



Department of
Environmental
Conservation

PROGRESS REPORT

MOHAWK RIVER BASIN ACTION AGENDA

Environmental Sustainability and Flood Hazard Risk Reduction

March 2018



PROGRESS REPORT – MOHAWK RIVER BASIN ACTION AGENDA

Environmental Sustainability and Flood Hazard Risk Reduction

Prepared by the New York State Department of Environmental Conservation
Mohawk River Basin Program

March 2018

For additional information regarding this report, contact:

Alexander J. Smith, PhD
Mohawk River Basin Program
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233
mrbp@dec.ny.gov
<http://www.dec.ny.gov/lands/58571.html>

TABLE OF CONTENTS

From the Commissioner	1
An Agenda For Action in the Mohawk River Basin	4
Forming partnerships in the Mohawk	6
Working toward flood resiliency and protecting communities	11
Progress on Flood Hazard Reduction and enhanced Resiliency targets	11
Reducing flood risks and Mitigating flood damage for resiliency.....	11
Additional Projects Working toward flood resiliency and protecting communities.....	21
Creating a Drinkable, Swimmable Mohawk River	23
Progress on water quality targets.....	23
Expanding water quality monitoring programs, Integrating Non-government Data sources, and Developing Long-term/Real-time Monitoring Networks.....	23
Improving Wastewater Infrastructure, Controlling Combined Sewer overflows, and reducing stormwater runoff.....	27
Additional Projects Advancing a Drinkable, Swimmable, Fishable Mohawk River	31
Protecting Mohawk river fisheries for the future.....	33
Progress on Fish and Wildlife targets	33
Updating fishery information and tracking the movement of species	33
Additional Projects protecting mohawk river fisheries for the future	39
Supporting Big ideas – Mohawk River Watershed grants	40



MARCH 2018

The Mohawk River is one of the most distinct and historically important rivers of New York State. Long viewed as a crossroads for water, wildlife, and people, the Mohawk River and its watershed connect the regions of western New York with those in the east. In most circumstances, this has been of benefit to communities in the watershed, but, at other times, it has brought with it the alteration of the landscape and subsequent environmental problems.

While the environmental quality of the Mohawk River and its watershed—significantly impacted during the industrial expansion of the 19th and early 20th centuries—has improved, there is still much to be done to preserve and protect the natural resources and the communities within the watershed. The development of the *Mohawk River Basin Action Agenda* and subsequent formation of the Mighty Waters Working Group by Governor Cuomo in 2012 were integral to the creation of an ecosystem-based management system for the Mohawk River watershed.

This winter, DEC was also responding, planning, and acting to address flooding and ice jams on the Mohawk River and its tributaries. We are committed to taking aggressive, science based, action to build flood resiliency throughout the Mohawk Valley – a core goal of the Action Agenda.

The Action Agenda, developed by DEC and partners from local, state, federal, academia and not-for-profit organizations, comprises the guiding principles that bring together collaborators and stakeholders to share a vision that highlights and achieves the over-arching goals for the watershed. Together with the Mohawk River Basin Program, the goals and objectives of the Action Agenda serve to carry out the responsibilities for environmental sustainability, flood resiliency, and economic revitalization within the Mohawk River watershed.

It is with great pleasure that I am presenting this report on progress in the Mohawk River basin. In a very short time, so many individuals have come together from a wide array of backgrounds to create great change in this important region of New York. We are making great progress together – improving water quality, reducing flood risks, and creating sustainable wildlife populations in the Mohawk. I thank our federal, state, and local partners for their help in making the *Mohawk River Basin Action Agenda* a reality.

Basil B. Seggos,
Commissioner

AN AGENDA FOR ACTION IN THE MOHAWK RIVER BASIN

Our Waters, Our Communities, Our Future, a 2009 report by the New York Ocean and Great Lakes Ecosystem Council, recommended better management of natural resources and human activities through ecosystem-based management. This type of management recognizes that humans are an integral part of the ecosystem and that ecosystems, in turn, are vital in supporting life. More importantly, this report specifically recommended using ecosystem-based management in the Mohawk River watershed, recognizing the connection to the Hudson River and creating a “whole Hudson” approach to natural resource management. The development of the *Mohawk River Basin Action Agenda* and DEC’s Mohawk River Basin Program initiated this move toward an ecosystem-based management system for the watershed.



Experts discuss Mohawk River basin-related natural resource management issues during a Mohawk River Basin Program Steering Committee meeting. The steering committee, representing various state and federal government agencies, not-for-profits, academia, and others, is integral to the success of the program.

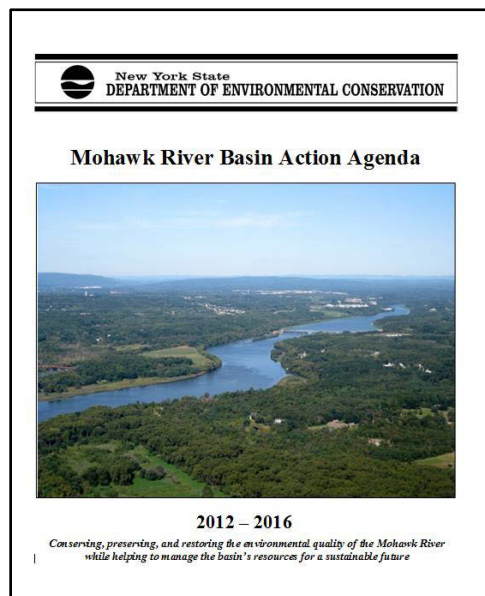
The involvement of partners in the development of the *Mohawk River Basin Action Agenda* was essential in developing a plan that integrated a shared set of goals for the watershed and which would establish a clear set of priority actions. The Action Agenda brings together collaborators and stakeholders to highlight and achieve the overarching goals all parties share for the Mohawk River watershed.

Integral to the success of implementing the goals and objectives of the Action Agenda was the formation of the Mohawk River Basin Program Steering Committee to oversee the development and implementation of the *Mohawk River Basin Action Agenda*. The steering committee, comprising

representatives from the Department of Environmental Conservation (DEC), Department of State (DOS), other federal and state agencies, and partnering stakeholder organizations working in the region—including academia, not-for-profits and local municipal governments—is tasked with advising the use of program resources for current and long-term environmental issues facing the Mohawk River watershed and suggesting revisions to the Action Agenda as appropriate. The committee formed subcommittees to draw together relevant expertise and interests to oversee and provide greater in-depth focus on identified Action Agenda goals, creation of work plans and project proposals.

The goals and objectives of the 2012-2016 Action Agenda are as follows:

- **FISH, WILDLIFE AND HABITATS:** Conserve and protect fish, wildlife and their habitats in the Mohawk River watershed while communicating to the public about their value to human communities and natural processes so that people can enjoy the unique natural character of the watershed and its living ecosystem
- **WATER QUALITY:** Protect and improve water quality in the Mohawk River watershed and communicate the issues so that people are protected from health hazards, drinking water supplies are conserved, aquatic communities flourish and natural processes are sustained
- **FLOOD HAZARD RISK REDUCTION:** Promote flood hazard risk reduction and enhanced flood resiliency by providing the tools to ensure that communities are prepared for climate change and important cultural, recreational, economic and environmental assets are protected
- **COMMUNITY PLANNING AND REVITALIZATION:** Revitalize Mohawk River watershed communities using sustainable development principles, integrating environmental, social, historic, cultural, recreational and economic factors to shape the region as a vibrant, healthy, desirable place to live, work and visit
- **WORKING LANDSCAPES, LAND USE AND OPEN SPACE:** Maintain and encourage those land uses within the Mohawk River watershed that support working landscapes, such as well-managed farms and forests that help sustain the regional economy, protect and enhance open space and rural development patterns, and provide for the sustainable use and protection of resources



The Mohawk River Basin Action Agenda was current through 2016. DEC staff are now revising it with expected publication of a new version in 2018.

Of these five goals DEC's efforts have focused on those related to fish and wildlife, water quality, and flooding. Other state agencies, federal, and local partners have made significant efforts on community planning and revitalization and preserving working landscapes and open space. The remainder of this progress report will highlight some of the many projects DEC and partners have initiated or completed since the inception of the 2012-2016 Action Agenda.

UPDATING THE MOHAWK RIVER BASIN ACTION AGENDA FOR 2018

DEC is currently working to revise the *Mohawk River Basin Action Agenda* for 2018. This revision will once again bring together the wide array of partnering agencies from federal and state government, local governments, not-for-profit organizations, academia and others to set a new vision for the watershed over the next five years (2018-2022). Development of the 2018 Action Agenda will include a series of stakeholder meetings to solicit input on Mohawk River watershed priorities. A draft is expected by January 2018.

FORMING PARTNERSHIPS IN THE MOHAWK

Making connections and forming partnerships is integral to the success and implementation of any program. **The overarching goal of the Mohawk River Basin Program and the Action Agenda is to provide a framework for basin-wide collaboration to foster management of the region's resources for a sustainable future.** Since the inception of the Mohawk River Basin Program and the Action Agenda, several very successful partnerships have been formed through implementation of programs, activities, and outreach, such as:

TREES FOR TRIBS:

Modeled after the successful Hudson River Estuary Program's Trees-for-Tribs program, the Mohawk River Basin Program partners with local communities and volunteers to provide no-cost trees and shrubs to land owners. These plants are then planted along the main-stem river and tributary streams of the Mohawk River watershed to restore riparian corridors and buffers. The program reduces erosion and flooding, protects property, and improves and protects water quality and habitats for fish and wildlife throughout the Mohawk River watershed. **To date, projects have been undertaken in Schoharie, Schenectady, Montgomery, Herkimer and Otsego Counties, resulting in approximately 3,500 trees and shrubs planted by volunteers.**



Community volunteers plant trees and shrubs along the Schoharie Creek during a 2012 Trees-for-Tribs event in the Town of Blenheim, Schoharie County.

A DAY IN THE LIFE OF THE RIVER/A DAY ALONG THE MOHAWK

In October each year, the Hudson River Estuary Program organizes the annual "A Day in the Life of the Hudson River" event, where students collect scientific information from dozens of locations along the river so they can better understand how their piece of the river fits into the larger Hudson River



Students pose by data collected during the 2013 "A Day in the Life of the River" at Peebles Island State Park.

ecosystem. At each location, students investigate aquatic life, water quality, weather, and collect core samples of the river's bottom mud for observation and analysis. Beginning in 2012, the Mohawk River Basin Program participated in this annual event, hosting school groups at Peebles Island State Park in Waterford, New York, at the confluence of the Mohawk and Hudson rivers. More recently in 2017 the event expanded to Lock 7 in Niskayuna as well. Members of the public participated in fish identification and water quality testing activities at the Lock 7 event which was organized by members of the not-for-profit group The Environmental Clearinghouse.

PARTNERSHIP HIGHLIGHT –

UNION COLLEGE AND THE ANNUAL MOHAWK RIVER WATERSHED SYMPOSIUM



One of the greatest examples of forming lasting, meaningful partnerships in the Mohawk River watershed is that of Union College’s annual Mohawk River Watershed Symposium. In 2009, the Mohawk Watershed Research Group at Union College organized and hosted the first of what would become an annual symposium on the physical aspects of the Mohawk River watershed. The symposium, a scientific program, was intended to highlight recent and on-going work in the watershed. This inaugural event focused on the themes of water quality, floods, habitats, sediment yield, the impacts of watershed processes on infrastructure, water rights, water budget, and synoptic evaluations of the Mohawk River watershed. More than 75 people registered for the event. The keynote speaker was Robert H. Boyle, the founder of Riverkeeper and the Hudson River Foundation for Science and Environmental Research. Mr. Boyle’s address focused on using science and the law to protect the natural resources of the Mohawk River watershed. Of the 26 speakers and posters presented, 21 focused directly on the Mohawk River watershed. It was at this event that the Mohawk River Basin Program was first introduced in a presentation entitled “The NYSDEC Mohawk River Basin Program: An Ecosystem-based Approach to Managing the Mohawk River and Its Watershed,” given by co-authors Anne Reynolds, Paul Bray and Alexander Smith.

Building on the success of the 2009 symposium, Union College again organized and hosted a second Mohawk watershed symposium in 2010, ensuring that the exchange of information, ideas and technology between various stakeholders would continue. Every year since 2009, the event has continued to grow significantly. Over the years, there has been a wide array of topics covered, with presentations including information on fishery management, flood mitigation projects, water quality monitoring and many others. Keynote speakers from various backgrounds have addressed the attendees, providing lessons learned and important advice for workers focused on improving the natural resources of the Mohawk River watershed. For example, Assemblyman Peter Lopez, 127th New York Assembly District representing Schoharie and other towns and villages in the upper part of the Schoharie watershed, addressed the conference on the subject of reducing flood risks and creating resiliency within communities of the Mohawk following the 2011 flood events. Senior Advisor to the Secretary of the Interior, Rebecca Wodder, addressed the symposium in 2013. Ms. Wodder works on conservation issues associated with America’s Great Outdoors Initiative. As past president of American Rivers, she led efforts to assist communities with restoring the health of rivers through a variety of conservation measures, including creation of river trails, removal of dams and practices to safeguard clean water.

Highlights of the 2015 Mohawk Watershed Symposium, with nearly 200 attendees, were John Lipscomb's keynote address and Christopher Swain's presentation.

Keynote speaker John Lipscomb is a patrol boat captain for Riverkeeper. In 2014, Riverkeeper did the first exploratory patrols in the Mohawk to gauge the interest of local advocates and explore partnerships for the future. His address provided insight into Riverkeeper's success in the Hudson River and revealed the organization's intention to work in the Mohawk.

Presenter Christopher Swain, a resident of Boston, MA, swam the entire length of the Mohawk from October to December in 2014, photo documenting and recording his observations and experiences along the way. As shown by the increased attendance and interest in the annual Mohawk River Watershed Symposium, there is growing appreciation and stakeholder involvement in the watershed when it comes to flood mitigation, improving water quality, recreational opportunities, and community revitalization. Rivers are increasingly becoming more important to society as seen by the resurgence in efforts to preserve and maintain clean and healthy ecosystems and to engage communities to regard the river as a source of recreation, transportation and inspiration. The Mohawk River Basin Program looks to Union College to continue its dedicated annual event to foster partnerships and communication among those focused on improving the natural resources of the watershed.



John Lipscomb, Captain of the Riverkeeper patrol boat, gave the keynote address at the 2015 Union College Mohawk River Watershed Symposium.

PARTNERSHIP HIGHLIGHT –

THE MOHAWK RIVER WATERSHED COALITION OF SOIL AND WATER CONSERVATION DISTRICTS



In January 2011, representatives from the 14 Soil and Water Conservation Districts (SWCD) located within the boundaries of the Mohawk River watershed signed a Memorandum of Agreement forming the Mohawk River Watershed Coalition of SWCDs, since renamed the Mohawk River Watershed Coalition. Funded through a grant from the Department of State's Local Waterfront Revitalization Program, the coalition consists of representatives from the SWCDs in Albany, Delaware, Fulton, Greene, Hamilton, Herkimer, Lewis, Madison, Montgomery, Oneida, Otsego, Saratoga, Schenectady and Schoharie counties. The stated goal of this newly formed coalition was the development of a long-term water quality protection plan for the Mohawk River to maintain and enhance the water quality essential for the economic well-being, environmental and public health, recreational opportunities and quality of life for local governments, residents and visitors to the watershed. In 2015, the coalition finalized the *Mohawk River Watershed Management Plan*, designed to advance the implementation of ecosystem-based management and the *Mohawk River Basin Action Agenda*.

The Mohawk River Basin Program and the Mohawk River Watershed Coalition are two complimentary programs working with the same goal—protection of the Mohawk River watershed, the ecosystem, the communities, and the people, and toward sustainability and flood resiliency. Because of these shared goals, the Mohawk River Basin Program and the Mohawk River Watershed Coalition work together to foster coordination and integration of efforts and to promote collaboration and cooperation across the watershed. This partnership results in more efficient management of natural resources through communication, sharing of expertise and assistance.

Presently the Mohawk River Watershed Coalition is working on implementing its comprehensive watershed management plan. **Funding for implementation of the plan was provided through New York State Department of State Local Waterfront Revitalization Program grants.** The implementation projects being funded through these grants address watershed issues such as flood mitigation, stormwater management, invasive species, and erosion control, all of which directly relate to achieving the goals of the *Mohawk River Basin Action Agenda*. Other, more agricultural-related projects that address non-point source pollution are being funded separately through the NYS Department of Agriculture and Markets.

Some, but not all, of the significant projects being funded and implemented through the Mohawk River Watershed Coalition's program include:

Flood Mitigation Studies for the Schoharie Watershed

The flood studies will be conducted by the engineering firm Milone and MacBroom, Inc., and include the Schoharie Creek watershed in Greene, Schoharie, Albany, Montgomery, and Schenectady counties. Total cost: \$444,000

Stormwater Management for the Oriskany Creek Watershed and Sites in Fulton County

The project includes stream restoration for Oriskany Creek and its tributaries in Oneida County and culvert replacement in the City of Johnstown in Fulton County. Total cost: \$368,250

Invasive Species Control – Hamilton, Saratoga, Albany, and Fulton Counties

For the counties involved, the focus is on terrestrial invasive species and includes public education, site assessments and mapping, implementation of elimination/reduction/prevention strategies, and long-term maintenance of problem sites. Total Cost: \$105,000

Boat Wash Stations in Fulton County

Boat wash decontamination stations will be installed at boat launches on Caroga Lake, Canada Lake, and Peck Lake to prevent the introduction of aquatic invasive species. Total Cost: \$320,640

Restoration of Oriskany Creek Headwaters Sub-Watershed

The project is in Madison County and includes stream restoration, riparian buffers, and replacement of culverts in the Village of Madison. Total Cost: \$330,000

Vegetating Roadside Ditches via Hydro-seeding

This project will reduce sediment runoff to streams and lakes in Schoharie, Hamilton, Albany, and Schenectady counties. Total Cost: \$66,320

WORKING TOWARD FLOOD RESILIENCY AND PROTECTING COMMUNITIES

Historically, the Mohawk River watershed has sustained devastating flooding causing extensive damage throughout the entire watershed. While floods have occurred dating back to the 1800s, more recent events such as Hurricane Irene, Tropical Storm Lee or the microburst flood event of 2013 seem to indicate that this area of New York State continues to be susceptible to extreme weather events and subsequent flooding.

Reducing flood risks for Mohawk River valley communities and enhancing their resiliency is a critical step in the ecosystem-based strategy of managing natural resources in the Mohawk River watershed. For years following flood events in the watershed, significant resources have been spent rebuilding and restoring natural floodplains and riverfront communities and their infrastructure. During these periods, other natural resource management objectives were overshadowed—rightfully so—by the importance of quickly resolving these flood-related issues. Therefore, to protect our communities from future floods and ensure continued protection of natural resources, we must focus substantial effort on creating flood-resilient communities now.

In the watershed, creating flood-resilient communities and reducing risks to flooding means a multi-tiered approach. This includes: 1) freeing the natural floodplain from constrictions that hinder the movement of flood waters; 2) restoring natural river channel structure, which reduces the severity of floods; 3) moving critical structures/infrastructure out of floodplains; and 4) providing earlier warning for communities so they can take action in the event a flood occurs. The *Mohawk River Basin Action Agenda* laid out several distinct targets along the lines of this approach. These targets included continued development of updated flood inundation maps for the region, developing a flood alert system across the watershed, addressing ice-jam hazards, and many others. **This approach has meant the partners working in the Mohawk River basin have invested approximately \$20.8 million in efforts thus far to reduce flood risks and enhance flood resiliency.** Highlights of some of the projects related to this investment follow below.

PROGRESS ON FLOOD HAZARD REDUCTION AND ENHANCED RESILIENCY TARGETS

REDUCING FLOOD RISKS AND MITIGATING FLOOD DAMAGE FOR RESILIENCY

In response to Hurricane Irene and Tropical Storm Lee, Empire State Development and DEC established a Hurricane Irene/Tropical Storm Lee Flood Mitigation Grant Program to fund projects to help municipalities recover from these two flood events. The grant program provided \$16 million to assist affected communities. The purpose of the grant program was to fund flood mitigation or flood control projects in creeks, streams and brooks within declared counties. **A total of \$7,705,788 in funding was provided to support 44 flood recovery projects within Albany, Schoharie, Schenectady, Montgomery, Herkimer, and Oneida Counties.** These projects included streambank stabilization, installation of natural stream design structures, floodplain restoration, berm removal, culvert upgrades, bridge repairs, debris and gravel removal, and riparian buffer plantings.

Immediately following the June/July 2013 flood, Governor Cuomo identified 13 high flood-risk streams within Oneida, Herkimer and Montgomery counties. Working with the New York State Department of Transportation, DEC hired a nationally recognized environmental consulting firm, Milone and MacBroom, to conduct comprehensive watershed assessments in these 13 high flood-risk streams to determine the causes of flooding, and provide practical project recommendations to mitigate flooding in surrounding communities. The assessment reports can be downloaded here:

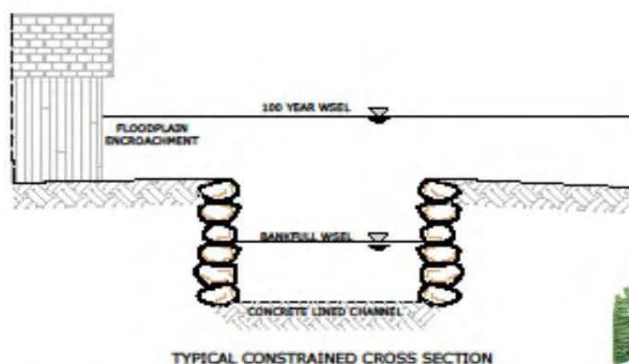
<https://wri.cals.cornell.edu/mohawk-river-basin/flood-resiliency/subwatershed-basin-assessments>

The 13 high flood-risk streams included the following:

1. Fulmer Creek, Herkimer County, Town of German Flatts
2. Steele Creek, Herkimer County, Town of Litchfield, Village of Ilion
3. Moyer Creek, Herkimer County, Town and Village of Frankfort
4. Bellinger Brook, Herkimer County, Town and Village of Herkimer
5. Big Creek (tributary to Oriskany Creek), Oneida County, Town of Marshall
6. West Canada Creek, Herkimer County, Towns of Russia, Newport, and Herkimer
7. East Canada Creek, Herkimer County, Town of Manheim
8. Nowadaga Creek, Herkimer County, Town of Danube
9. Maltanner Creek, Herkimer County, Village of Middleville and Town of Fairfield
10. Sauquoit Creek, Oneida County, Towns of Whitestown, New Hartford, Paris, and Kirkland, and Villages of New York Mills, Whitesboro, and Yorkville
11. Mud Creek, Oneida County, Village of New York Mills
12. Oriskany Creek, Oneida County, Town and Village of Kirkland, and Towns of Marshall, Augusta, Whitestown, and New Hartford
13. Otsquago Creek, Montgomery/Herkimer Counties, Village of Fort Plain, and Towns of Minden and Stark

These studies included state-of-the-art hydraulic modeling and a fluvial geomorphic assessment of the streams to determine the most effective flood mitigation solutions. Many of the recommended projects involve creating what is known as a “compound stream channel,” which is proven to mitigate flooding by reconnecting the river to its floodplain (see figure).

All 13 watershed studies have been completed, and a number of communities have sought and received funding to implement projects specifically identified in these studies. For example, the Town of German Flatts and the Village of Mohawk received grants to undertake flood mitigation projects along Fulmer Creek. Funding was secured through the Office of Parks, Recreation and Historical Preservation, the Environmental Facilities Corporation (EFC) and DOS to complete an engineering design of an extensive floodplain restoration project from West Main Street to Route 28, to complete an engineering design to stabilize a massive landslide, and to undertake a floodplain restoration project that will then be turned into a town park. In addition, during Governor Cuomo’s 2015 “Capital for a Day” event in Utica, **DEC announced providing an additional \$1.4 million to implement flood mitigation projects identified in these 13 watershed studies within Oneida, Herkimer and Montgomery Counties.**



TYPICAL CONSTRAINED CROSS SECTION

BENEFITS

✓ Mitigate flooding

✓ Reconnect floodplain



TYPICAL COMPOUND CHANNEL

A cross-sectional diagram shows the differences between a typical constrained, human-altered stream channel and the more effective compound channel (figure courtesy of Milone and MacBroom, Inc., 2014). Construction of compound channels provides a connection between the river and its floodplain, creating storage for base-flow, spring high flow, and flood flow conditions, and minimizing impacts to infrastructure. Construction of compound channels and reconnecting floodplains is a common recommendation in the 13 watershed assessments conducted by Milone and MacBroom on behalf of DEC.

In addition to these new projects to transform the resiliency of communities in the Mohawk River watershed, other projects exist which—through partnerships with local municipalities and the U.S. Army Corps of Engineers—will reduce flood risk and enhance resiliency. For example, in many areas of the Mohawk River basin where flooding has been a frequent occurrence for many years, flood control structures already exist. Updating these structures to meet current projections for flood recurrence and volume is important to protect surrounding communities.

In areas such as Amsterdam, Herkimer, and Holland Patent, flood control structures are already in place and protect local communities. However, in these locations, many of the structures needed repairing or upgrading. **Through funding from Governor Cuomo's New York Works Program, DEC accomplished some of these types of projects, spending approximately \$1.1 million on improvements.** In Amsterdam, flood walls along South Chuctanunda Creek and the Mohawk River were improved. These walls were originally constructed in 1965 to protect the City of Amsterdam against floods of 122,500 cubic feet per second (CFS) on the Mohawk River, with a coincidental discharge of 3,400 cfs on South Chuctanunda Creek. Floodwalls and riverbanks were repaired at a cost of \$164,248, and a pump station was proposed for upgrade at a cost of \$777,600.

In the Village of Herkimer, improvements were made to the flood levee along Bellinger Brook and the Mohawk River. Originally constructed in 1964, the levee protects low areas of the Village of Herkimer against a flood of 33,800 cfs on the Mohawk River. To maintain proper functioning of the levee, a conduit inspection, boundary survey, and pump station replacement were paid for through this program, totaling approximately \$155,000. In Holland Patent, a similar project on a flood levee along

Thompson and Willow creeks was improved. Here the original levee was constructed in 1974 to protect the Village of Holland Patent against 100-year storms. This project included repairing culverts, among other restoration activities, at a cost of approximately \$60,400.

Following major flood events, communities are often alarmed about the possible recurrence of flooding in their areas. Scientists and engineers use the most current information they have to make projections about future vulnerability of communities to flooding. Much of this information is obtained through flood insurance rate studies and mapping.



Above are an improved culvert and sidewalk crossing at a flood-control levee originally constructed in 1974. Many existing flood-control structures in the Mohawk River basin need upgrading and modernization to continue to effectively protect communities. Approximately \$1.1 million in NY Works funding has or will be invested in these types of projects in the watershed.

DEC and its partners at the Federal Emergency Management Agency (FEMA) began updating flood insurance rate maps through studies conducted or currently in progress within Albany, Oneida, Montgomery, Herkimer, and Schenectady counties following the 2006 Mohawk River flood event. Subsequent partial updates in the Cobleskill area of Schoharie County were also made. Unfortunately, these studies and the mapping that follows them can be very costly. **In the Mohawk River basin, approximately \$9 million in federal emergency funds have been spent to complete flood insurance rate studies and mapping.**

In continued collaboration with FEMA, DEC was granted \$100,000 to conduct a Mohawk River floodplain coordination and outreach project from Utica to Schenectady. The resulting report found 390 critical non-residential facilities along the river in the floodplain at risk of flooding, equal to approximately \$309 million in potential flood losses. The project also provided detailed maps and summaries of potential losses that communities can use for mitigation planning. Copies of maps and the report can be obtained by contacting DEC's Bureau of Floodplain Management.

PARTNERSHIP HIGHLIGHT –

**NEW YORK STATE DEPARTMENT OF STATE: STORM RECOVERY
AND RESILIENCE**



In the summer of 2011 Hurricane Irene and Tropical Storm Lee hit New York State, causing catastrophic flooding. In the wake of disaster, many of the affected communities received federal and state assistance, and many hours of volunteer services to help meet basic shelter, humanitarian and cleanup needs. As communities moved beyond the immediate recovery phase, long-term community recovery planning was needed to establish a blueprint for how the communities would rebuild and reduce their vulnerability to future weather-related disasters.

The Department of State's Long-Term Community Recovery Program provided financial assistance, up to \$50,000 per grant, on a competitive basis. The Long-Term Community Recovery grant program supported local efforts to develop community strategies for long-term recovery of the areas with the most flood damage and least capacity to recover on their own. The grants assisted the most severely flood impacted communities by organizing the support and capacity they needed in completing locally driven recovery strategies that would address the specific needs of the affected community relative to one or more of the following sectors: housing, economy, infrastructure and environment. Community recovery strategies included a vision of each community's future; identification and description of projects needed to achieve the vision and reduce future hazard damages; prioritization of projects that would have the most significant recovery value and could be accomplished quickly; and implementation strategies for priority projects. Grant funding was made available to six Mohawk River Watershed communities: the Towns of Windham, Lexington, Prattsville, Blenheim, Rotterdam, and the Village of Schoharie.

In October of the following year, 2012, Superstorm Sandy caused major damage in Long Island, New York City, and lower Hudson River communities. Recognizing the need for comprehensive planning, Governor Cuomo established New York Rising Community Reconstruction Program (NYRCR), a monumental effort toward planning for storm recovery and resilience. The NYRCR Program was a bottom-up, planning process designed to empower communities that also suffered significant damage not only from Superstorm Sandy but also from Hurricane Irene and Tropical Storm Lee. The planning effort was led by the Department of State and together with local leaders, community members, and consultant teams, each community's unique needs were incorporated into Community Reconstruction Plans, delivered in March 2014. Each of these plans recommended innovative and transformative projects designed to prepare each community for future extreme weather. The planning process included: Public Engagement; Asset Inventory; Risk Assessment (Hazard, Exposure, Vulnerability); Needs and Opportunities Assessment; Strategies for Investment and Action; and an Implementation Schedule. Following completion of each plan, \$3 million was made available to each community for implementation of identified projects.

In the Mohawk River Watershed, New York Rising Community Reconstruction Plans were prepared for:

- Town of Fulton and Town of Blenheim;
- Towns and Villages of Esperance, Schoharie, and Middleburgh;

- City of Amsterdam, Town of Amsterdam, and Town of Florida;
- City of Schenectady and Town of Rotterdam;
- Village of Waterford

These plans are available at: <https://stormrecovery.ny.gov/community-regions/capital-region-north-country-and-mohawk-valley>

As part of New York Rising, State funds were also provided to three counties in the Mohawk River Watershed to develop Countywide Resiliency Plans in Herkimer, Oneida and Montgomery counties after the storms and flooding in 2013. In each instance, a countywide NYRCR Planning Committee was formed in consultation with local leaders that included members representing county planning, economic development, human service organizations, soil and water services, emergency services, highway services, local governments, educational institutions, business and other organizations. The approach in these three counties was two-pronged, focusing first on identification of remaining recovery needs, and then on developing countywide long-term resilience strategies and actions. Planning Committee meetings were held, during which members worked with the State's NYRCR Program team to identify storm damage, recognize recovery efforts in the immediate aftermath of the storms, and develop a list of projects still needed to recover from the storms. These reports, published in early April 2014, include descriptions of recovery projects and their estimated costs and project benefits.

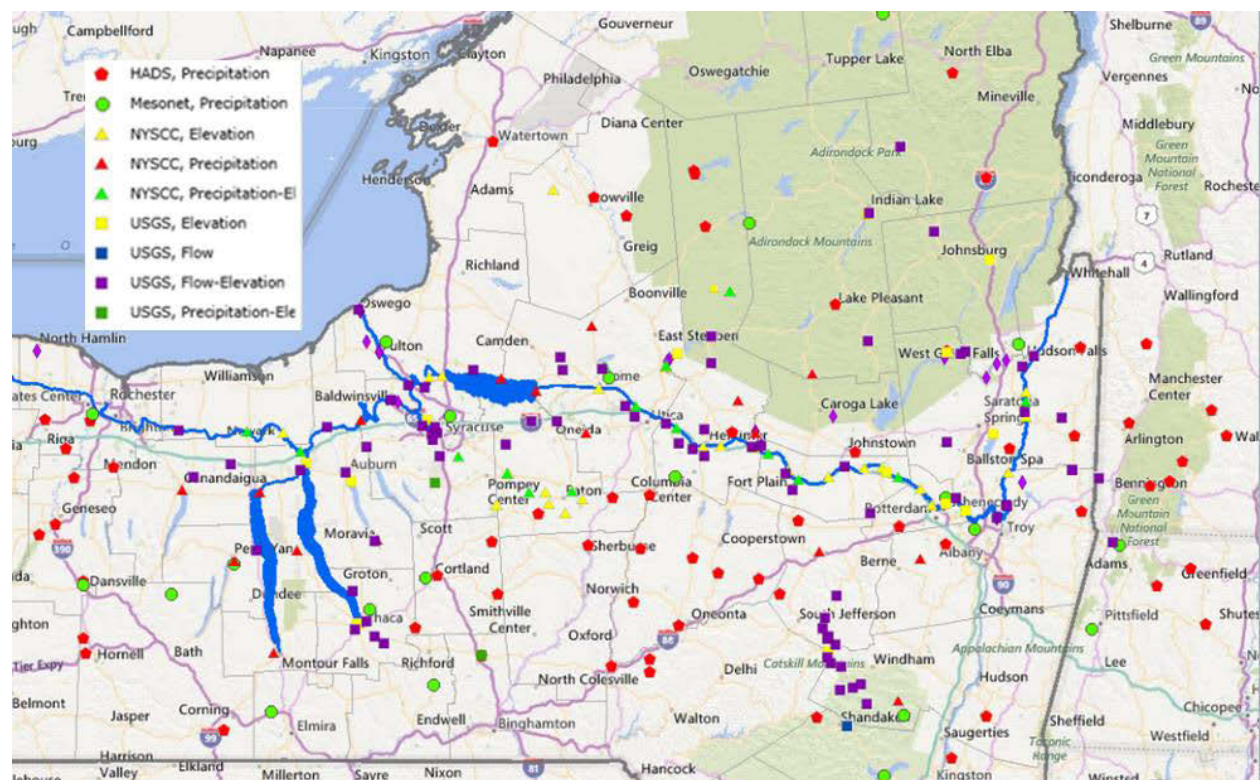
PARTNERSHIP HIGHLIGHT –

NEW YORK STATE CANAL CORPORATION AND THE MOHAWK RIVER BASIN FLOOD ALERT SYSTEM



Following the flooding in the Mohawk River watershed that occurred in 2006 and 2011, the New York State Canal Corporation began drafting plans for improving flood forecasting and flood warning capabilities in the watershed. **With \$8.5 million in funding from two different FEMA grants, the Canal Corporation began implementing upgrades to the watershed's current capabilities.** Previous flood warning systems for the watershed forecasted water levels at defined points along the waterway at six-hour time intervals. These were translated into inundation forecasts by applying them to static maps of inundation at selected water levels. The maps were available for a limited number of levels only, and the approach did not take into account the dynamic nature of a flood event, which can vary considerably from the single representation of a static map. Instead, real-time inundation forecasting provides highly valuable warnings to enable the protection of lives, property and critical infrastructure.

The NYS Canal Corporation in cooperation with the NYS Division of Homeland Security and appropriate federal partners, including USGS and FEMA, established a real-time flood inundation alert system. This system includes an enhanced network of real-time stream gauges in the watershed, additional



This map of the area of the Mohawk River watershed shows new and existing stream gauges as a result of the Canal Corporation's efforts in establishing a flood alert system for the watershed. New gauges in the watershed include 11 USGS stream gauges, 30 stage gauges, and 16 precipitation gauges.

precipitation gauges at higher elevations, and new hydrologic and hydraulic models to forecast runoff, water levels, and flows at hourly time intervals.

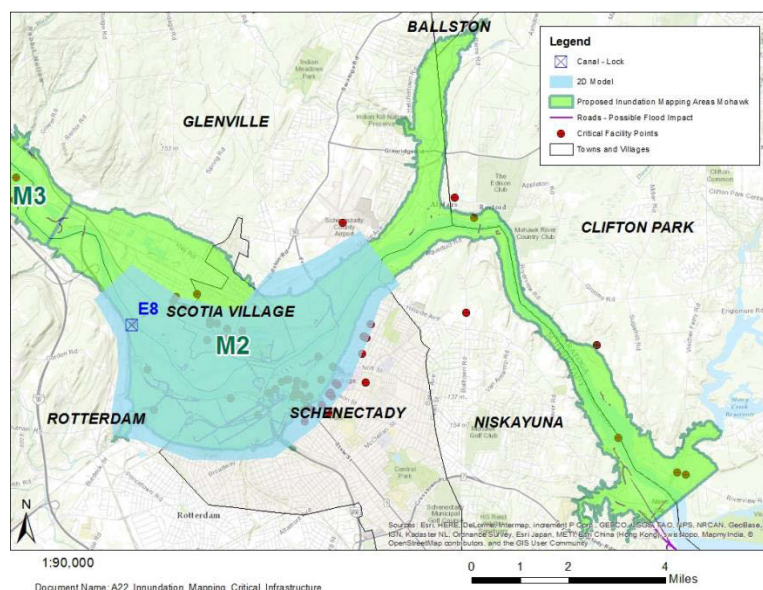
Many key real-time stream gauges existed in the watershed already, but many more were needed in the Mohawk River and in key reaches. As part of the flood alert system, Canal Corporation expanded the number of real-time stream gauges throughout the watershed. **Enhancement of the basin-wide real-time stream gauge network provides considerable benefits to emergency managers, communities, and the public. Stream gauges can serve multiple functions and are an indispensable part of flood mapping, infrastructure design, navigation operations, and drought analysis.** Higher elevations in the Mohawk watershed have a limited number of precipitation gauges. Additional gauges are essential to address the limitations of observing precipitation with radar. The recent installation of additional precipitation gauges was essential to address the limitations of radar-based precipitation estimates and improve flood forecasts within the watershed. The NYS Canal Corporation is also working with the NYS Mesonet to incorporate their new gauge data into the flood warning system.

Flood inundation mapping will provide emergency managers and the public with forecasts of where and when flooding will occur in key geographical areas in the Mohawk watershed. Real-time inundation mapping is highly data and computationally intensive, so it can only be performed for selected areas within the watershed. Areas selected are those with high population density and critical infrastructure in danger of flooding during record-level events.

The real-time flood forecast inundation maps are provided to the Office of Emergency Management. Combining these with current data on critical infrastructure will make it possible to identify the times of forecasted flood depths and velocities at these infrastructure locations. The gauges included in the flood warning system were all installed during 2014 and 2015.

NEW YORK STATE CANAL CORPORATION IMPROVES STORM RESILIENCY ON THE ERIE CANAL

Following the historic flooding along the Erie Canal resulting from Hurricane Irene and Tropical Storm Lee in 2011, the New York State Canal Corporation, under the direction of Governor Cuomo, began strengthening and upgrading the eight movable dams that canalize the Mohawk River between Scotia, Schenectady County, and Fort Plain, Montgomery County.



This map of the Schenectady area shows an example of locations defined for real-time flood inundation mapping and selected critical infrastructure. Many areas throughout the Mohawk River have been selected for real-time flood inundation mapping.

Using \$28 million in funding from FEMA, the Canal Corporation began modifying the movable dams with new steel and other components which allow them to be safely raised out of the water in anticipation of a major flood event. This will lower 100-year peak water levels and help prevent backup of debris at the dams. Previously, the dams could not be removed during the navigation season without damaging their components. These upgrades, coupled with new operating procedures, enable the Canal Corporation to use these structures to help mitigate the effects of future flooding. In fact, the new procedures and infrastructure have worked as designed in the face of extreme weather over the last few years.



The movable dam at Lock E-13 in Randall, Montgomery County

PARTNERSHIP HIGHLIGHT –

THE UNITED STATES GEOLOGICAL SURVEY AND MOHAWK RIVER ICE JAMS



Ice-jam floods threaten lives and property in low-lying areas along the Mohawk River, particularly in the vicinity of the Stockade District in Schenectady, NY. Backwater from an ice jam can cause flooding upstream of the jam, and the abrupt release of backwater from a jam breakup can pose a threat to lives and property downstream. Emergency managers typically monitor ice jams and associated water levels through on-site observations. These are inefficient and do not describe the spatial or temporal extent of ice-jam conditions, which can be spread over several river miles.

During the winter of 2012-13, the U.S. Geological Survey, New York Water Science Center in cooperation with DEC, the New York State Power Authority, Brookfield Renewable Power, and Union College, launched a monitoring system tool to help emergency managers assess river conditions and the potential for ice-jam flooding near Schenectady. The tool is available to the public as a web-based product at:

<http://ny.water.usgs.gov/flood/MohawkIce/>

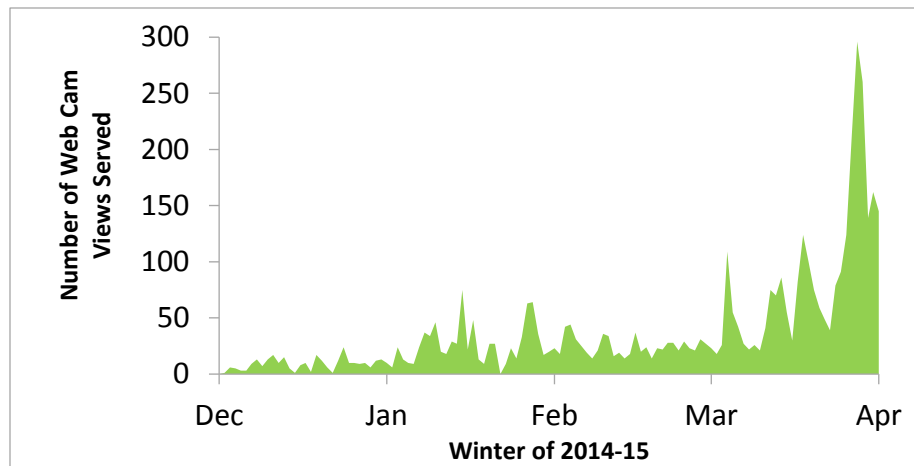
The monitoring system uses four USGS stream gages along the Mohawk River between Lock 8 and the Vischer's Ferry dam, 11 miles downstream. Data from these stream gages are used as input for simple models that estimate the amount of ice-related backwater between each stream gage. Graphs depicting changing backwater conditions are updated every 20 minutes on the project webpage.

A webcam between Lock 8 and Freeman's Bridge provides an alternative to previous on-site observations by emergency managers and police and assists in the interpretation of backwater



Images captured just 20 minutes apart by the project webcam show how quickly river conditions can change in response to ice jams. The camera is web accessible to the public and emergency managers during winter months to assess river conditions and related threats to public safety.

graphs. The ice-jam monitoring system webpage includes near real-time plots of computed backwater for each of the three reaches between the stream gauges, along with plots of river stage for all four gages, a site map, and webcam display. USGS Water Alert subscriptions are available for all the parameters displayed on the webpage, enabling individuals to receive text or e-mail messages when the river stage and/or backwater exceed(s) a critical, user-defined threshold.



The graph on the left shows the daily total webcam views for the winter of 2014-15. The pattern seen generally reflects the increased likelihood of ice-jam flooding during the season, with more views provided as ice breakup approached in late March.

ADDITIONAL PROJECTS WORKING TOWARD FLOOD RESILIENCY AND PROTECTING COMMUNITIES

Floodplain Management Workshops

DEC sponsored full-day floodplain management workshops aimed at assisting municipalities in properly maintaining their floodplain corridors. Workshops were conducted in six counties within the Mohawk River watershed at an approximate cost of \$74,000.

Prattsville Flood Inundation Mapping

The USGS in cooperation with Schoharie County completed flood inundation maps for the Schoharie Creek. The inundation maps can be used for emergency planning, response, and recovery by residents, local officials, and emergency responders. DEC's Mohawk River Basin Program provided \$47,000 in funding, and the USGS provided \$9,000.

Post-flood Emergency Stream Training

The Mohawk River Watershed Coalition of SWCDs conducted ten post-flood emergency stream intervention training sessions throughout the Mohawk River watershed. These trainings provide technical, educational, and organizational support to municipalities and others. The approach uses tools developed to conduct post-flood responses in an environmentally sensitive manner. DEC's Mohawk River Basin Program provided \$72,300 in funding.

A New Tool for Estimating Daily Mean Streamflow Statistics at Rural Streams in New York State, Excluding Long Island

Streamflow statistics are essential for many applications such as bridge design, the equitable allocation of water among competing needs (human and ecological), and understanding the effects of land use, water use and climate change on water resources. Long-term (greater than ten years) streamflow records provide water resource managers, policymakers, scientists, and engineers with the data necessary to calculate reliable streamflow statistics—for example, the probability of occurrence for a given streamflow. The USGS, in cooperation with The Nature Conservancy (TNC) and the New York State Energy Research and Development Authority (NYSERDA), has developed the New York Streamflow Estimation tool (NYSET). This program will enable users to estimate daily-mean streamflow (statistics) at ungauged locations and evaluate hydrologic impacts of withdrawals for various water uses:

<http://ny.water.usgs.gov/projects/nyset/>

USGS and NRCS-Supported LiDAR Acquisition

In the aftermath of Hurricane Sandy, LiDAR acquisition of Schoharie County in support of modeling, water quality studies, and flood risk reduction was funded by the Science Application for Risk Reduction Project under the USGS Land Change Science Program. To have complete LiDAR coverage for the Schoharie Creek watershed, the Natural Resource Conservation Service funded an additional acquisition to capture the northern extent of Schoharie Creek that flows through Montgomery County. LiDAR was collected in fall 2013 and spring 2014, and final delivery of the 1,041 square-mile project area occurred in August 2015.

Schoharie County Soil and Water Conservation District Flood Warning System Enhancement Project

The goal of the Flood Warning System Enhancement Project is to reduce the risk and consequences associated with flooding within flood-prone communities of the Schoharie Creek basin through improving the measurements and methods needed for advanced predictions of flood stage. This enhanced system consists of a series of networked stream and precipitation gauges which will improve flood forecast capabilities and augment information from the National Weather Service and provide a mechanism for disseminating information to both emergency managers and the general public through various media in real time.



Installation on the SR-30 Bridge in Middleburgh

CREATING A DRINKABLE, SWIMMABLE MOHAWK RIVER

Vitally important to maintaining and creating vibrant communities and recreational opportunities in the Mohawk River watershed is the protection and improvement of water quality. This means creating the changes in water quality that protect people from health hazards, conserve drinking water supplies, and enhance the sustainability of fish and wildlife populations.

As with any of the region's larger rivers, there are many potential sources of water pollution in the watershed. These sources include aging sewage treatment infrastructure, landscape alteration such as agricultural practices and suburban development, and legacy contamination from historical industrial practices. These have caused elevated bacteria levels harmful to human health, increased nutrients (nitrogen and phosphorus) that reduce oxygen important for fish, algal blooms which diminish recreational opportunities, polluted drinking water supplies, and sediment that reduces water clarity, disrupts water supply intakes, and causes problems for canal navigation.

The *Mohawk River Basin Action Agenda* outlines several targets to protect and improve water quality conditions. Initially, most of them focused on determining the specific locations and quantities of pollutants in the river so that eventual management solutions effectively target problem areas. In addition, other targets addressed actual improvements to water quality conditions to reduce human health risks from sewage effluent and stormwater runoff. **This approach has meant that the partners working in the Mohawk River basin have invested approximately \$7.9 million to expand existing water quality monitoring programs, create new monitoring programs, upgrade wastewater infrastructure, and reduce stormwater runoff.**

PROGRESS ON WATER QUALITY TARGETS

EXPANDING WATER QUALITY MONITORING PROGRAMS, INTEGRATING NON-GOVERNMENT DATA SOURCES, AND DEVELOPING LONG-TERM/REAL-TIME MONITORING NETWORKS

DEC has long maintained one of the nation's most successful surface water quality monitoring programs. Cycling throughout NY, major river watersheds such as the Mohawk are the focus of this program every five years. Information collected is used to identify sources of impairment to drinking water supplies, recreation, and the existence of wildlife. During the most recent cycle of the 2015 monitoring program, DEC expanded its network of sampling in the Mohawk River watershed, exceeding targets outlined in the Action Agenda which called for expansion of this program by 20%. **In 2015, DEC targeted 125 stream and river and 12 lake sampling locations in the Mohawk Basin, compared with only 60 targeted sites during the previous cycle in 2010.** This more than doubled the coverage of DEC's core water quality monitoring program and



DEC Research Scientist Dr. A.J. Smith prepares to collect a water sample from Cayadutta Creek in Fulton County. In 2015, DEC expanded its surface water quality monitoring program in the Mohawk River basin.

represents the investment of approximately \$340,000. Visit <http://www.dec.ny.gov/chemical/8459.html> for more information on this and other water quality monitoring programs at DEC.

In addition to advancing the base water quality monitoring programs of the DEC, the Mohawk River Basin Program with entered a partnership monitoring program with the United States Geological Survey's, New York Water Science Center to enhance water quality monitoring in the Mohawk River watershed. The Mohawk River Basin Program allocated \$300,000.00 from it's SFY16-17 State Environmental Protection Fund appropriation for this work. This enhanced water quality survey began in the spring of 2016 and focused on 30 priority stream and river locations throughout the watershed. These locations targeted waste water treatment facilities, areas of known sewer overflows, and drinking water supply intakes. Water quality sampling included water chemistry, sediment toxicity, bacteriological parameters, and benthic macroinvertebrates. A detailed summary of this project can be found by visiting: <https://www.sciencebase.gov/catalog/item/569900f5e4b0fbd3f7fa4c93?community=USGS+New+York+Water+Science+Center>

Data from this project will be used beginning in 2017 to update the DEC Division of Water's Waterbody Inventory/Priority Waterbody List for the Mohawk River (<http://www.dec.ny.gov/chemical/36739.html>). More importantly however, the data will be used to calibrate a water quality model the DEC is developing in collaboration with the USGS. This model will be used to establish pollutant limitations for the Mohawk River that improve and protect water quality throughout the watershed. This will be accomplished through the DEC Division of Water's Total Maximum Daily Load (TMDL) process. The Mohawk River Basin Program has allocated an additional \$330,000.00 from it's SFY17-18 State Environmental Protection Fund appropriation for this work. The modeling portion of this TMDL has already begun and is scheduled for completion in 2019.

In addition to monitoring water quality on many of the Mohawk River's tributaries, DEC and partners have expanded remotely linked water quality monitoring stations into the main stem Mohawk River. The Hudson River Environmental Conditions Observing System (HRECOS) is a real-time water quality monitoring network operated by a consortium of partners from government, research, and non-profit organizations. Consortium partners include the Cary Institute of Ecosystem Studies, Stevens Institute of Technology, USGS, Marist College, Columbia University, New York-New Jersey Harbor and Estuary Program, Clearwater, Hudson River Park Trust, Sara Lawrence College, National Estuarine Research Reserve, Hudson River Foundation, and DEC.

Originally focused on characterizing Hudson River conditions, HRECOS in cooperation with DEC expanded its program into the Mohawk River. There are 15 HRECOS stations from the New York-New Jersey Harbor to Utica, NY. Mohawk stations exist at Illion, Lock 8 near Scotia, and Rexford. HRECOS stations provide real-time data on river acidity, dissolved oxygen, specific conductance, turbidity, and temperature. Data are collected using a deployed, unstaffed, water quality probe that collects and transmits them to HRECOS computer servers every 15 minutes. Current river conditions can be accessed along with pre-existing conditions through the HRECOS web-based data portal. By visiting the HRECOS website at www.hrecos.org, the public has immediate access to all current data from the Mohawk and Hudson rivers. DEC and HRECOS partners have invested more than \$95,000 in developing the expansion of HRECOS into the Mohawk River. New stations will be considered, depending on monitoring needs in the future.

While DEC scientists expanded the coverage of their monitoring program, volunteers from throughout the Mohawk River watershed became engaged in collecting and sharing water quality information as well. DEC's Water Assessment by Volunteer Evaluators (WAVE) program is a citizen-based water quality assessment program that enables citizen scientists to collect water quality information from New York streams and rivers. The information citizen scientists collect is then shared with DEC, expanding even more the coverage of water quality information for participating regions. DEC can then act on possible water quality violations identified through this program. **Since 2013 when WAVE began in the Mohawk River Basin, more than 170 volunteers have participated in the program assessing more than 65 stream and river locations, equating to over 500 volunteer hours** in the field. DEC has invested approximately \$30,000 in the Mohawk WAVE program so far, and plans exist for its continuation. Involvement of WAVE participants in monitoring Mohawk River basin water quality means DEC has fully met its Action Agenda target of integrating non-government data sources into its monitoring program. WAVE summary assessment reports and additional information on how to participate in the program can be found by visiting: <http://www.dec.ny.gov/chemical/92229.html>.



Tarrin Kuehner, a WAVE citizen scientist, collects a sample of aquatic life from Washout Creek, Schenectady County. More than 170 WAVE volunteers have sampled Mohawk River streams for water quality since 2013.

PARTNERSHIP HIGHLIGHT –

THE SCHOHARIE RIVER CENTER AND ENVIRONMENTAL STUDY TEAM



Engaging the public and specifically the youth of the Mohawk River watershed in protecting and conserving its natural resources is the focus of the Schoharie River Center (SRC). The SRC is a focal point for grassroots conservation and environmental education efforts, promoting environmental consciousness and understanding about the ecology of the Schoharie Creek and the Mohawk River watershed. The SRC provides a wide variety of year-round youth development, family, and community education activities to forge a connection between the natural



Environmental Study Team (EST) members conduct water chemistry testing on the Schoharie Creek. Data collected through the EST program are integrated with DEC's monitoring activities through the WAVE program.

history and ecology of the watershed and the people who live and work within it. As a not-for-profit, the SRC relies heavily on grants and donations to empower people to become actively engaged in the scientific study, monitoring, protection and improvement of the watershed's natural resources. The SRC maintains a science center and 20-acre nature preserve in Burtonsville, NY, along the banks of the Schoharie Creek. The center serves as a laboratory and field station where the SRC has its many successful community-based environmental programs.

Since early 2000, the SRC has implemented a youth-focused environmental education program called the Environmental Study Team (EST), serving students ages 12-18 years old. The goal of the program is to increase their understanding and knowledge of the emerging environmental issues confronting their communities. It provides them with the skills and critical knowledge needed to make informed decisions and to take action to protect and improve the quality of their local environment. EST activities focus on water quality monitoring of local tributaries to the Mohawk River and of the Mohawk River itself. **Since 2000, the SRC and its EST program have worked with more than 850 youth from the Mohawk River basin.** In 2013, the SRC and the EST program partnered with DEC and its water quality monitoring program to begin integrating DEC's WAVE program (see above) as a core EST activity.

The SRC's work cuts across Mohawk River Basin Action Agenda goals by fulfilling targets laid out under both the water quality goal (integrating non-government data into DEC) and the fish and wildlife goal (creating a network of community-based environmental education programs). The SRC has expanded its EST program into new communities throughout the watershed. EST draws youth from various school districts and neighboring counties. In time, the SRC hopes to continue to expand its EST program, developing successful environmental education curriculum for youth and having a positive influence on natural resource quality in the watershed.

THE SCHOHARIE RIVER CENTER RECEIVES A NYS ENVIRONMENTAL EXCELLENCE AWARD

In 2013, the Schoharie River Center and its work on the Environmental Studies Team program were recognized by New York State with an Environmental Excellence Award. These annual awards are given for outstanding innovative and sustainable projects or programs and unique partnerships that are improving and protecting New York's environmental resources and contributing to a stronger economy.

IMPROVING WASTEWATER INFRASTRUCTURE, CONTROLLING COMBINED SEWER OVERFLOWS, AND REDUCING STORMWATER RUNOFF

DEC has long partnered with NY's Regional Economic Development Council (REDC) initiative to support water quality improvement projects statewide through its Water Quality Improvement Project Program (WQIP). A competitive grant program, WQIP awards significant grants from the state's Environmental Protection Fund to municipalities, SWCDs, and not-for-profit organizations. These awards fund the planning and implementation of projects which reduce polluted runoff, improve water quality, and restore critical aquatic habitats. More information on the WQIP grant program can be found by visiting: <http://www.dec.ny.gov/pubs/4774.html>

In the Mohawk River watershed, WQIP grants have provided the necessary funding to support critical infrastructure upgrades, improve sanitation, and develop new control plans for dealing with wastewater and stormwater. Although many projects are funded through WQIP grants, a few in the watershed are worth highlighting.

In the City of Utica, a WQIP grant was awarded to control water pollution from combined sewer overflows (CSOs) at a cost of \$5 million. When completed this project will separate existing CSOs to reduce polluted discharge to Ballou Creek and the Mohawk River. Along with other CSO abatement projects in the city, this project will assist Utica in complying with its State Pollution Discharge Elimination System (SPDES) Permit to reduce CSOs and develop a long-term water pollution control plan. A similar CSO improvement project was also granted funding through WQIP in the Town of Waterford at a cost of \$935,000. Waterford implemented various activities to reduce CSO discharges to the Mohawk River that are consistent and compatible with the requirements for their approved long-term water pollution control plan. The town implemented activities such as removing roof leaders and sump pump connections, disconnecting catch basins along specific streets from combined sewer systems to reduce stormwater volumes in CSOs, increasing pumping capacity at specific pump stations and constructing new main wastewater lines connecting to their wastewater treatment plant, and retrofitting CSOs to enhance control of solids and improve prevention of backflow from the Mohawk River. Together with previously completed improvements, Waterford will further reduce and/or eliminate CSO discharges, reducing bacteria levels and improving discharge quality to the Mohawk and Hudson rivers.

In addition to CSO abatement projects, several municipalities were awarded funds to enhance the quality of their wastewater effluent, something that directly impacts the Mohawk River's water quality. In the Town of Waterford, \$722,500 was awarded through WQIP for the installation of effluent disinfection at their wastewater treatment plant. Disinfection of wastewater greatly reduces the amount

of pathogens in wastewater discharge which can be harmful to human health. Installing effluent disinfection will improve water quality in the Mohawk River and achieve water quality suitable for swimming. Similarly, the Village of Herkimer was also awarded funding through WQIP to install effluent disinfection at their wastewater treatment plant, reducing pathogen discharges to the Mohawk River. Funding was secured in the amount of \$871,250.

PARTNERSHIP HIGHLIGHT –

ONEIDA COUNTY AND THE NEW YORK STATE ENVIRONMENTAL FACILITIES CORPORATION



Environmental Facilities Corporation

The Oneida County Sewer District (OCSD) owns and operates approximately 45 miles of major interceptor sewers, Sauquoit Creek Pump Station (SCPS), Barnes Avenue Pumping Station, and the Oneida County Water Pollution Control Plant (WPCP). The sewer district also comprises 15 municipalities that own and operate a total of 220 miles of collection sewers within their boundaries. Portions of the collection system within the City of Utica consist of combined sewers that allow stormwater to enter the system during periods of wet weather events. The effluent from all of these sources directly affects Mohawk River water quality. For many years, the collection system has had difficulty managing sanitary sewer overflows (SSO) and combined sewer overflows (CSO). In an effort to eliminate SSOs at the SCPS and improve Mohawk River water quality, Oneida County entered into a Consent Order with DEC in 2012.



Above is the Oneida County Water Pollution Control Plant, located in Utica. The plant has an operating capacity of 48 million gallons per day and discharges to the Mohawk River. Oneida County and the NYS EFC have begun to invest significant resources in system upgrades which will improve Mohawk River water quality in the region. Photo courtesy of <http://www.ocgov.net>

Repairs associated with the OCSD-DEC agreement have been divided into several different projects. The first two phases of these mitigation projects target wastewater collection system repairs. **The work includes approximately 41 miles of sewer rehabilitation, repair of 3,100 lateral sewer connections, and rehabilitation of approximately 160 manholes. OCSD estimates that this work will cost upwards of \$25 million and has secured low-interest funding from EFC.** Included in the costs for these phases are dye testing, flow metering, a treatment plant evaluation and manhole inspections, all aimed at refining future collection system rehabilitation work.

Other aspects of Oneida County's improvement projects include upgrades to the WPCP, in particular to the solids handling system. Upgrades are necessary because the existing WPCP lacks the solids handling capacity for the additional flow volume expected from SSO mitigation projects and collection system upgrades. The scope of this phase of the project includes various upgrades and refurbishing of inefficient and antiquated equipment for enhanced treatment of wastewater. These upgrades will bring the system into compliance with new regulatory requirements. This phase of Oneida County's overall wastewater improvement project is estimated at upwards of \$34 million and is being funded with low-interest financing through EFC.

Another major component to Oneida County's improvement to wastewater treatment is enhancement of their Sauquoit Creek Pumping Station, which currently has the capacity to move 15 million gallons per

day of sewage to the WPCP. Enhancements to the pump station will increase the system's flow capacity and reliability and result in fewer SSO events. The future peak daily flow of the Sauquoit Creek Pump Station will be 35 million gallons per day, and the future WPCP will be 111 million gallons per day. This project is estimated at \$117 million and is being funded with low-interest financing through NYS EFC.

In addition to managing sewer system repairs and upgrades, the County was awarded a \$50,000 Engineering Planning Grant (EPG) from NYS EFC to investigate the feasibility of building a county-owned wastewater treatment system to treat wastewater from a newly proposed semiconductor fabrication facility in the area. This investigation became necessary as capacity at the existing county WPCP is already limited, and the upgrade of the Sauquoit Creek pumping station will increase expected plant flow volume.

These are just a few of OCSD's many mitigation projects. In addition to collection system repairs and WPCP upgrades, the county is developing a wet weather treatment system for the anticipated additional flow volume following the City of Utica's own SSO/CSO repairs and upgrades. **These projects will result in the capture of 85% of untreated effluent currently entering the Mohawk River, greatly improving water quality.** The county is working with EFC on funding for these projects and others; together they are expected to cost an estimated \$360 million. Many of these projects are already underway and/or nearing completion. Following their completion, a greater volume of untreated sewage will be captured, benefitting both local communities and the Mohawk River. This work represents significant progress toward restoring water quality in the Mohawk River watershed.

ADDITIONAL PROJECTS ADVANCING A DRINKABLE, SWIMMABLE, FISHABLE MOHAWK RIVER

Monitoring Sedimentation in the Mohawk River

The United States Geological Survey (USGS) is measuring suspended sediment discharges from various locations along the Mohawk River, including Fonda, Burtonsville, and Cohoes. Data are used to identify sources of sediment that affect recreation, drinking supplies, and navigation throughout the Mohawk and eventually even New York harbor. This project has been ongoing and was funded through DEC's Mohawk River Basin Program in the amount of \$59,400.

Groundwater Quality Monitoring in the Mohawk River Basin

Groundwater quality is of vital importance to communities throughout the Mohawk River watershed because of reliance on aquifers and groundwater wells for drinking water supplies. The USGS in collaboration with DEC monitors groundwater quality on a rotating cycle similar to that of DEC's other monitoring programs. To date, DEC has provided the USGS with approximately \$240,000 for the most recent work in the watershed in both 2006 and 2011. Reports and data are available from the USGS.

City of Schenectady Wastewater Treatment Engineering Study

Through DEC's Wastewater Infrastructure Engineering Planning Grant (EPG) program, administered in cooperation with the EFC, the City of Schenectady will complete an engineering report exploring its wastewater treatment and collection system. Specifically, the study will analyze the system's ability to address sanitary sewer overflows. Through the EPG program, \$50,000 was awarded.

Village of Frankfort Inflow/Infiltration Study

Through the EPG program, DEC in cooperation with EFC funded the Village of Frankfort's completion of a study of inflow/infiltration for its wastewater collection system. Funding in the amount of \$30,000 was committed.

Town of Rotterdam Inflow/Infiltration Study

Through the EPG program, DEC in cooperation with EFC funded the Town of Rotterdam's completion of a study of inflow/infiltration for its wastewater collection system. Funding in the amount of \$30,000 was committed.

Village of Nelliston Inflow/Infiltration Study

Through the EPG program, DEC in cooperation with EFC funded the Village of Nelliston's completion of a study of inflow/infiltration for its wastewater collection system. Funding in the amount of \$30,000 was committed.

Oneida County Nano-center Wastewater Treatment System Study

Through the EPG program, DEC in cooperation with EFC funded Oneida County's completion of an engineering study to further investigate the feasibility of building a county-owned wastewater

treatment system to treat general rinse water from a proposed semiconductor fabrication facility in Marcy, NY. Funding in the amount of \$50,000 was committed.

Town of Glenville Wastewater Engineering Study

Through the EPG program, DEC in cooperation with EFC funded the Town of Glenville's completion of an engineering study to evaluate the possibility of constructing a new wastewater collection system for its developed and unsewered areas. Funding in the amount of \$30,000 was committed.

The Northeast Regional Stream Quality Assessment (NESQA)

A USGS National Water Quality Assessment Program study included numerous streams in the Mohawk River watershed. These streams were sampled June - August 2016 for a large suite of constituents, including nutrients, pesticides, emerging contaminants, and others. A period of weekly water sampling was followed by ecological surveys of fish, macroinvertebrates, and algal communities, bed sediment sampling, and the collection of fish samples for mercury analysis. This study sampled sites throughout the Northeast but is part of a much larger nationwide Regional Stream Quality Assessment program: <http://txpub.usgs.gov/RSQA/>.

NYS Agricultural Non-point Source Abatement and Control Grant Program

Established in 1994 by the State of New York to assist farmers in preventing non-point source water pollution from agricultural activities, funding for this statewide program is provided by the NYS Environmental Protection Fund through a coordinated effort with the Department of Agriculture and Markets and the Soil and Water Conservation Committee to provide technical and financial assistance to farmers for non-point source pollution abatement. Grants cover environmental planning and project implementation activities. Since 2009, 53 planning and implementation projects totaling ~\$16.4 million have been undertaken within the Mohawk River watershed.

Pollution Prevention in the Schoharie Creek Watershed

Through the NYS Soil and Water Conservation Committee, projects throughout the Schoharie Creek watershed that included implementation of conservation buffers on four farms, upgrading of petroleum bulk storage tanks to include secondary containment, and conservation cover cropping and tillage on 850 acres were funded through the Environmental Protection Fund's Ocean and Great Lakes Initiative. Funding in the amount of \$150,000 was awarded.

PROTECTING MOHAWK RIVER FISHERIES FOR THE FUTURE

A central theme of the *Mohawk River Basin Action Agenda* regarding conservation and protection of natural resources is to improve upon the lack of knowledge and understanding regarding dynamics of fish and wildlife populations and their habitats in the Mohawk River watershed. The outdated information available surrounding many important fish and wildlife species in the watershed hinders progress toward conservation and protection of these resources. This is of concern as a major goal of the Action Agenda is to ensure that fish and wildlife populations are sustained so that people can enjoy the unique natural character of the watershed into the future.

The Mohawk River watershed's location in the center of New York State and its history of navigation with the Erie and Barge canals make the Mohawk watershed's connections with surrounding watersheds unique. Through connections with western watersheds of the Great Lakes and the Hudson River in the east, the Mohawk's watershed is a conduit for fish and wildlife migration like no other. These connections also mean the flow of invasive species between regions is accelerated, environmental disturbances originating in the west can affect migratory wildlife in the east, and negative effects of human alteration of river water levels are felt throughout the watershed.

With more than 20 years since the last large-scale Mohawk River watershed evaluation of fisheries, it is imperative that new information be established on current baseline conditions. The same is true for important habitats such as wetlands and grasslands used by migratory fowl. This information will eventually inform better management decisions related to protection of fish and wildlife. The current edition of the *Mohawk River Basin Action Agenda* focuses heavily on targets to conserve and protect Mohawk River fisheries. This includes a commitment to begin implementing DEC's *Lower Mohawk River Fisheries Management Plan*, starting with the call to update a survey of the river's fisheries. The Action Agenda also calls for increasing public awareness and stewardship of fish and wildlife resources.

Focusing on these targets alone means partners working in the Mohawk River basin have invested approximately \$690,000 to update and characterize fishery information, including analyzing Fish tissue contamination, tracking the movement of migratory fish, and educating the public.

PROGRESS ON FISH AND WILDLIFE TARGETS

UPDATING FISHERY INFORMATION AND TRACKING THE MOVEMENT OF SPECIES

The Mohawk River is a significant recreational fishery for the region, boasting smallmouth bass, walleye, rock bass, and perch among others. Unfortunately for many areas of the Mohawk River, the New York State Department of Health (DOH) and DEC have issued advisories limiting the consumption of fish from the river. For example, in the area of Herkimer and Oneida counties, fish consumption is limited to one meal/month, and for some fish, none should be eaten. Understanding and tracking the occurrence of harmful contaminants in fish are important components of safeguarding communities from legacy contamination. Therefore, through approximately \$89,000 in funding from the NYS Environmental Conservation Fund each year, DEC regional fisheries offices statewide collect wild fish for contaminant analysis as part of a

toxic substance monitoring program (TSMP) within DEC's Division of Fish, Wildlife, and Marine Resources. DEC's Analytical Services Unit at the Hale Creek Field Station analyzes these fish samples for mercury (Hg), PCBs, and organochlorine pesticides. Annual surveys can represent multiple trips to a waterbody to collect a target number of each species (usually 10) as directed by DEC protocol. All fish collected are usually adults of desirable or legal harvest size for anglers. Each fish collected is tagged, bagged, and frozen until delivered to Hale Creek. Results are typically available for review the following year and often warrant changes in NYSDOH's fish consumption healthy advisory notices. See:

http://www.health.ny.gov/environmental/outdoors/fish/health_advisories/

DEC's Stamford fisheries unit in Region 4 made two TSMP collections in the lower Mohawk River during the period of 2010-2015. In June 2011, staff collected common carp, walleye, smallmouth bass, and rock bass in the upper reach of the lock E7 pool near the Rte. 5 bridge in Schenectady. Results concluded that all fish tested below the FDA allowance for Hg (1.0 ppm), and only two smallmouth bass and one rock bass had > 0.5 ppm levels of Hg. However, three carp tested above the FDA allowance for PCB (1.0 ppm), and a fourth was very close, with one specimen having PCB levels near 9.0 ppm. All other fish tested had negligible levels of toxins in their flesh. In May 2015, staff collected common carp, walleye, smallmouth bass, yellow perch, and white perch in Niskayuna below the Vischer's Ferry dam adjacent to lock E7; and common carp, walleye, smallmouth bass, and blueback herring in Rotterdam below lock E9. These results will become available for review in 2016.

PARTNERSHIP HIGHLIGHT –

THE UNITED STATES GEOLOGICAL SURVEY AND MOHAWK RIVER FISHERIES

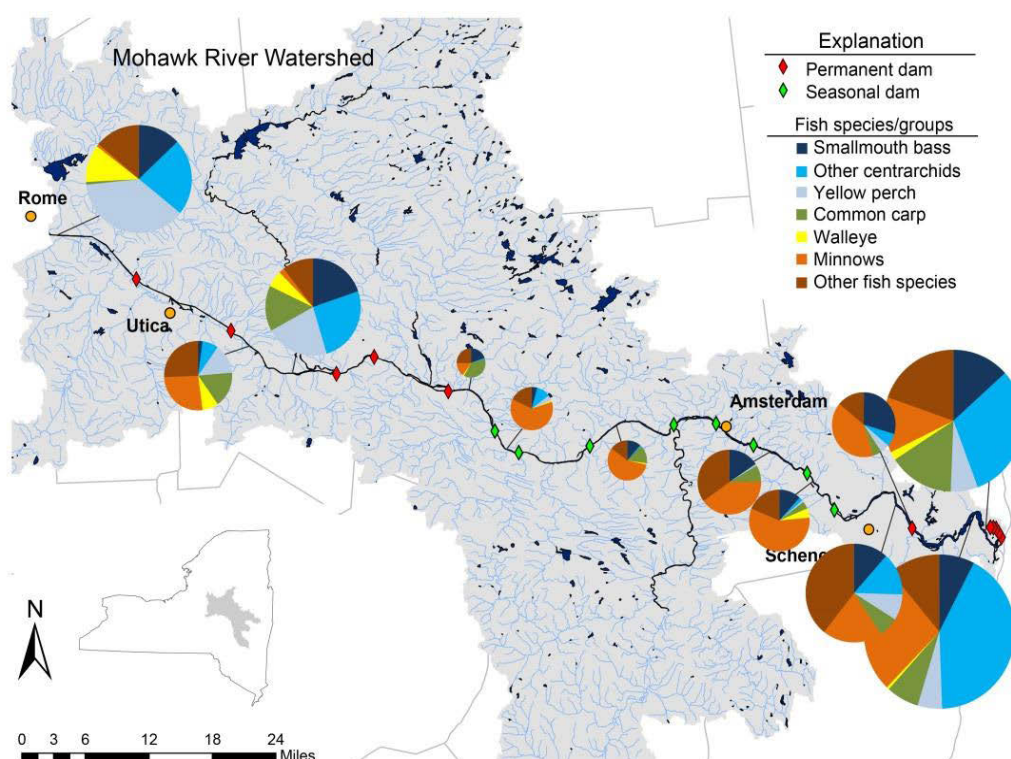


The Mohawk River and eastern Barge Canal boast a diverse fish assemblage and provide important ecological, angling, recreation, and transportation needs for the residents of New York State. Seasonal (winter) drawdowns between locks 8 to 16, and proposed changes in flow management (to address increasing flood threats) may adversely affect the health of native species populations and aid the dispersal of non-native or invasive species. Contemporary fishery data are needed to assess their: (a) present-day condition, (b) susceptibility to changes in flow management, (c) response to non-native invasions, and (d) resilience to change with anticipated shifts in precipitation and thermal regimes. However, data are not available because the river's fish communities have not been surveyed in more than three decades. The USGS and DEC recently partnered to implement a collaborative study of fish assemblages in the Mohawk River and eastern Barge Canal to improve our understanding of their current status, how they vary between river segments with different flow-management strategies, and how they may have changed over the past 30 years. This study's river-wide survey of Mohawk River fisheries directly addresses Goal 1: Fish, Wildlife and Habitats of the *2014 Mohawk River Basin Action Agenda*.

During spring 2014 and 2015, the USGS and DEC surveyed fish assemblages at a total of 24 sites on the Mohawk River/Barge Canal between Cohoes and Rome, NY. At least one site was located between every pair of dams, and approximately 15 days were spent sampling resident fish populations. Fish were collected at each study site using standard boat-electrofishing techniques. In general, 15 to 20-minute shoreline runs were conducted, where fish were temporarily stunned by an electric field, netted, identified to species level, measured, and weighed. To date, a total of 3,927 individuals from 39 species have been collected across the system during both surveys. Although several species were encountered at almost all study sites, analyses indicate that different segments of the river contain rather unique fish communities. Lake-dwelling species like largemouth bass, pumpkinseed, and bluegill were more abundant in the permanently impounded sections in which water levels remain high year-round. In contrast, the river section which is drawn down in the winter months supported a greater proportion of minnows, many of which are native to the Mohawk River Basin.



USGS and DEC staff sample fish communities on the Mohawk River using electrofishing during a 2015 survey. The survey updates information on Mohawk River fisheries over 30 years old.



Proportional pie charts (chart size reflects the overall abundance of fish) show relative abundance for key species/groups at 12 sites sampled during 2014. Although several species were encountered at almost all study sites, analyses indicate that different segments of the river contain rather unique fish assemblages which may be related to water-level management in the canal system.

Analysis of data from the 2015 surveys is ongoing, yet once completed (and published), results from this study will help natural resource managers make informed decisions with goals to optimize use of water resources; maintain transportation and recreational uses; better protect aquatic life, public infrastructure, and private property; sustain native biodiversity; and maintain outstanding angling opportunities in the Mohawk River and eastern Barge Canal.

PARTNERSHIP HIGHLIGHT –

STATE UNIVERSITY OF NEW YORK COLLEGE OF ENVIRONMENTAL SCIENCE AND FORESTRY (SUNY ESF), MOHAWK RIVER BLUEBACK HERRING AND AQUATIC INVERTEBRATE COMMUNITIES



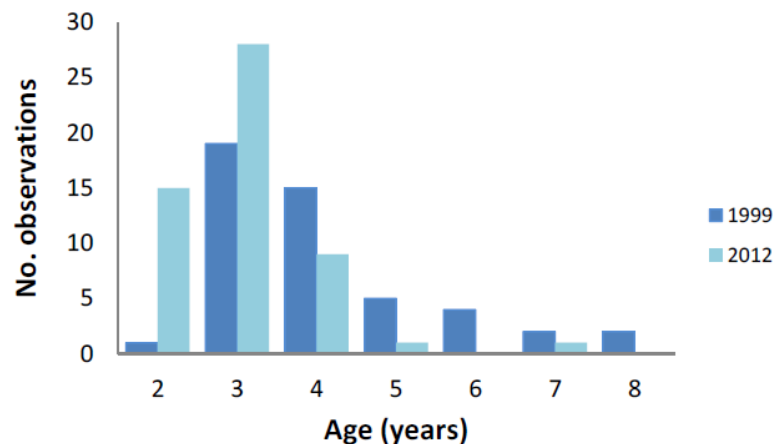
State University of New York
College of Environmental Science and Forestry

Along the North American east coast, anadromous river herring are in severe decline. “River herring” comprises two species of alosine herrings—alewife (*Alosa pseudoharengus*) and blueback herring (*A. aestivalis*). Whereas these species once composed a major portion of the biomass of rivers and estuaries from the Canadian Maritimes down to Florida, they are at or just above historically low numbers. In this depleted state, we can say that their functional role as links between inland and marine ecosystems is minimal, where once it was critically important. Although there is interest in increasing the stocks, listing

river herring as Threatened on the Endangered Species list has not been decided. However, concern about the health of these species and the rivers they depend on remains.

With this backdrop, the blueback herring population that spawns in the Mohawk River is of growing importance from both conservation and fisheries perspectives. Previous unpublished studies demonstrated that blueback herring can overwinter somewhere in the system as sub-adults, but eventually all recruits to the spawning stock migrate out to sea before returning to spawn. Hence, **blueback herring demonstrate a strong linkage between the Mohawk and Hudson Rivers, and the ocean.** However, the previous work was a pilot study that required expansion and updating to assess the population status, the degree of homing to the Mohawk River for spawning, and the Mohawk River's overall importance as a nursery habitat.

With funding from DEC's Mohawk River Basin Program in the amount of \$115,000, SUNY ESF together with DEC Region 4 fishery biologists collected blueback herring in the Hudson River at the Troy dam and continued up into the Mohawk River near Little



SUNY/ESF and DEC have been studying populations of the migratory blueback herring that use the Hudson and Mohawk rivers as well as the Atlantic Ocean for their life cycle. Age-frequency plots of blueback herring in the late 1990s vs. 2012 show the mean age in 1999 was 4.13 years old; in 2012, it had dropped to 3.0 years—a potential negative indication for the existence of this important migratory fish species.

Falls. These surveys were conducted in 2012 and 2013. Fish were counted, but samples were also taken back to the lab for further analysis. Body sizes, condition, sex ratio, and spawning readiness were quantified, and samples of tissues were taken for chemical analyses. These analyses include stable isotope analysis of tissues, and microchemistry of otoliths (ear stones). Otoliths, which are calcified structures in the inner ears of fishes, grow as the fish grows and thus leave a “record” of growth that reflects environmental influences. But chemical “signatures” in otoliths provide an even more detailed record of environmental history, specifically movements between the Mohawk and Hudson rivers, and the Atlantic Ocean.

One new and exciting finding has been that blueback herring use the Hudson-Mohawk system more than previously thought. Conventional thinking about migratory species like shad, river herring, salmon, etc. is that once they leave after their first growing season, they don't return until they've become mature adults. Results from analyses of blueback herring otoliths have shown that these fish return from the ocean as “yearlings” with the adults, at least as far as Troy. “Yearling migration” back to spawning waters is the dominant pattern seen retrospectively in the otoliths of returning adults. In other words, over half of the adult blueback herring that spawn in the Hudson and Mohawk rivers returned as one-year-olds, immature and thus incapable of spawning. Although it is only speculative,

one hypothesis is that these sub-adult individuals travel with the adults to learn the route back to the spawning grounds.

Currently, two other sub-projects are underway to further understand the role herring play in the Hudson and Mohawk rivers and their movements between these rivers and the ocean. **Some of this work included examination of size at a given age in blueback herring collected in an earlier study (1999) vs. the 2012-13 collections. Results suggest that current blueback herring sizes at given ages have declined significantly—a potential negative sign for Hudson and Mohawk River populations of this important migratory fish species.**



Aquatic macroinvertebrates such as this stonefly are important components of the Mohawk River food web. They provide a direct connection between fishery health and water quality.

In addition to ESF's blueback herring work in the Mohawk River, the college has also been engaged in connecting fishery information (blueback herring, ESF; main stem Mohawk Fishery Project, USGS) to lower trophic-level community conditions. Lower trophic-level organisms such as aquatic macroinvertebrates and algae are important base food sources for Mohawk River fisheries. Understanding their condition informs natural resource managers about water quality in the river and food resource quality for the fishery. As part of a cooperative agreement, ESF, Onondaga Environmental Institute (OEI), and DEC Region 4 spent the summers of 2014 and 2015

sampling these organisms at the same locations where USGS fishery work was conducted from Utica to Cohoes.

Some of the specific objectives of this study were to: (1) monitor aquatic macroinvertebrate communities at select locations in the Mohawk River, updating a comprehensive accumulation of information not collected since the late 1970s; (2) identify the environmental factors significantly impacting macroinvertebrate communities; (3) assess long-term trends in macroinvertebrate diversity and stream condition from historical data; (4) work cooperatively with other scientists performing fish sampling; (5) compare assemblage-specific (i.e., fish and macroinvertebrate) measures of water quality and biological condition to make recommendations that may be used to guide future studies and restoration efforts, particularly as they pertain to the *Mohawk River Basin Action Agenda*.

Twenty-five locations between Cohoes and Utica in seasonally impounded, permanently impounded, and natural sections of the river were sampled. Sampling locations for fish were in areas also sampled by the USGS and DEC (see partnership highlight above). **Analysis of samples showed a dominance of pollution-tolerant taxa such as midges, scuds, and zebra mussels. However, 2015 data suggest increases in some pollution-intolerant taxa. Water quality sampling and habitat assessments documented the negative effects of channelization and dredging activities on habitat diversity, water clarity, and water quality.**

ADDITIONAL PROJECTS PROTECTING MOHAWK RIVER FISHERIES FOR THE FUTURE

American Eel in Tributaries to the Mohawk River

American eel are a unique native fish species once abundant in many inland waters in New York State, including the Mohawk River, but they have declined substantially throughout their historical range over the past 30 years. The USGS, SUNY ESF, and DEC conducted a screening survey of large tributaries to the Mohawk River to identify which if any tributaries still support populations of American eels. Fish-screening surveys were completed at sites in 20 tributaries during 2015, and a similar effort was conducted in 2016. This \$26,000 project was funded by DEC's Mohawk River Basin Program and the USGS.

Mercury Bioaccumulation in Fish of New York's Streams and Rivers

Although New York State has more than 70,000 miles of streams and rivers, little is known about the status, distribution, and trends of mercury (Hg) levels in stream fish, or the environmental drivers of these patterns. This three-year project is being conducted by the USGS in cooperation with NYSEDA. The project's overall goal is to characterize and improve the understanding of Hg bioaccumulation in the fish of New York's streams, and to develop models of tissue concentration to inform the cost-effective monitoring and prediction of Hg-sensitive settings. Many of the locations sampled in this project are within the Mohawk River watershed. Visit <http://ny.cf.er.usgs.gov/nyprojectsearch/projects/LK00-FKZ02.html> for more information.

Identifying Thermal Refuges in the Schoharie Watershed

Water temperature is a critical component of trout habitat. Stream temperatures not only affect the distribution, behavior, and survival of trout (and other species), but also compel them to move toward small areas of preferred temperatures, known as refuges, to maximize growth, survival, and fitness. The Schoharie watershed in the Catskill Mountains, including the East Kill, West Kill, and Batavia Kill tributaries and the main stem Schoharie River, supports small or transient populations of wild brook trout and hatchery-raised brown and rainbow trout. Water temperatures in parts of the tributaries and river typically exceed lethal thresholds for these trout during several weeks each summer. Managing agencies within the Schoharie watershed are often confronted with decisions that impact the thermal profile of the stream, such as permitting new discharges or other watershed alterations. The USGS, in cooperation and collaboration with the Greene County SWCD and the Rochester Institute of Technology, mapped surface water temperatures along the West Kill and main stem of the Schoharie River using airborne thermal infrared (TIR) photography. For more information related to this project, please visit: <http://pubs.er.usgs.gov/publication/70146667>

SUPPORTING BIG IDEAS – MOHAWK RIVER WATERSHED GRANTS

Essential to the successful implementation of the goals of the *Mohawk River Basin Action Agenda* is engaging local partners and providing the tools necessary to encourage preservation and protection of the Mohawk River watershed through local projects.

In 2012, DEC's Mohawk River Basin Program awarded approximately \$50,000 for the first grant program that specifically targeted the watershed. This inaugural round of funding offered grants up to \$10,000 for municipalities and not-for-profit corporations. Stipulations required that all projects be located within the boundaries of the Mohawk River watershed, that they facilitate implementation of the five goals and associated objectives of the Action Agenda, and that they be completed within one year of the grant contract award. In all, six proposed projects were awarded grant funds. The chosen projects were located in Schoharie, Schenectady, Montgomery and Albany counties. Projects and descriptions are listed below:

Schenectady County - Bintz Conservation Easement: Protection of approximately 117 acres of active, working farmland and associated natural areas within the Town of Glenville through a conservation easement.

Schenectady County - Niskayuna Waterfront Development: Feasibility study to assess the viability of building a community facility/boathouse on lands adjacent to the park, which would include improved public comfort stations and historic displays Aqueduct Park.

Schoharie and Montgomery Counties - Schoharie River Center: Expanding the volunteer Environmental Study Team program, targeting youth in grades 7-12 in at-risk, environmental justice areas, and instructing team members in conducting water quality monitoring activities in the Mohawk River watershed's streams and tributaries

Schoharie County - Schoharie County Recreation

Map: Developing an inventory of recreational opportunities within Schoharie County to be distributed in the form of GIS-based web and paper maps.

Albany County - Mohawk Landings Park

Connection: Establishing enhanced opportunities for passive recreational opportunities through a connecting trail from the Town of Colonie Mohawk Landings Park to the Colonie Bike Path



Mohawk Landings Park is pictured above. DEC's mini grants assisted the Town of Colonie by funding trail enhancement work along the town's river front. Photo courtesy www.colonie.org.

Albany, Schenectady and Montgomery Counties, The Environmental Clearinghouse: *Along-the-Bike Trail Guides*: research, writing, printing and distribution of guide books for use on the Mohawk River Bike/Hike Trail in Albany, Schenectady and Montgomery counties.

Building on the success of the previous grant program, in October of 2015 the Mohawk River Basin Program offered another round of funding to municipalities and not-for-profit corporations for projects which specifically target conserving, protecting and restoring fish and wildlife and their habitats, protecting and improving water quality, and promoting flood hazard mitigation and enhanced flood resiliency within the boundaries of the Mohawk River watershed. This round offered grants with a minimum award of \$15,000 and maximum of \$50,000, and allowed for project completion within two years of grant contract award. In total, four were awarded grant funding, totaling more than \$155,000 in grant funds overall. The chosen projects and descriptions are listed below:

Oneida County Soil and Water Conservation District: Stabilization of an existing sewer line in the Sauquoit Creek and restoration of the natural function and habitat of this stream segment.

Research Foundation for SUNY Cobleskill: Two phase project that included 1) SUNY Cobleskill and partners performing water sampling throughout the Mohawk River and its major tributaries with samples analyzed for trends or new/unexpected pockets of chronic contamination; and 2) Promotion of community-based environmental education programs with educators from Middleburgh High School in Schoharie and the Madison Oneida BOCES New Visions Program in Utica.

Onondaga Environmental Institute: Youth engagement through classroom lessons and field activities for students in the New York Mills and Oriskany school districts. Activities will be designed to increase environmental awareness and stewardship and will focus on watershed issues and concepts of the Mohawk River watershed.

The College of Saint Rose: Investigation of microplastic pollution in the mainstem Mohawk River from Rome to Waterford.

MOHAWK RIVER WATERSHED GRANTS – 2017

In September 2017 the Mohawk River Basin Program announced its awards for it's latest round of grants for the Mohawk River watershed. The awards funded six projects to improve water quality, promote resiliency, and create recreational opportunities. \$200,000 in grants were awarded to the following:

Oneida County Soil and Water Conservation District (SWCD) - Ninemile Creek Natural Channel Design Stream Bank Stabilization Project: The Oneida County SWCD in cooperation with the U.S. Fish and Wildlife Service will stabilize 200 feet of the southern bank of Ninemile Creek to restore the stream bank and reduce downstream sedimentation through creation of a natural, self-maintaining stable stream that will improve aquatic habitat.

Research Foundation for SUNY Polytechnic Institute - Determination of Baseline and Augmented Conditions of Microbial Indicators in the Mohawk River: Building upon positive results of an initial 2016 SUNY Poly study, this proposal will construct baseline distributions of the microbial indicators *E. coli* and

enterococci at 10 locations in the Utica/Rome area of the watershed. This project will seek to identify microbial contaminant sources, predict microbial concentrations following rain events, and provide guidance on the risk/recovery of the river to microbial contamination events.

Town of Niskayuna - Aqueduct Park River Access Upgrades: This project will fund the creation of a new bulkhead, dock anchoring system, walkway and stormwater management measures at a Mohawk River public access point in Aqueduct Park. The proposal would improve water quality by reducing riverbank erosion, improve public access to the river, protect the docks from severe weather and flooding, and create a safer and more accessible gangway to the docks for people launching kayaks and canoes.

Onondaga Environmental Institute, Inc. - Lessons for the Mohawk River: Youth Engagement and Environmental Stewardship: This project is a continuation of a Mohawk River Basin Program third round grant where the Onondaga Environmental Institute partnered with the Oriskany school district to develop and pilot classroom lessons and field trips about the Mohawk River watershed, stream ecology, and water quality. This phase of the project will expand the number of students reached by this program by providing teachers with tools and support to incorporate this curriculum into their classrooms, and ultimately help normalize the incorporation of Mohawk River watershed-based lessons into schools throughout the watershed.

Trustees of Union College - Investigation of Microplastic Pollution in Tributaries of the Mohawk River: This project is a continuation of a Mohawk River Basin Program third round grant that demonstrated that microplastic pollution is pervasive in the Mohawk River, but that the specific sources remain unclear. This project will focus on clarifying the role of tributaries in delivering microplastics to the Mohawk River and will involve collecting samples of river water from tributaries along the length of the Mohawk River and quantifying the microplastic load from each tributary.

Research Foundation for SUNY Brockport - Mapping Manure-Sensitive Karst Zones for Farmers in Schoharie County: This project will identify and map sinkholes and other karst-related features utilizing oblique imagery which will be converted into GIS shapefiles. Much of this area is farmed and utilizes groundwater. Mapping will be provided to farmers to implement manure management practices to protect domestic groundwater supplies, reducing the potential recharge of liquid manure into the carbonate aquifer via sinkholes and thinly soiled karst features. A brochure will be produced describing how to identify karst, and a workshop will be conducted to share the maps with agricultural planners, as well as a fieldtrip that will incorporate a google earth/iPhone demo.

