughts, temperature increases combined with shifting precipitation patterns may reduce the total amount of dissolved oxygen that can be held in water, potentially exacerbating existing dissolved oxygen problems in both extent and severity, affecting fish survival and health. In particular, areas that are less well-flushed and where the main sources of fresh water are sewage treatment plants, such as Jamaica Bay and the Hackensack River, are more susceptible. There are significant needs in terms of research and monitoring to understand how water quality may be impacted and possible adaptive responses.

WATER QUALITY CONTEXT

PASSAIC

MORRIS

BERGEN

BRONX

ESSEX

NEW YORK

HUDSON

QUEENS

NASSAU

SOMERSET

UNION

KINGS

RICHMOND

MIDDLESEX

Shell fishing region

MONMOUTH

0 5 miles

Data sources: CSOs, Bathing Beaches & Shell Fishing Region: HEP, 2006 Water Quality Report. Wastewater Treatment Plants: U.S. EPA, Facility Registry Service (FRS). NJ Publicly Owned Treatment Works (POTW) Outfalls: Open Data, NJ GIS, Surface Water Discharge Points. NY POTW Outfalls: EPA FRS, NPDES. Impervious Cover: National Land Cover Dataset.

- Public Bathing Beaches
- Combined Sewer Outfalls
- Wastewater Treatment Plant Outfalls
- Percent Impervious Cover
 - 25-50%
 - 50-75%
 - 75-100%
 - Public Waterfront Spaces

Summary Table ~ GOALS AND OBJECTIVES



Water Quality



Reduce the sources of pollution so that the waters of the Harbor Estuary will meet the fishable/swimmable goal of the Clean Water Act, where attainable.

OBJECTIVE A *Improve coordination and begin to establish consensus amongst regulatory agencies on science, standards and design conditions in shared waters*

WQ-A-1 DIALOGUE

Maintain an ongoing dialogue across agency and state boundaries.

WQ-A-2 CONSISTENT STANDARDS

Support the states and EPA in their development of consistent (where possible) water quality standards that are both scientifically defensible and protective of appropriate highest attainable uses in shared waters.

WQ-A-3 NO DISCHARGE ZONES

Help establish a No Discharge Zone for vessel waste in Raritan Bay.

OBJECTIVE C *Address monitoring gaps and lack of information for key locations, parameters and state and local track-down programs*

WQ-C-1 PATHOGEN MONITORING

Design an intensive pathogen monitoring and notification plan in select near-shore areas.

WQ-C-2 DISSOLVED OXYGEN MONITORING

Address monitoring gaps and lack of information, including the need for real-time monitoring, relevant to DO requirements for different life stages of benthic and pelagic fauna.

WQ-C-3 EMERGING CONTAMINANTS

Support and share research to help assess the fate, transport and ecosystem impact of known contaminants and those of emerging concern, in particular microplastics.

OBJECTIVE B *Accelerate creation, adoption and implementation of Long Term Control Plans and MS4 Permits*

WQ-B-1 LTCP/MS4 COMMUNICATION

Communicate the benefits and outcomes of LTCP, MS4 work and associated infrastructure improvements to the public.

WQ-B-2 GREEN INFRASTRUCTURE SUPPORT

Support implementation of green infrastructure opportunities in CSO and MS4 communities.

WQ-B-3 SHARED WATERS

Synthesize information on LTCP/CSO controls and MS4 permit implementation to determine the effects on shared waters.

WQ-B-4 CSO EVENTS NOTIFICATION

Advance Means and Methods for Public Notification of CSO Events.

WQ-B-5 TRASH REDUCTION

Reduce sources and develop solutions for trash and floatables in both CSO and MS4 areas.

OBJECTIVE D *Share water quality information in a clear and easy to understand way with the public, focusing on uses and potential public health risks*

WQ-D-1 HARBOR-WIDE REPORT

Prepare an updated Joint Harbor-Wide Water Quality Report.

WQ-D-2 WATERWAY STORIES

Develop briefs and stories about water quality conditions of individual waterways and watersheds.

OBJECTIVE E *Assess the potential impacts of climate change on water quality*

WQ-E-1 CLIMATE IMPACTS

Support and share research to assess climate change impacts on water quality and hydrology.

WQ-E-2 CLIMATE MONITORING

Identify parameters and potential for establishing a long-term monitoring program to assess climate change impacts on temperatures and other water quality variables.

WQ-E-3 CLIMATE ADAPTATION

Advance understanding and consideration of water quality in the analysis of hazard mitigation and coastal resilience projects.

CHALLENGES	INDICATORS
<p>● LIMITED SWIMMING</p> <p>OBJECTIVES A, B, C, D & E</p>	<p>LIMITED SWIMMING</p> <ul style="list-style-type: none"> • Enterococcus • Fecal Coliform • CSO Discharge • Debris Collected by Skimmers and Booms • Debris Collected on Beaches
<p>● FISHING IS IMPAIRED</p> <p>OBJECTIVES B, C, D & E</p>	<p>FISHING IS IMPAIRED</p> <ul style="list-style-type: none"> • Dissolved Oxygen • Water Temperature • Chlorophyll a • pH • Turbidity • Transparency (Secchi) • Salinity • Nitrogen • Dissolved Organic Carbon • Dissolved Inorganic Phosphorous • Metals, PAHs, Dioxin in Sediments • PCBs • Chemical Contaminants of Emerging Concern • Microplastics • Harmful Algal Blooms



WATER QUALITY ACTIONS

OBJECTIVE A

Improve coordination and begin to establish consensus amongst regulatory agencies on science, standards and design conditions in shared waters

WQ-A-1

DIALOGUE

Maintain an ongoing dialogue across agency and state boundaries.

NEED

Water quality management in the Estuary is complicated by the distinct political jurisdictions of New York and New Jersey, which dictate regulatory approaches and can make communication difficult. For example, water quality standards may differ between states and thus determining what constitutes “achievement” for a shared waterbody may be unclear. Defining the end goals is crucial for measuring success. Continued dialogue across agencies is therefore a key element in meeting the fishable/swimmable goal of the Clean Water Act.

DESCRIPTION

HEP and its Water Quality Work Group (WQWG), and in particular the regulatory agency partners, will work together to advance discussion of new science/research related to pathogens, nutrients and dissolved oxygen, and toxic contaminants. HEP will work with its partners to identify the most important issues and relevant ways to share information.

The WQWG was formed under HEP in 2013 to help address complex issues and facilitate communication across agencies and organizations working towards the common goal of cleaner, healthier waters. Its membership includes EPA, NYSDEC, NJDEP, NYCDEP, New Jersey Harbor Dischargers Group, and representatives of the scientific and civic community. The WQWG meets at least quarterly and more frequently when necessary.

KEY PARTNERS: Water Quality Work Group

RESOURCES: Staff and Leveraging

TIMELINE: 2017-2022

OUTCOMES

Short-term:

- Agreement on shared goals for water quality improvement.
- Clear definitions of impairment status and fully supported uses.
- Discussions will also help frame and advance action A-2.

Long-term:

- State agencies have a shared vision for water quality improvements, including appropriate standards and uses, and work cooperatively towards achieving it.

WQ-A-2

CONSISTENT STANDARDS

Support the states and EPA in their development of consistent (where possible) water quality standards that are both scientifically defensible and protective of appropriate highest attainable uses in shared waters.

NEED

Due to different laws, policies and management approaches in NY and NJ, water quality criteria, attainable uses, and intermediate goals for water quality improvement often differ. This is problematic when considering the impact of improvements for shared waters and can lead to confusion among stakeholders and the public.

DESCRIPTION

EPA is working with the two states on developing a roadmap for how best to align their standards. Building from this collaborative effort, HEP will work with EPA and the two states to identify and discuss how best to translate differing standards and data on water quality parameters of shared waters, including how to communicate those conditions and goals to stakeholders and the public. Discussion items could include hydrology, hydrodynamics, design period, return period, target indicator, water quality standards, and boundary conditions. This effort could start with a focus on a particular water body, such as Raritan Bay and/or a specific pollutant of concern, such as pathogens or nutrients.

These discussions will help inform the collaboration on the water quality modeling effort proposed as Action B-3 and help provide a basis for communication about these shared waters to the public. The result will be better consistency between states on Long-Term Control Plans (LTCP) and Municipal Separate Stormwater Sewer System (MS4) permits. HEP's work will assist the principal parties as they develop long term goals for other water quality improvements in shared waters. This effort will start with the members of the Water Quality Work Group but could involve other stakeholders.

KEY PARTNERS: EPA, NYSDEC, NJDEP, Water Quality Work Group

RESOURCES: Staff and Leveraging

TIMELINE: 2017-2019

OUTCOMES

Short-term:

- Agreement on translation and communications for specific water quality criteria/standards for one or more shared waters.

Long-term:

- Coordination between agencies on LTCP and MS4 implementation and other water quality improvements affecting shared waters.
- Unified public communication strategies on water quality status and public health effects for shared waters.



WATER QUALITY ACTIONS

OBJECTIVE A

Improve coordination and begin to establish consensus amongst regulatory agencies on science, standards and design conditions in shared waters

WQ-A-3

NO DISCHARGE ZONES

Help establish a No Discharge Zone for vessel waste in Raritan Bay.

NEED

Microbial pathogens from sewage wastes pose direct threats to human health and limit shellfishing and recreational uses. While wastes discharged by vessels to surface water are often treated by marine sanitation devices, they still pose some risk and contain chemical additives, such as chlorine. HEP's 2015 Raritan Bay Conference focused attention on the need to continue water quality improvements to the Bay, and benefits of sustaining and expanding its beneficial uses. No Discharge Zone (NDZ) designations are a key component of larger strategies for protecting navigable waters and educating the public about water quality.

DESCRIPTION

HEP will work with the two states, EPA and other partners to advance establishment of a no discharge zone in the Bay. The New England Interstate Water Pollution Control Commission recently completed a Vessel Waste No Discharge Zone Designation Petition

for Raritan Bay on behalf of the New York State Department of Environmental Conservation and the New Jersey Department of Environmental Protection. The petition provides the justification required for designation, primarily that there are adequate vessel waste pump-out facilities. HEP will provide a forum for discussion of this initiative with key stakeholders and will work with agencies to publicize the initiative when it is adopted.

KEY PARTNERS: HRF, EPA, NYSDEC, NJDEP, NGOs, NEIWPPC, Sea Grant, USCG and Commercial and Recreational Vessel Communities.

RESOURCES: Staff and Leveraging

TIMELINE: 2017-2018

OUTCOMES

Short-term:

- Establishment of a No Discharge Zone Designation for Raritan Bay.

Long-term:

- Improvements in water quality and greater public enjoyment of this important water body.
- Greater public awareness of the Bay, its resources and the need for continued water quality improvements.

Photo:
NY – NJ Harbor Estuary Program





WATER QUALITY ACTIONS

OBJECTIVE B

Accelerate creation, adoption and implementation of Long Term Control Plans and MS4 Permits

WQ-B-1

LTCP/MS4 COMMUNICATION

Communicate the benefits and outcomes of the implementation of LTCP, MS4 permits and associated infrastructure improvements to the public.

NEED

Billions of dollars are being invested in crucial projects to improve water quality in both NY and NJ. Stakeholders, including ratepayers and local government officials, are often unaware of what work is currently underway, the intricacies of the projected changes, and what improvements will mean for their communities.

DESCRIPTION

HEP will develop factsheets, story maps, and/or other material intended for a broad audience to describe what LTCPs, MS4 and other infrastructure improvements will achieve in terms of water quality improvements and how. This effort will likely focus on one or more specific nearshore areas such as sections of the Hudson River, Coney Island Creek, Harlem River, Passaic River, or Raritan Bay. A key focus will be the importance of improved stormwater management given climate change projections. The effort will be conducted in partnership with appropriate public agencies, utilities, and civic partners such as Jersey Water Works and the SWIM Coalition. This grant funded work could contribute to broader campaigns conducted by civic partners in support of needed capital investment for LTCP and MS4 implementation.

HEP will also participate in public outreach opportunities with states and permittees in LTCP development.

KEY PARTNERS: EPA, NYSDEC, NYCDEP, NJDEP, NJCSO Group, SWIM Coalition, Jersey Water Works

RESOURCES: Staff and Leveraging; Grant Funded Project <\$200,000; Major Capital Investment

TIMELINE: 2017-2020. This action will begin in 2018 with a focus on one waterbody to start. Additional materials will be developed for other waterbodies during 2019 and 2020.

OUTCOMES

Short-term:

- Clear information describing what the LTCPs and MS4 work will achieve for specific waterbodies, including timelines and associated costs, and what this will mean in terms of waterbody uses.

Long-term:

- Greater support from local government, business and community stakeholders.
- Investments and other steps to improve water quality management Infrastructure.

WQ-B-2

GREEN INFRASTRUCTURE

Support implementation of green infrastructure opportunities in CSO and MS4 communities.

NEED

Green infrastructure is a crucial tool for improving water quality in urban areas. Local communities and private property owners require assistance in terms of planning, designing, and managing implementation options that suit their particular watershed.

DESCRIPTION

HEP will work with a variety of stakeholders, in particular community representatives, local government, transportation agencies and development interests to encourage implementation of green infrastructure in advancing their Long-Term Control Plans. A key focus will be the importance of stormwater management, stream-bank protection and mitigating local flooding given climate change projections. This effort will include sponsoring workshops and review of technical guidance offered by agencies and permittees. A key partner is the Jersey Water Works collaborative. Grant funding will be required for work on targeted projects or locations. Implementation of green infrastructure will require securing major capital funding and meeting on-going operating needs. Advancing adoption and implementation of local stormwater utilities will also be a point of emphasis given their ability to generate resources.

KEY PARTNERS: EPA, NYSDEC, NYCDEP, NJDEP, NJCSO Group, SWIM Coalition, Jersey Water Works, local government, transportation agencies, private developers and property owners

RESOURCES: Staff and Leveraging; Grant Funded Project >\$200,000; Major Capital Investment; On-Going Operating

TIMELINE: 2017-2020. HEP began supporting green infrastructure implementation efforts in 2016, focusing on one community in NJ and supporting statewide efforts through Jersey Water Works. HEP will target an additional community and/or projects in NJ or NY to be completed by 2020.

OUTCOMES

Short-term:

- Implementation of one large-scale, or several small-scale, green infrastructure project(s) in a CSO target community.
- Advancement of efforts to establish stormwater utilities and/or adoption in one local CSO community.

Long-term:

- Reduced number of CSO overflow events in targeted communities.



WATER QUALITY ACTIONS

OBJECTIVE B

Accelerate creation, adoption and implementation of Long Term Control Plans and MS4 Permits

WQ-B-3

SHARED WATERS

Synthesize information on LTCP/CSO controls and MS4 permit implementation to determine the effects on shared waters.

NEED

The combined effects of controls and permits on NY and NJ's shared waters are uncertain. The timelines for the LTCPs and MS4 permits currently underway in NYC and NJ are varied and complex and expected water quality improvements following implementation are unclear.

DESCRIPTION

HEP will advance the creation of a unified modeling framework that will predict expected outcomes of combined LTCP/CSO implementation in a specific shared waterbody. The modeling efforts will focus on areas such as the Raritan Bay that do not meet primary contact recreation goals and/or fish survival and reproduction goals. Key partners include EPA, state agencies, utilities, local municipalities, Jersey Water Works and the SWIM Coalition. This action will build on other actions to improve coordination and communication about shared water bodies, including the "road map" discussions proposed in Action A-2. While it is anticipated that such a modeling effort will build on existing efforts, including work being done in both states on LTCPs, preparing such a model will require significant additional grant funding or sponsorship by the regulated utilities. A specific first step in this action will be to develop the scope of work for the modeling framework.

KEY PARTNERS: EPA, NYCDEP, NYSDEC, NJDEP, NJHDG

RESOURCES: Grant Funded Project >\$200,000

TIMELINE: An appropriate bi-state waterbody will be selected as a pilot area by 2018. Modeling will be completed by 2020.

OUTCOMES

Short-term:

- Creation of a project-specific modeling framework for bi-state waters.
- Identification of expected water quality improvements following implementation of controls for the modeled waterbody.

Long-term:

- Observable water quality improvements for all pollutants addressed by the controls in all shared waters.

WQ-B-4

CSO EVENT NOTIFICATION

Advance Means and Methods for Public Notification of CSO Events.

NEED

CSO discharges can occur with as little as one tenth of an inch of rain and can pose significant health risks to humans that come into contact with this water. The vast majority of the public is not aware of these discharges or the hazards they create.

DESCRIPTION

HEP will engage agencies, utilities and user groups to share lessons learned and identify additional pilot projects. This effort will build on the experience of programs such as NYSDEC's NY-Alert Sewage Pollution Right-to-Know program, the NYCDEP text messaging pilot program and CSO Advisory Web Page, the NJ CSO Group's public notification web application that predicts CSO events and public signage installed by the City of Hoboken with the goal of adding value and improving these existing and in some cases mandated efforts. New grant funding will be required to undertake any pilot projects.

KEY PARTNERS: NYCDEP, NJDEP, NYSDEC, EPA, NJCSO Group, local municipalities and community groups

RESOURCES: Staff and Leveraging; Grant Funded Project <\$200,000

TIMELINE: 2018-2020. HEP will begin reaching out to align with and expand current efforts in 2018. A pilot project will be undertaken in 2019.

OUTCOMES

Short-term:

- Communities are more aware of CSO overflow events in their local waterbodies and know not to come into contact with the water during these times.

Long-term:

- Individuals and CSO communities are helping to reduce the number of CSO discharge events through personal choices and support LTCP and other water quality improvements.



WATER QUALITY ACTIONS

OBJECTIVE B

Accelerate creation, adoption and implementation of Long Term Control Plans and MS4 Permits

WQ-B-5

TRASH REDUCTION

Reduce sources and develop solutions for trash and floatables in both CSO and MS4 areas.

NEED

Trash and debris in the Estuary are a persistent problem. While various clean-up programs and techniques are essential, innovative solutions that expand the engagement of stakeholders are necessary to make a lasting impact.

DESCRIPTION

HEP will continue working with stakeholders to develop sustainable, long-lasting, proactive solutions to trash prevention and detection, concentrating on addressing land-based sources. Efforts will build on partnerships created during the “Stopping Trash Where It Starts” NEIWPCC funded project in collaboration with Montclair State University. Potential projects include developing innovative monitoring techniques to identify debris hotspots, creating a shoreline 311 system and/or Unified Phone Application to report on floatables and overflowing trash booms, compiling metrics on floatables collected to assess trends and determine if

current measures are having desired effects, and encouraging adoption of trash “hotspots” through stewardship grants. HEP will also assess the feasibility of piloting a trash water wheel or similar trash trap device in a Harbor tributary. Undertaking any of these projects will require additional grant funding.

KEY PARTNERS: NY/NJ TFW Partnership, NYCDEP, NJHDG, NJCSO Group, NGOs, Community Groups

RESOURCES: Staff and Leveraging: Grant Funded Project >\$200,000

TIMELINE: 2017-2019. HEP began a trash track down project with Montclair State University through a NEIWPCC grant in 2016. Future projects will be pursued starting in 2018 through 2020.

OUTCOMES

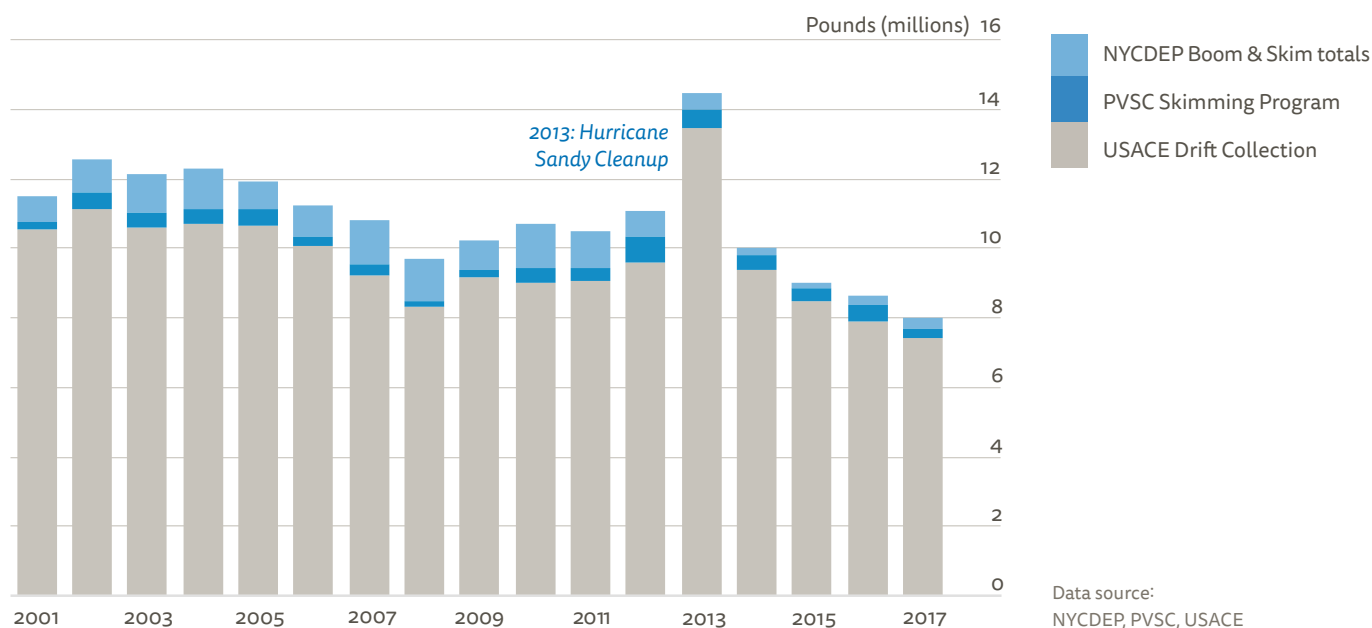
Short-term:

- Community awareness of the negative impacts of disposable items on the environment.
- Increased use of reusable bags, bottles and travel mugs.
- Local business buy-in into waste-free alternatives for dishware and carry-out items.

Long-term:

- Significantly reduced floatable debris in the Estuary.

Total Floatable Debris Collected by Boom and Skim Programs





WATER QUALITY ACTIONS

OBJECTIVE C

Address monitoring gaps and lack of information for key locations, parameters and state and local track-down programs

WQ-C-1

PATHOGEN MONITORING

Design an intensive pathogen monitoring and notification plan in select near-shore areas.

NEED

While there has been significant overall improvement in pathogen levels in the Estuary over the past 20 years, water quality in many near-shore areas remains unknown. Routine agency sampling is typically conducted mid-channel via boat, while recreational season shoreline sampling only occurs at designated beaches. Many residents and visitors boat and swim in areas that are either being monitored infrequently or not at all.

DESCRIPTION

HEP funded two groups to conduct pathogen sampling in near shore areas of Staten Island and the Raritan Bayshore in 2016. This effort was made possible by a close partnership with the Interstate Environmental Commission (IEC). HEP will continue and expand its work with IEC and other partners to develop a systematic approach for determining pathogen levels for near shore areas in reference to contact recreation and other uses. This effort will also involve EPA, state agencies, and NGOs involved in Citizen Science efforts. Another parameter of interest is harmful algal blooms (HABs). Monitoring for HABs could occur during pathogen sampling efforts. The pathogen effort could also involve working with states and utilities to accelerate track down efforts to identify 'dry weather' sources of bacterial contamination. It will require new grant funding to support local collection efforts.

KEY PARTNERS: IEC, NYCDEP, NJDEP, EPA, NJHDG, NJCSO Group, NYSDEC, State and local health departments, NGOs

RESOURCES: Staff and Leveraging; Grant Funded Project

>\$200,000; On-Going Operating

TIMELINE: 2017-2022. HEP will work with partners beginning in 2017 to develop a monitoring plan and needs. Monitoring will be conducted as needed through 2022.

OUTCOMES

Short-term:

- Routine monitoring at select sites during the recreational season.
- Valuable data that will help to fill in data gaps and complement other sampling programs.
- Early warning to agencies of potential water quality issues, such as HABs.

Long-term:

- Improved understanding of recreational water quality in the Estuary.
- An established monitoring program that provides high quality data.



WATER QUALITY ACTIONS

OBJECTIVE C

Address monitoring gaps and lack of information for key locations, parameters and state and local track-down programs

WQ-C-2

DISSOLVED OXYGEN MONITORING

Address monitoring gaps and lack of information, including the need for real-time monitoring, especially relevant to DO requirements for different life stages of benthic and pelagic fauna.

NEED

Sufficient dissolved oxygen is essential for all aspects of an aquatic organism's lifecycle. In order to accurately measure levels of DO in an aquatic system, and the effects they may have on the biota, continuous measurements are crucial but very frequently lacking. Targeted projects addressing these data gaps are necessary to fully grasp what standards are sufficiently protective of aquatic life requirements.

DESCRIPTION

HEP will continue building on the HEP/HRF Great Lakes Environmental Center (GLEC) DO study and upcoming work in the Hackensack River. The GLEC study was conducted during 2015-2016 and evaluated the effects of projected and measured low DO on marine organisms in the Estuary. GLEC is continuing their investigations in 2017 by focusing on the Hackensack River in NJ on behalf of NJHDG. HEP will provide a forum for reviewing the results of the ongoing study of the Hackensack River and discussing its implications for

DO criteria. Consistent standards are needed to provide for protection of aquatic life. This forum may also discuss the role of nutrients in DO impairments and the need to consider nutrient loading reductions. In addition, one project possibility is to design an intensive monitoring plan in select areas to capture fluctuations in surface and bottom DO, in addition to reviewing the HRECOS continuous monitoring data. EPA's REMAP data will also be reviewed for any relevant information on benthic organisms. Conducting additional monitoring will require new grant funding.

KEY PARTNERS: NYCDEP, NJHDG, NJDEP, NYSDEC, NGOs, Academia

RESOURCES: Staff and Leveraging; Grant Funded Project >\$200,000

TIMELINE: 2017-2020. HEP will explore funding possibilities for a project beginning in 2017. If funding allows, a project will be completed by 2020.

OUTCOMES

Short-term:

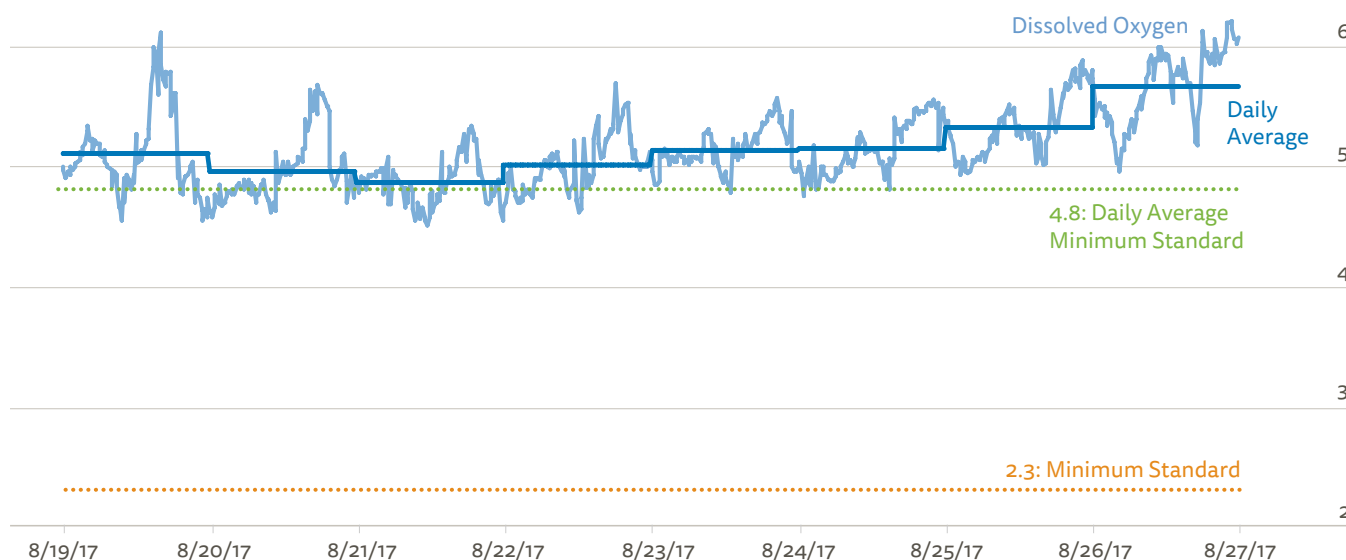
- Understanding DO requirements for certain species in the Estuary.
- Valuable data will help to fill in spatial and temporal data gaps.

Long-term:

- Site-specific DO criteria where appropriate.
- DO criteria fully protective of all stages of aquatic life.

Dissolved Oxygen, HRECOS Pier 84

Dissolved Oxygen (mg/L) 7





WATER QUALITY ACTIONS

OBJECTIVE C

Address monitoring gaps and lack of information for key locations, parameters and state and local track-down programs

WQ-C-3

EMERGING CONTAMINANTS

Support and share research to help assess the fate, transport and ecosystem impact of known and emerging contaminants, in particular microplastics, in the Harbor Estuary.

NEED

In addition to the Estuary's legacy of toxic contamination, a variety of newer chemicals, pharmaceutical by-products, and microplastics, are now a cause for concern. For many of these substances, their effects on organisms in terms of reproduction and survival are unknown, including their effects on human health.

DESCRIPTION

HEP and partners will build on the Harbor Toxics Total Maximum Daily Load (TMDL) work and recent sampling conducted by Riverkeeper/Cornell University to look at the feasibility of undertaking a risk assessment for our region. Similar work is being conducted both in the Netherlands and under EPA CERCLA/RCRA to characterize and develop response actions for various emerging contaminants, including working with states to accelerate track down efforts of contaminants. HEP and the HRF will also support projects that document the impact of these new and emerging contaminants in the Estuary, such as the microplastic trawling surveys conducted by Baykeeper in the Harbor as well as sediment/beach sampling

and will advance research opportunities into shellfish and fish consumption of microplastics. HEP will also encourage research and development of novel tools and controls to prevent and remove microplastics, such as that developed by the Rozalia Project (www.rozaliaproject.org) to prevent microfibers from entering our waterways. HEP and HRF could also support a program to track down and reduce ongoing sources of toxic contaminants, as identified through the Contaminant Assessment and Reduction Project (CARP). These assessments and projects will require new grant funding.

KEY PARTNERS: EPA, NYCDEP, NJHDG, NJDEP, NYSDEC, NGOs, Academia, Community Groups

RESOURCES: Staff and Leveraging; Grant Funded Project >\$200,000

TIMELINE: 2017-2022. HEP and HRF will explore possibilities for funding a research project beginning in 2018.

OUTCOMES

Short-term:

- Additional data on concentrations and distribution of contaminants in the estuary.
- Better understanding of fish and shellfish microplastics consumption.

Long-term:

- Reduce effects of microplastic consumption on human health.
- Limit ecosystem impacts of various widespread contaminants.



WATER QUALITY ACTIONS

OBJECTIVE D

Share clear and easy-to-understand water quality information with the public, focusing on uses and potential public health risks

WQ-D-1

HARBOR-WIDE REPORT

Prepare an updated Joint Harbor-Wide Water Quality Report.

NEED

The last joint harbor report was published in 2011. This report combined data collected throughout the Harbor by NYCDEP and NJHDG and gave a clear picture of water quality trends in both NY and NJ waters. Presenting this data in a joint fashion is a key communication tool for interested stakeholders and users of the region's waters.

DESCRIPTION

HEP will work with NYCDEP, NJHDG and other partners to compile data on water quality and show trends throughout the Harbor. This information should describe what impairments mean and how the EPA, the states and the public can use this information. The report will focus on data interpretation and identifying gaps in information. Parameters will include those of importance to stakeholders with long-term datasets such as pathogens and dissolved oxygen. It may include information on contaminants. Maps and graphics will reflect ongoing challenges in addressing recreational water

quality and help address desire for consistent messaging across agencies on criteria, standards, and monitoring. Reports will be available on HEP's new website as well as in hardcopy. In addition, an interactive web-based map will identify all existing sampling locations in the Harbor Estuary with pertinent information associated with each. Creation of the map will require new grant funding.

KEY PARTNERS: NYCDEP, NJHDG

RESOURCES: Staff and Leveraging; Grant Funded Project <\$200,000

TIMELINE: 2017-2019. HEP will work with partners beginning in 2017 on both the joint report and the web-based map.

OUTCOMES

Short-term:

- Clear, easily-accessible information on water quality trends and impairments in the Harbor.

Long-term:

- Better informed stakeholders that are aware of what "safe uses" means and how to incorporate that information into their decisions on where and when to recreate.
- Collaboration between sampling programs in NY and NJ.



Citizen science groups performing pathogens analyses on water quality samples. Photo: NY/NJ Baykeeper



WATER QUALITY ACTIONS

OBJECTIVE D

Share clear and easy-to-understand water quality information with the public, focusing on uses and potential public health risks

WQ-D-2

WATERWAY STORIES

Develop briefs and stories about water quality conditions of individual waterways and watersheds.

NEED

Waterbody and watershed-specific information focused on potential public health risks related to uses and ways that agencies and organizations are working to eliminate or minimize these risks is currently lacking. Breaking down overall Harbor water quality trends into easily digestible, locally relevant, information is another key communication tool that is needed for the region's stakeholders.

DESCRIPTION

This material can be distributed through the HEP website and newsletter to effectively communicate activities and progress. The effort will help support NYSDEC fact sheets and NJDEP watershed planning efforts as well as information prepared by local stewardship organizations. Waterbody specific story maps can also be used to share information on fish and shellfish consumption advisories.

KEY PARTNERS: NYSDEC, NJDEP, NGOs

RESOURCES: Staff and Leveraging

TIMELINE: HEP will work with partners to develop two waterbody and/or watershed-specific briefs in 2018 to start. This effort will continue with additional waterbodies.

OUTCOMES

Short-term:

- Accurate, current and clear information on waterbody-specific conditions as well as ongoing initiatives and projects within the watershed.

Long-term:

- Better informed stakeholders that are aware of local waterbody conditions and efforts to improve them.



Collecting floatable debris on the Passaic River. Photo: PVSC



WATER QUALITY ACTIONS

OBJECTIVE E

Assess the potential impacts of climate change on water quality

WQ-E-1

CLIMATE IMPACTS

Support and share research to assess climate change impacts on water quality and hydrology.

NEED

It is certain that climate change will affect water quality in the Harbor Estuary but specific impacts and the magnitude, duration and frequency of these impacts are not well understood. Modeling future possibilities through a range of climate change scenarios is crucial to help advance policy options.

DESCRIPTION

HEP and HRF will support research projects seeking to explore climate impacts, model anticipated changes, and communicate this information to stakeholders to discuss possible policy responses. Research projects will require new grant funding. Of particular concern are the effects of changing precipitation patterns and temperature on pathogens, nutrient input, eutrophication, availability of dissolved oxygen, exposure to toxic contamination, changes in watershed dynamics, streamflow and residence time in the Estuary, ocean acidification, and harmful algal blooms (HABs).

KEY PARTNERS: HRF, EPA, NYSDEC, NJDEP, NYCDEP, NJHDG, Hudson River Estuary Program, Academia

RESOURCES: Grant Funded Project >\$200,000

TIMELINE: 2017 - 2022.

OUTCOMES

Short-term:

- Additional information on the potential impacts of climate change on water quality in the Harbor Estuary.
- Accurate models demonstrating water quality impacts for a variety of climate change projections.

Long-term:

- Adaptive policies that take into account water quality impacts
- Projects specifically intended to mitigate effects on water quality.

WQ-E-2

CLIMATE MONITORING

Identify parameters and potential for establishing a long-term monitoring program to assess climate change impacts on temperatures and other water quality variables.

NEED

There are many uncertainties in the ways that climate change will impact water quality. Collecting observable data to track changes will assist in future planning and mitigation efforts.

DESCRIPTION

HEP will convene partners to identify specific parameters, including dissolved oxygen, algal blooms, and nutrients as well as how best to support this long term monitoring need and reporting over time. This effort may focus on especially susceptible waterways, such as the Hackensack, where dams and drinking water reservoirs may exacerbate future temperature increases. Monitoring could involve citizen scientists to help collect data on algal blooms and other parameters. Creation of the monitoring system will require grant funding and on-going operating support.

KEY PARTNERS: IEC, EPA, NYSDEC, NJDEP, Hudson River Estuary Program, Academia

RESOURCES: Grant Funded Project >\$200,000; On-Going Operating

TIMELINE: HEP will convene partners in 2019. Monitoring will be established in at least one watershed by 2022.

OUTCOMES

Short-term:

- A monitoring plan that lays out appropriate locations and parameters for long-term data collection with the specific goal of assessing climate change impacts.
- Pilot data for at least one susceptible waterbody/watershed.

Long-term:

- Data throughout the Harbor Estuary that will supplement other monitoring programs.
- Clear information on how climate change is impacting water quality.



WATER QUALITY ACTIONS

OBJECTIVE E

Assess the potential impacts of climate change on water quality

WQ-E-3

CLIMATE ADAPTATION

Advance understanding and consideration of water quality in the analysis of hazard mitigation and coastal resilience projects.

NEED

Water quality is infrequently taken into account when the focus of a project is long-term resiliency. Primary concerns are human health and safety as well as habitat protection, however understanding potential impacts on water quality will facilitate the design and selection of appropriate projects. This will help ensure that projects are not working against water quality goals for the broader Harbor Estuary.

DESCRIPTION

HEP staff will participate in advisory committees, organize workshops, and work through the Water Quality Work Group, Citizens Advisory Committee, and Hudson River Estuary Program to help ensure that hazard mitigation projects, such as the tidal barriers being considered under the USACE Harbor and Tributaries Study, fully assess implications of their construction on water quality issues.

KEY PARTNERS: USACE, EPA, Hudson River Estuary Program

RESOURCES: Staff and Leveraging

TIMELINE: Participation in advisory committees will occur as needed with the project schedule, beginning in 2017 onwards.

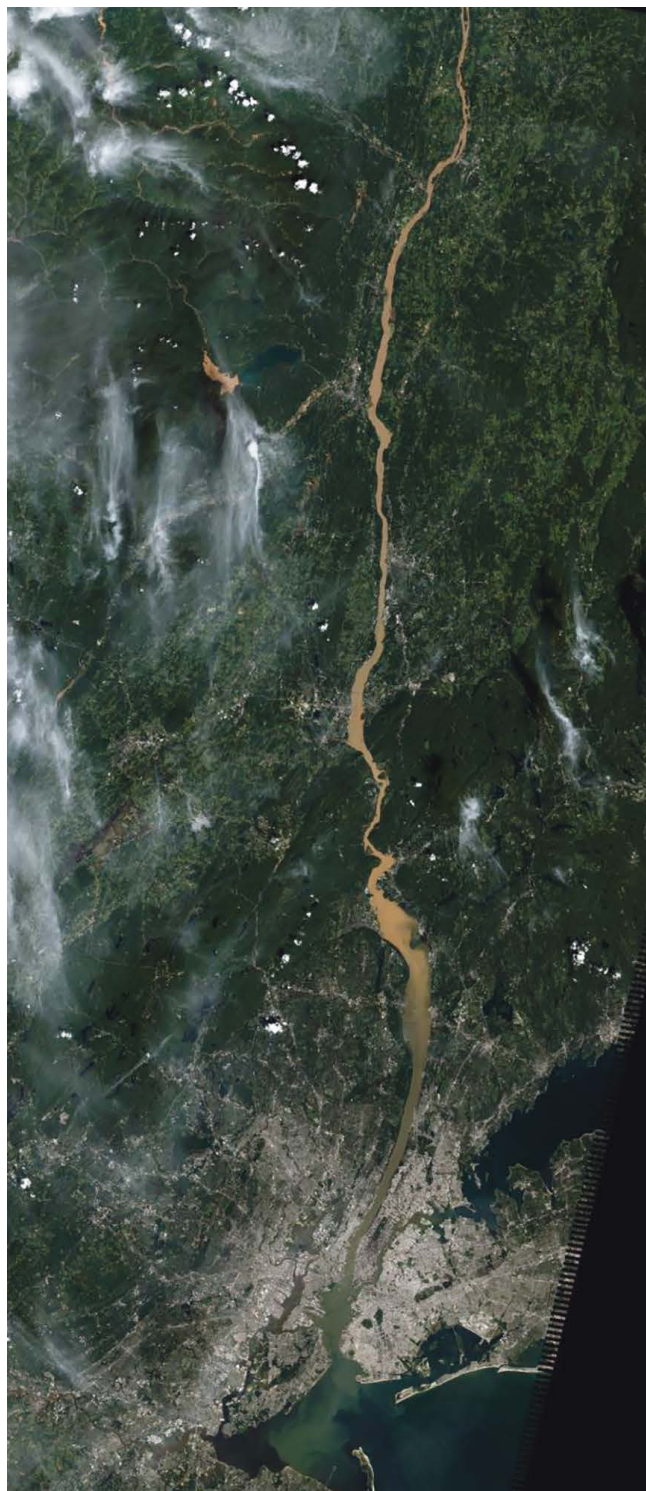
OUTCOMES

Short-term:

- Input from water quality experts on potential impacts of climate adaptation projects in the Harbor Estuary.
- Approved projects take into account these potential impacts and ways to address them.

Long-term:

- Projects are able to properly mitigate hazards without negatively impacting water quality.



Sediment plume following
Hurricane Irene, 2011.
Photo: David Ralston