FINAL REPORT

Citizen Science Monitoring for Pathogen Indicators in NY-NJ Harbor Tributaries
Bronx River Alliance

December 15, 2014

The grant award was $25,000, with $16,700 in matching funds from foundation and municipal sources.

The project period was January 31, 2014 through January 15, 2015.

The Bronx River Alliance partnered with Rocking the Boat on this citizen science project to find out more about how water quality conditions vary in the Bronx River. The project enabled us to generate data for assessing baseline conditions, establish a consistent monitoring program, apply results to inform targeted actions to address water quality problems, educate the public, and share results with relevant agencies for prioritizing policies and plans impacting the Bronx River. A clean and healthy river is essential to support existing uses including recreation, education and wildlife habitat. The first fish passage in NYC for river herring is scheduled to open on the Bronx River this spring, highlighting the need for improving water quality to sustain the increased fish populations it will attract to the river. The monitoring results will also be used for engaging upstream municipalities in Westchester County in collaborating on a watershed level to protect the river.

Project Summary:

The Bronx River Alliance and its Bronx River Stewards have been measuring the Bronx River's dissolved oxygen, turbidity, salinity, and other physical and chemical parameters for many years. With the support of the *Citizen Science Monitoring* program, the Alliance was able to expand this body of river data to incorporate pathogens monitoring, identification of levels and sources of contamination, with the goal of contributing to solutions to the problem of pathogen pollution. These additional data will be used to provide our more than 100 community partners with a fuller picture of the river's health and key problems, while highlighting the need for local residents to be aware of water quality issues and to protect their health when using the river for recreation and enjoyment. The Alliance has long been actively monitoring water quality issues in the river, and this summer provided the opportunity to build on this work, incorporating pathogens data to better understand water quality issues and support our goals for wildlife habitat and recreation.

The Bronx River Alliance and Rocking the Boat partnered to collect and analyze samples, using a lab that was set up at the Rocking the Boat headquarters. Training was provided by EPA staff in field and lab techniques, quality control, and data management.

Project Staff

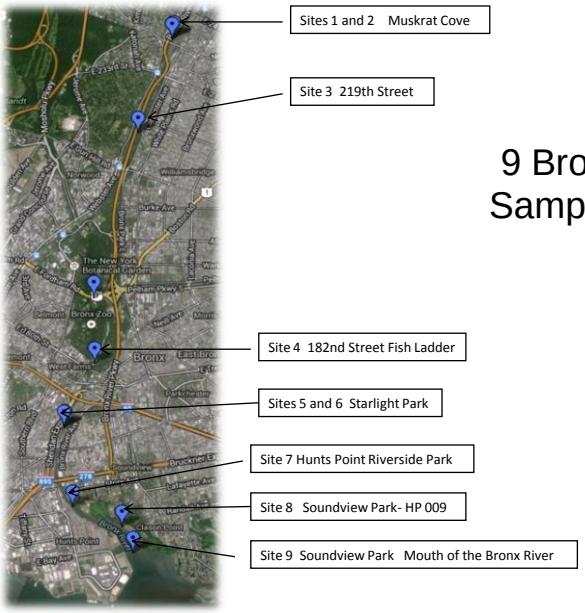
Name	Title	Organizational Affiliation	Responsibilities (specific to this project)
Damian Griffin	Project Leader	Bronx River Alliance	Coordinate activities for the Bronx River Alliance and act as field leader
Robin Kriesberg	Project Quality Assurance/Quality Control Manager	Bronx River Alliance	Responsible for ensuring the QAPP is fully implemented, reports deficiencies to the project managers and oversees all QA/QC related activities
Sam Marquand, Sherene Steer, Sana Mirza, Michael Mendez	Field Personnel	Rocking the Boat, Bronx River Alliance	Sampling and delivery of all samples to lab
Penny Brown	Data Entry	Bronx River Alliance	Uploading all data provided by field personnel
Cathy Perez	Laboratory Personnel	Rocking the Boat	Maintains lab and coordinates laboratory procedures

Methodology

During the summer of 2014, the Bronx River Alliance and Rocking the Boat partnered to monitor water quality at nine sites along the Bronx River, to assess conditions and identify problems. The Alliance was responsible for the northernmost six sites, and Rocking the Boat sampled at the lower three. The Quality Assurance Project Plan (http://www.harborestuary.org/citizenscience-2014project.htm). outlines the sampling methodologies for each site, based on local conditions and accessibility.

Pathogen testing was done for enterococcus following EPA protocols, and a lab was set up at Rocking the Boat for analyzing these samples. All data were checked and verified by trained staff members. After verification, the results of this testing were entered into the EPA's STORET database. Additional data were collected including dissolved oxygen, water temperature, pH, specific conductance, conductivity, and salinity, and weather and river conditions were recorded.

The nine testing sites were chosen either because of their location on the river, accessibility to the general public, or based on how conditions at the site might impact bacterial levels in the short term.



9 Bronx River Sampling Sites

Sampling Site #	Sampling Site Name	GPS Coordinates*	Sampling Protocol
1	Muskrat Cove 1	40.90142683892559, -73.85972142219543	Mid channel sample, wading
2	Muskrat Cove 2	40.9011673423199, -73.8600218296051	Mid channel sample, wading
3	East 219th Street	40.884451994702665, -73.86734426021576	Sample from dock in channel
4	182nd Street	40.84350548994645, -73.87654423713684	Top of fish passage
5	Starlight Park North Dock	40.83228774455079 ,-73.88283669948578	Sampled from end of dock in channel
6	Starlight Park South Dock	40.83225121478278, -73.88302445411682	Sampled from end of dock in channel
7	Hunts Point Riverside Park	40.81804772785357, -73.88125419616699	Sampled from end of dock
8	Soundview Park HP 009	40.81443446654404, -73.87076675891876	Mid stream sample, from boat
9	Soundview Park Mouth of River	40.80974505311306, -73.86821866035461	Mid stream sample, from boat

Data Management

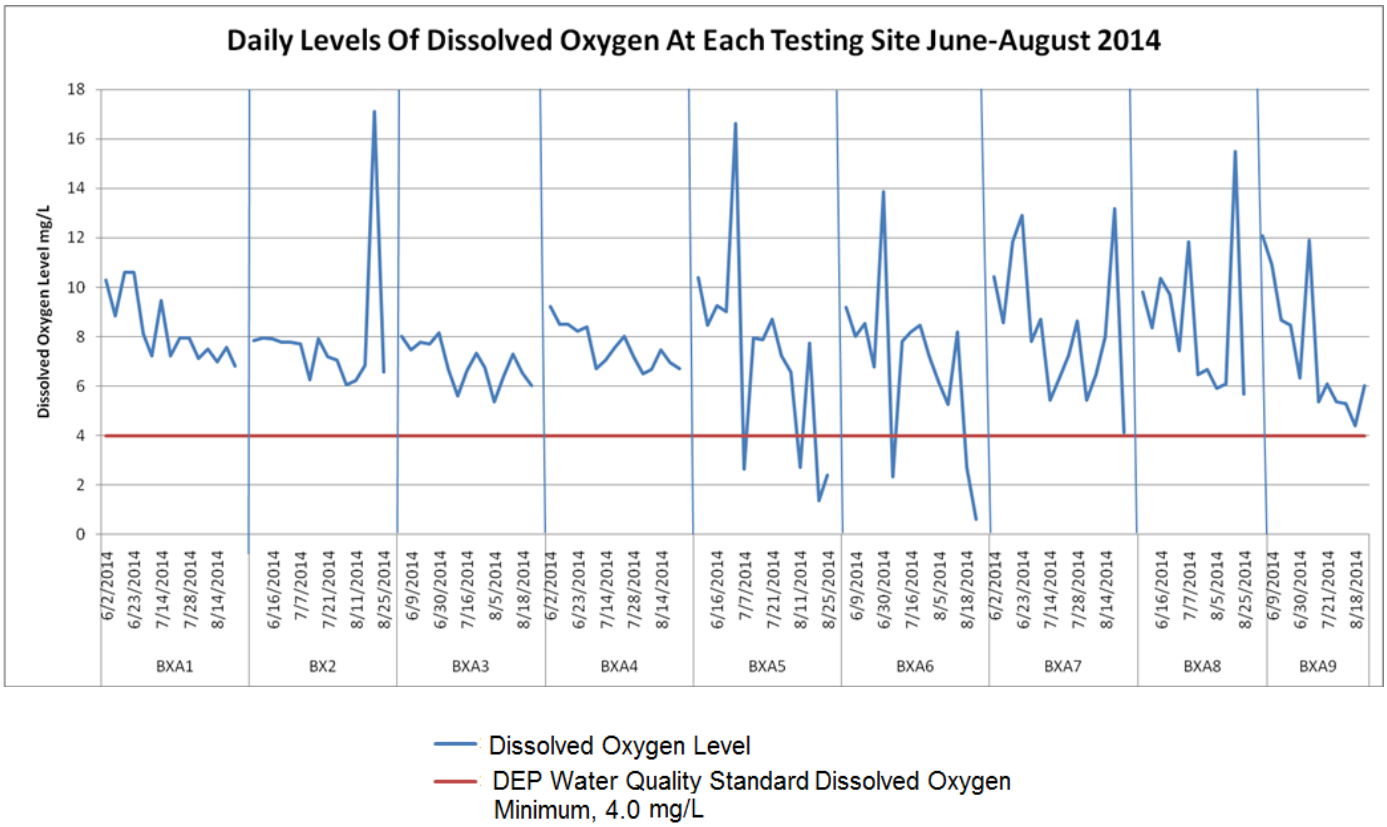
All data were collected on the field/calibration/laboratory datasheets. After each field sampling event, the data were checked for completeness, missing information or questionable data. The individual responsible for data entry contacted the field sampling team for the missing data and had the team clarify any discrepancies with the data. The corrected data were then entered into preformatted electronic spreadsheets supplied by EPA Region 2. The Project QA/QC Manager reviewed 10% of the data to verify accuracy of the data entered into the spreadsheet from the field datasheets. The validated and completed electronic spreadsheets were emailed to Stanley Stephansen of EPA Region 2 or the designated contact for review during the initial phases of the

project. Data were uploaded into WQX/STORET by the contractor after verification and approval by the Project QA Manager. The original datasheets will be stored by the Project Leader for 5 years after the completion of the project in the project file. Copies of the field/lab datasheets were sent to NEIWPCC as part of the quarterly reports.

Data Review and Usability Determination

Field/Lab Checks Performed	Data Management Checks Performed
Monitoring performed per SOPs or QAPP	Data entry and transcription errors
Measurements performed correctly	Calculation/reduction errors
Calibrations performed correctly	Proper data and document storage
Data meets acceptance criteria	Missing data documented
Holding times met	Confirm time records
Evaluate any deviations from QAPP or SOPs to determine the impact to the data and project objectives	Assess data for usability

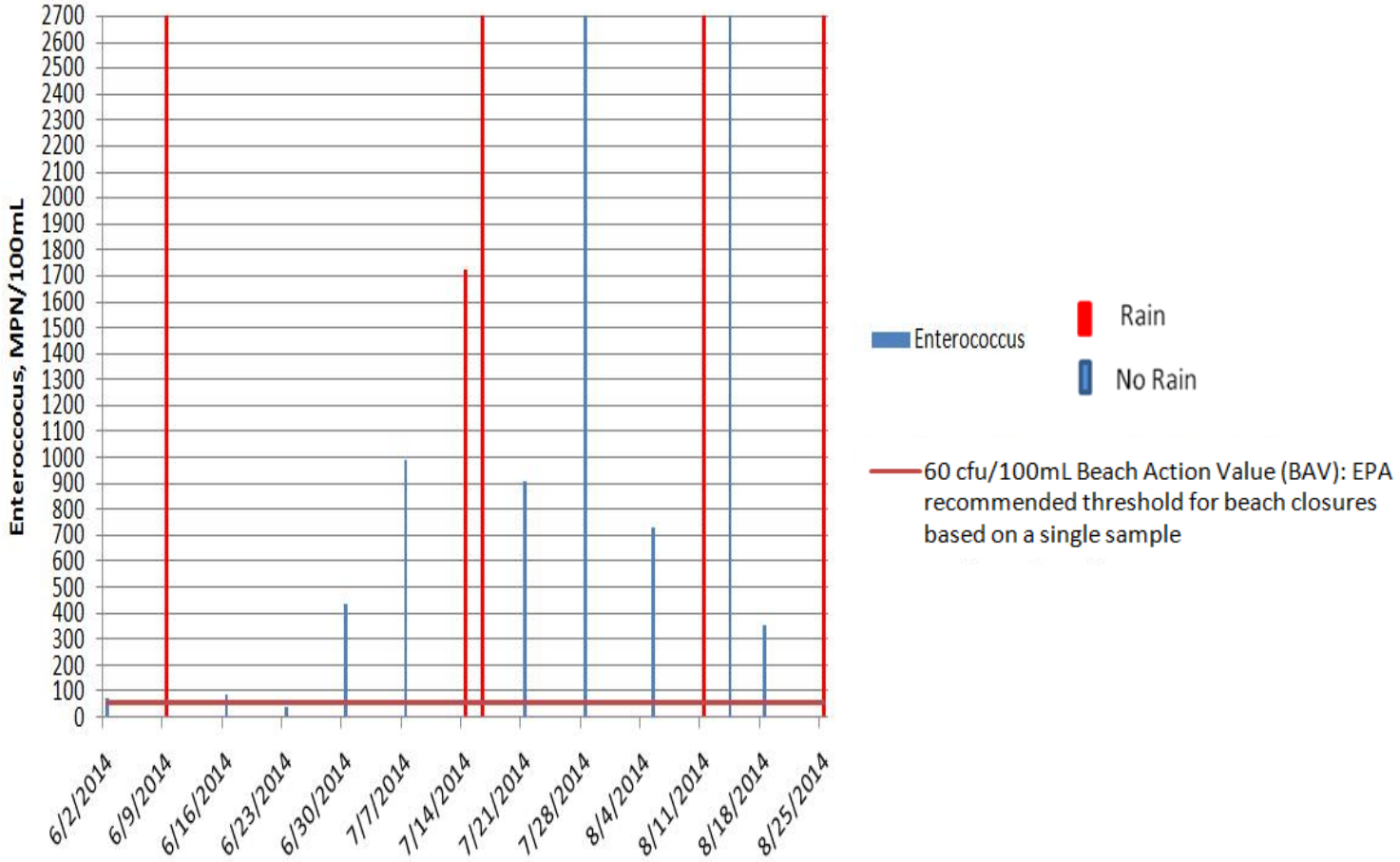
Dissolved Oxygen Results June – August 2014



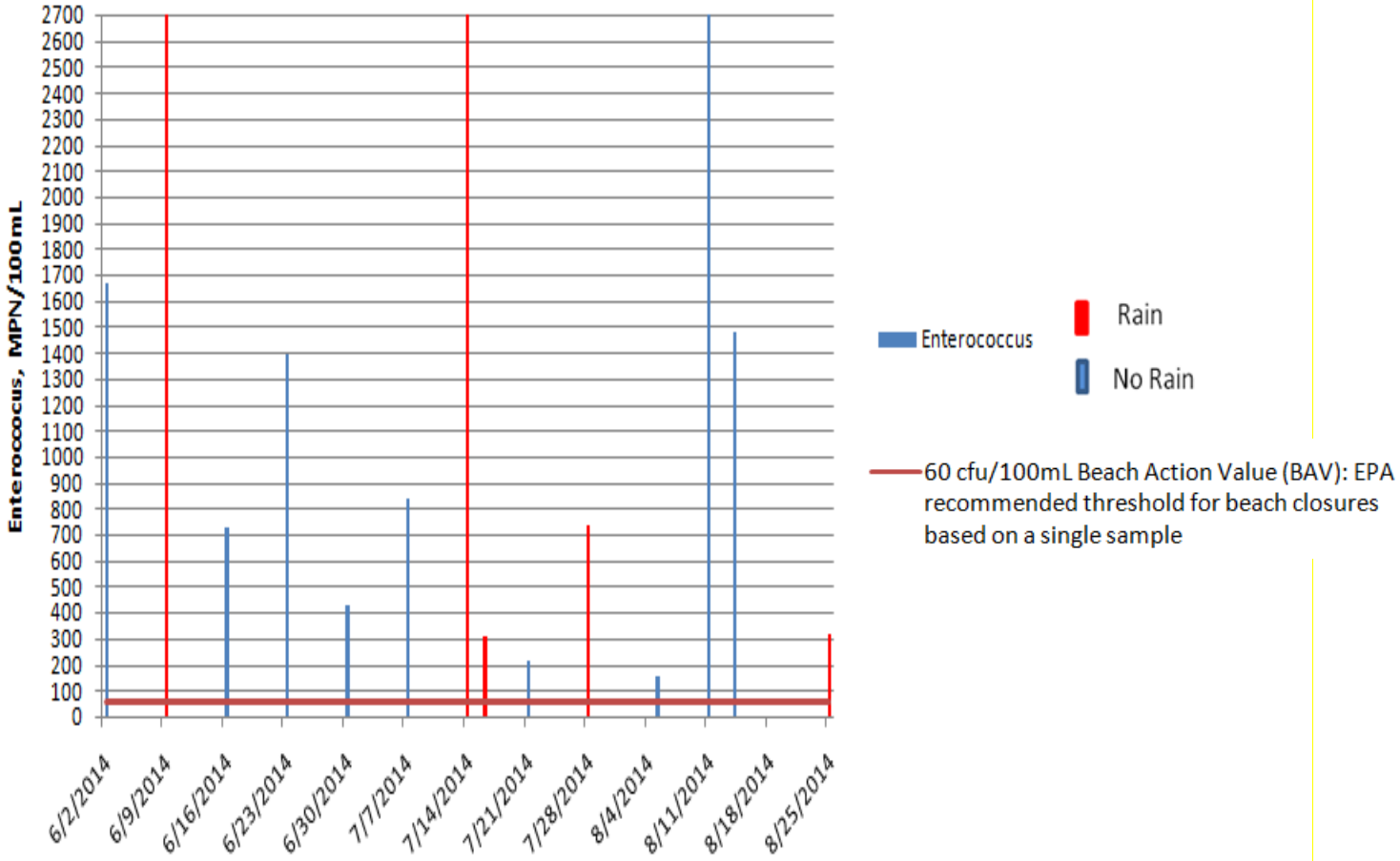
Key findings:

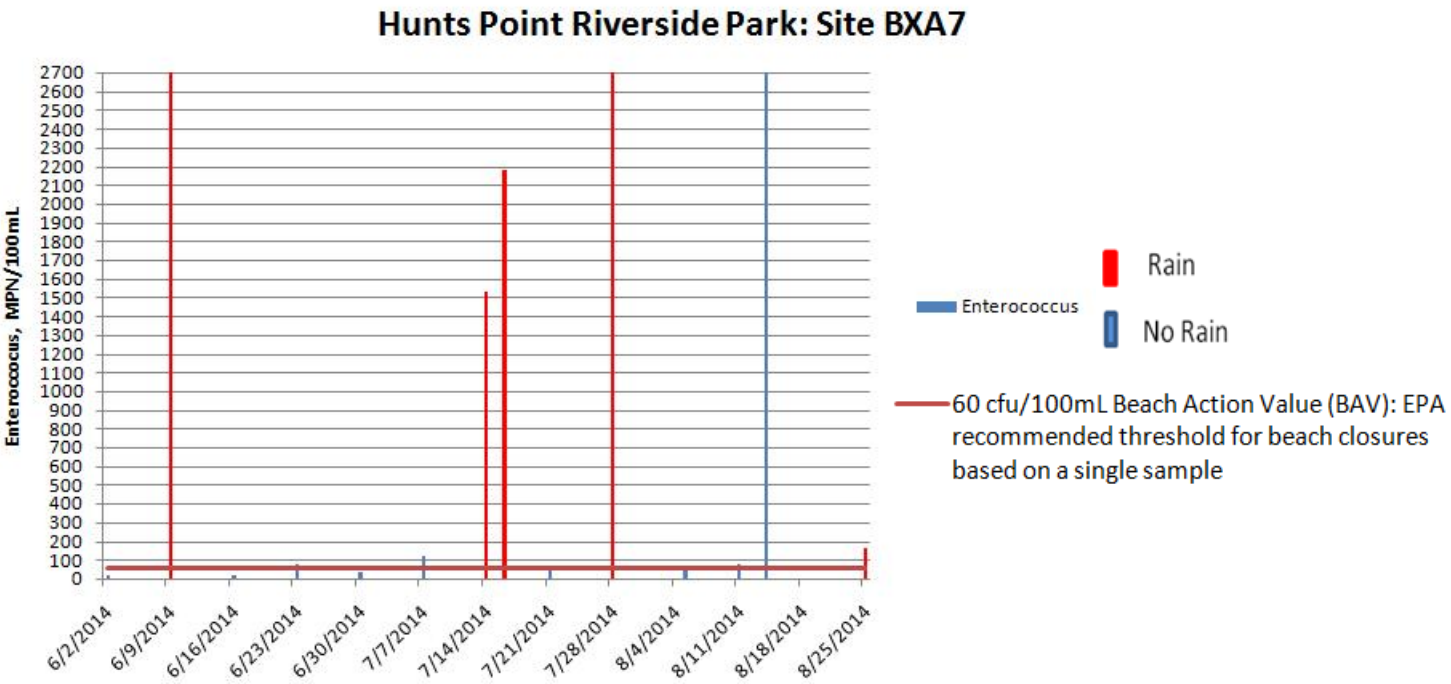
- During the course of the summer, approximately 115 pathogen samples were collected and analyzed. Of these, only 19 (17%) were equal to or below the 60 cfu/100 ml beach action value (BAV) proposed by EPA for beach closures based on a single sample.
- On August 18th and August 25th, sites 5 and 6 had readings of below 4 mg/L, possibly due an algal bloom. Green water was observed during water quality testing on those dates.
- The algal blooms may possibly be correlated to high phosphate inputs, from fertilizers and other upstream sources. More study is needed to identify sources of these inputs.
- Water quality in the estuary section of the river, from site 4 and south, is influenced by tidal waters from the Hudson River estuary, New York Harbor and Long Island Sound, where low dissolved oxygen (DO) levels are of special concern.
- The sites that most frequently experienced very high pathogen readings were sites 1 and 2, located at Muskrat Cove, and site 7, at Hunts Point Riverside Park (as illustrated in the charts below). Site 7 is located near a combined sewer overflow (CSO), which may account for the high numbers following rain events. Sites 1 and 2 are located at the border of the Bronx and Yonkers, where an outfall pipe empties into the river. These events were often associated with rain, but not always, suggesting that there may be problems with the inputs to the pipe.

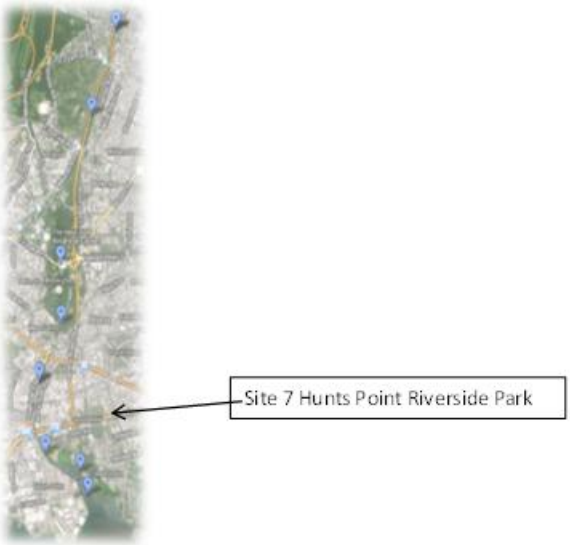
Muskrat Cove Park: Site BXA1



Muskrat Cove Park 2: Site BXA2







Accomplishments/deliverables/outcomes

The Alliance and Rocking the Boat gathered data according to protocols established in the QAPP. Outcomes of the project included verified data on pathogen levels for the summer of 2014, personnel trained in pathogen monitoring protocols, and an established procedure for collecting and analyzing water quality samples.

Alliance and Rocking the Boat staff participated in EPA training sessions on water quality monitoring and analysis. The data collected during the project period were reviewed and updated for uploading to the EPA STORET database, and will also be available on the Alliance's bronxriverwater.org website. Results were shared at the water quality workshop hosted by EPA on November 21st.

On August 18, dozens of scientists convened along the Bronx River for a full day of research, collaboration, nature enjoyment, and recognition of everybody's continued hard work on river-related projects. A joint sampling day such as this one strengthens relationships among researchers while generating a snapshot of

conditions in the river, which will enhance our understanding of ecosystem interactions. This important event highlighted the need for more research and collaboration in future years.

During the fall of 2014, 222 local students along with 29 teachers have been engaged in water quality monitoring. After learning about the river and the monitoring program, they participated in testing for pH, salinity, phosphates, turbidity, temperature, and dissolved oxygen. The schools and community organizations involved included: Bronx Community Charter School, Learning Tree Academy, Pelham Preparatory Academy, One to World Global Classroom, the BEST Academy of Sustainable South Bronx, Green Generations After School Program, Landmark Academy, Van Nest Academy and Fannie Lou Hamer High School. These educational opportunities are an essential part of training and engaging students to become future stewards of the river.

Lessons/conclusions/recommendations

This project demonstrated that the Alliance and Rocking the Boat have the capacity for serious field and lab work when adequate support systems and organizational commitment are in place. By establishing a regularly-occurring project with training and scientific validity, the program drew the attention of other researchers who were interested in the Bronx River, resulting in a collaborative multi-agency river sampling day on August 18th.

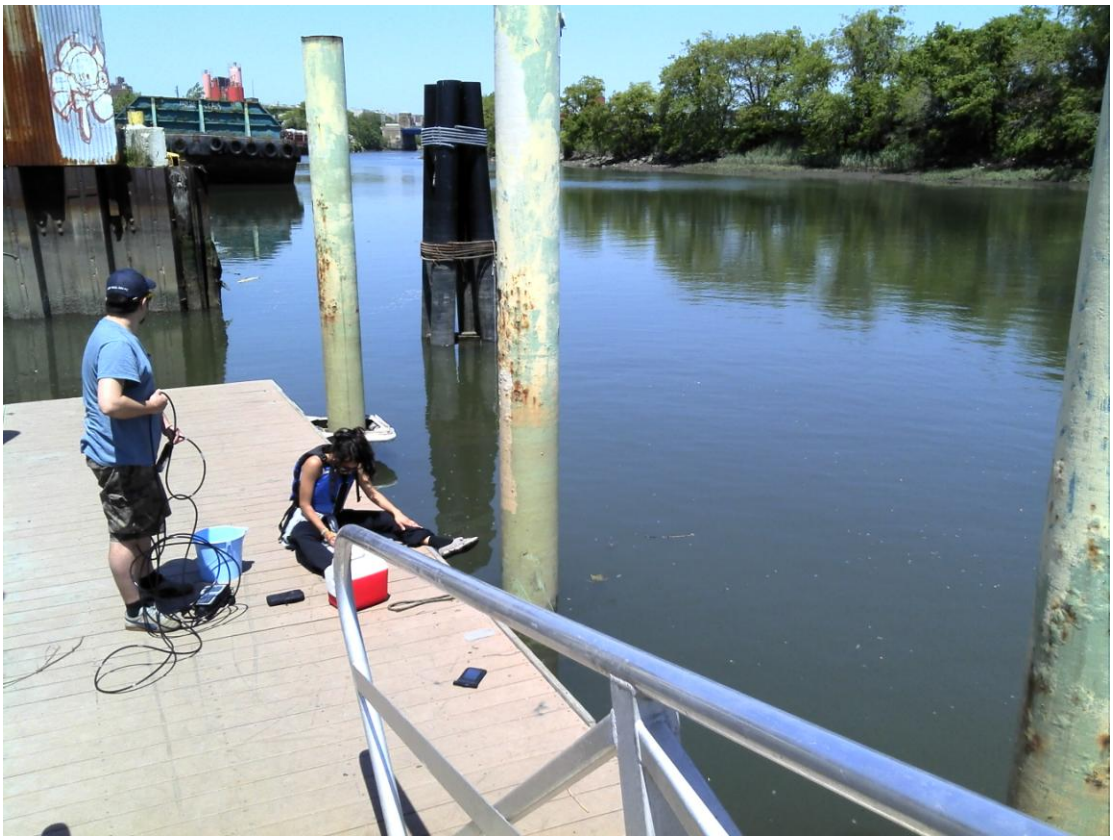
An ongoing challenge is incorporating this testing into the organization's regular programming in a sustainable way so that it can be replicated and continued. Transportation and coordination with partners presented challenges, as there were times when insufficient vehicles were available for transportation to hard to access sampling sites. Ideally, sampling would incorporate locations in Westchester County to provide a more complete view of conditions in the watershed. Year-round testing would help in evaluating weather impacts on testing results. Tracking tides during storm events would contribute to a better understanding of river recovery times after CSO events. Expanding our capacity to analyze and interpret data will help identify data gaps and target areas needing more study and attention.

Starting in 2015, all water quality data will be shared with partners, on a new website at www.bronxriverwater.org, currently being finalized. The information will also be shared at meetings including the Bronx River Ecology Team and other educational opportunities.

In the spring of 2015, a fish passage will open to allow migratory river herring to gain access to their upstream spawning grounds. This is the first fish passage in NYC and plans are already underway to build two more at the next two upstream dams. These investments are dependent on clean water to support the fish populations they are designed to attract. Ongoing monitoring will help identify potential problems needing further study and attention.

The data collected through this project has demonstrated that a watershed based approach is needed to address cleaning up the water quality in the Bronx River. With hotspots at the border of Westchester County as well as near CSOs, it is clear that a comprehensive and collaborative approach is needed to make real progress on improving water quality to support the recreational, habitat, educational and community uses of the Bronx River.

The Bronx River Alliance and Rocking the Boat are actively seeking additional support to continue to engage in water quality monitoring including pathogens, to build a more robust body of data and leverage the training and support that this funding has provided. Expanding our capacity to incorporate ongoing testing and sharing the results with the community, school groups and partner agencies will help us to provide important information for public health, wildlife conservation, and policy initiatives for improving the overall health of the Bronx River.



Water quality monitoring at Hunts Point Riverside Park, photo by Bronx River Alliance

Water quality monitoring by Rocking the Boat at Hunts Point Riverside Park, Photo by Bronx River Alliance

Dr. Solange Duhmamel, Columbia University, testing the water at Starlight Park
Photo by Bronx River Alliance

Water quality monitoring at River Park fish passage, photo by Bronx River Alliance

Analyzing results in lab at Rocking the Boat, Photo by Bronx River Alliance

Links:

Bronx River Alliance's homepage:
www.bronxriver.org

Rocking the Boat's homepage:
www.rockingtheboat.org

Bronx River water quality data:
www.bronxriverwater.org

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