



HUDSON RIVER ENVIRONMENTAL SOCIETY



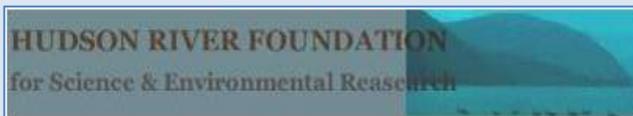
2016 The Hudson River Estuary & Mohawk River: “The Coming Together of the Waters”

Wednesday May 4th, 2016
Student Union Building
SUNY at New Paltz
New Paltz, New York

Presentations 9:00-4:00
Reception and Poster Session
4:00-5:30

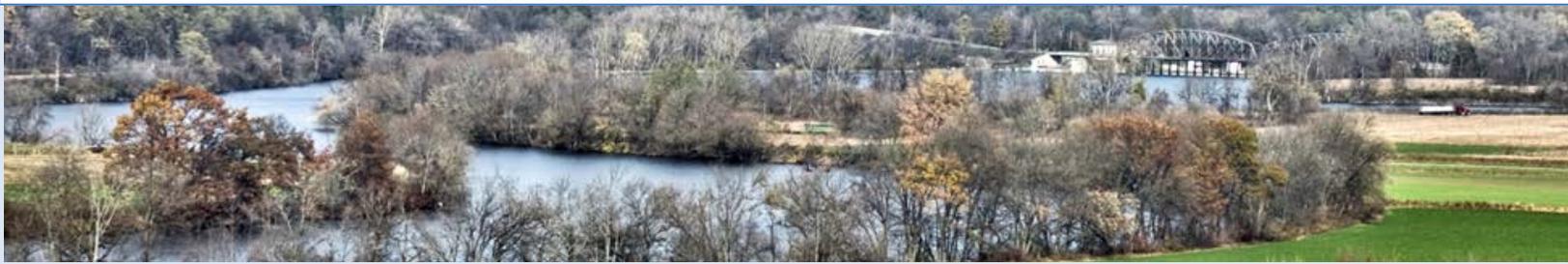


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Symposium Speakers:

James Besha, Albany Engineering Corporation

Katherine Czajkowski, NYSDEC, Mohawk River Basin Program

Angus Eaton, NYS Department of Environmental Conservation

John Garver, Union College

Scott George, U.S. Geological Survey

Robert Radliff, Erie Canalway National Heritage Corridor

David Ralston, Wood Hole Oceanographic Institution

Dan Shapley, Riverkeeper

David Strayer, Cary Institute of Ecosystem Studies

Dennis Swaney, Cornell University

James Tierney, NYS Department of Environmental Conservation

Mark Woythal, NYS Department of Environmental Conservation

Brian Yates, Erie Canalway National Heritage Corridor

This one day symposium seeks to reconnect the resource professionals, educators, students, and interested public of the Hudson River Estuary and the Mohawk River by highlighting the environmental and cultural influence the Mohawk River has on the Estuary. Presentations will cover a wide range of topics including the geologic history of the Mohawk River, the Mohawk River Valley as a source of nutrients and sediments to the Estuary, the history of and current role of the Erie Canal system, the threat from invasive species, the state of fisheries science, and the role of hydropower in managing flow and providing fish passage. A poster session and reception will wind up the day, providing ample opportunity for participants from the Mohawk Valley and Hudson Valley to connect and plan for the future.

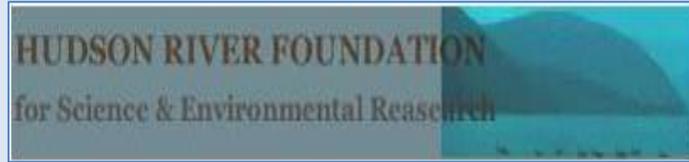
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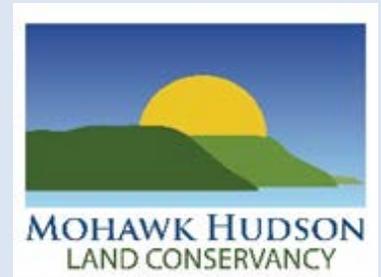
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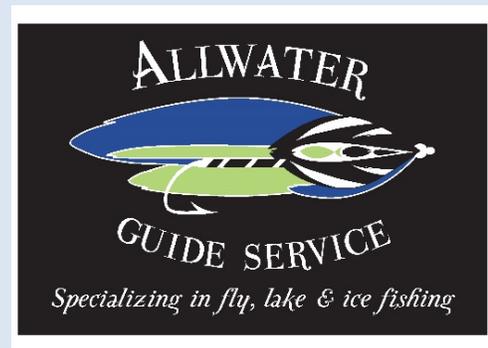


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THANK YOU TO THE GRADY MOORE FUND SPONSORS:





HUDSON RIVER ENVIRONMENTAL SOCIETY

2016 Hudson River Symposium: *Hudson River Estuary & Mohawk River: The Coming Together of the Waters*

State University of New York at New Paltz, Student Union Building
May 4, 2016 9:00 AM -5:30 PM

8:00 – 8:45: Registration and Breakfast

8:45 – 9:00: Welcome – HRES and the Benjamin Center, SUNY New Paltz (15 minutes)

Introduction to the Mohawk River (9:00 to 10:00)

An Overview of the Mohawk Watershed: Progress, Problems, and Future Directions – *John Garver, Geology Department, Union College*

The Erie and Champlain Canals: Agents of Transformation - *Robert Radcliff & Brian Yates, Erie Canalway National Heritage Corridor*

10:00 -10:30: Coffee Break, Registration, and Poster Set-up

Life in the Mohawk River: The Good, the Bad and the Ugly (10:30 – 12:00)

Response of Fish Assemblages to Seasonal Drawdowns in Sections of the Mohawk River-Barge Canal System – *Scott George & Barry Baldigo, U.S. Geological Survey, New York Water Science Center*

Hydropower – Help or Hindrance – *James Besha, Albany Engineering Corporation*

The Mohawk River and Erie Canal as a Corridor for Biological Invasions – *David Strayer, Cary Institute of Ecosystem Studies*

12:00 – 12:45: Lunch – with Remarks by Mr. James Tierney, NYSDEC Deputy Commissioner for the Division of Water

Merging of the Waters: Hydrology & Water Quality (12:45-2:45)

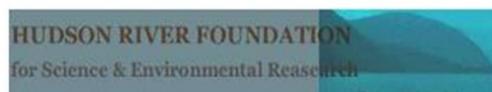
The Role of the Mohawk in Hudson River Nutrient Dynamics – *Dennis Swaney, Department of Ecology and Evolutionary Biology, Cornell University*

The Role of the Mohawk River in Hudson River Sediment Dynamics – *David Ralston, Woods Hole Oceanographic Institution*

How's the Water? Riverkeeper's Community Science Water Quality Monitoring Projects – *Dan Shapley, Riverkeeper*

Total Maximum Daily Load Baseline Monitoring for the Mohawk Basin – *Angus Eaton, NYSDEC, Division of Water*

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Managing the Waters (2:45-3:45)

Hydroelectric Project Operations on the Mohawk River – *Mark Woythal, NYSDEC Bureau of Habitat, Division of Fish, Wildlife, and Marine Resources*

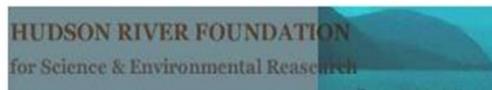
The Mohawk River Basin Program: Creating a Sense of Place – *Kathy Czajkowski, NYSDEC Mohawk River Basin Program, NYS Water Resources Institute at Cornell University*

Mohawk River Watershed Projects: A Collaborative Approach. *Peter Nichols, Schoharie County Soil and Water Conservation District*

Linkage, Summary, Closing Remarks. *Simon Litten, Hudson River Environmental Society*

4:00 – 5:30: Poster Session, Reception, and Raffle

Conference Sponsors and Collaborators:



SPEAKER ABSTRACTS

Hydropower – Help or Hindrance

*James A. Bessa, Sr., P.E.
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The Mohawk and Hudson Rivers have been used to harness the power of water for more than 100 years. Has this been good for the Hudson River Estuary or not?

This presentation will begin with a discussion of the history and current status of hydropower on the Mohawk and Hudson Rivers and its relationship to navigation, water quality, fisheries, and recreation in the Hudson River Estuary. This will be followed by identification of the impacts imposed by hydropower development and operation, both beneficial and detrimental.

Once the problems are identified, attention will be given to the opportunities available for improvement in hydropower impacts, increasing the beneficial impacts and mitigating the detrimental impacts. The presentation will conclude with a suggested system management approach for the Mohawk and Hudson Rivers and the benefits such a system could provide for the Hudson River Estuary.

The Mohawk River Basin Program: Creating a Sense of Place

*Katherine Czajkowski
katherine.czajkowski@dec.ny.gov*

*Mohawk Watershed Coordinator
NYSDEC – Mohawk River Basin Program/Cornell Water Resources Institute*

Located wholly within the boundaries of New York State, the Mohawk River is the largest tributary to the Hudson River. This approximately 3,460 square mile watershed comprises roughly 25% of the entire Hudson River drainage area. The headwaters of the Mohawk River are located between the southwestern portion of the Adirondack Mountains and the eastern edge of the Tug Hill Plateau; from here, it flows south towards Rome, carving a 140 mile path through the Mohawk Valley before joining the Hudson River in Cohoes. The Mohawk River watershed includes several major tributaries and reservoirs: the Schoharie Creek, West Canada Creek, East Canada Creek, the Hinkley Reservoir and the Schoharie and Delta Reservoirs.

The 2009 report by the New York Ocean and Great Lakes Ecosystem Council, entitled *Our Waters, Our Communities, Our Futures* recommended better management of natural resources and human activities through an ecosystem-based management system. Ecosystem-based 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 recognized the connection between the Mohawk

and Hudson Rivers, and specifically recommended the use of ecosystem-based management in the Mohawk River watershed, which in turn would give rise to a “Whole Hudson” approach to natural resource management.

Through the establishment of the Mohawk River Basin Program, the New York State Department of Environmental Conservation initiated a focused effort to conserve, preserve and restore the environmental quality of the Mohawk River and its watershed, while helping to manage the resources of the region for a sustainable future. Following the successful model of the Hudson River Estuary Program, the Mohawk River Basin Program acts as the coordinator of basin-wide activities, bringing together stakeholders and creating partnerships with established programs and organizations throughout the watershed to achieve these goals. The various partners and stakeholders of the Mohawk River watershed came together to develop the Mohawk River Basin Action Agenda, a plan that integrates shared goals for the watershed and establishes a clear set of priority actions and measurable goals. The Action Agenda is viewed as the guiding principles document meant to bring as many collaborators and stakeholders into the shared vision for the Mohawk as possible in order to highlight and achieve the over-arching goals all groups share for the watershed.

Total Maximum Daily Load Baseline Monitoring for the Mohawk Basin

Angus Eaton
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New York State Department of Environmental Conservation, Albany

The quality of surface water has important effects on human and ecological health. In the Mohawk River watershed surface water is an important drinking water source, and is used for swimming, fishing, and recreation. Water quality impacts on designated uses in the Mohawk River watershed are well documented by the DEC. These impacts include eutrophication from phosphorus which is reducing the quality of public water supply. In 2015 DEC formally committed to develop a protection Total Maximum Daily Load (TMDL) for the Mohawk River. The TMDL will focus on the protection of drinking water supplies and their susceptibility to eutrophication of the Mohawk River. Excessive algal growth due to eutrophication can have undesirable and/or detrimental effects on drinking water suppliers and end users. These effects include taste and odor problems, increased levels of cyanotoxins such as microcystins, higher levels of disinfection by-products (DBPs), and increased turbidity levels in source water. Certain algal species known to produce the musty, earthy, fishy, or grassy odors are often the culprits of taste and odor problems in eutrophic waters. One of the first steps in the TMDL process is watershed characterization including data needed for analysis, problem identification, and model calibration. This step will be completed in cooperation with the United States Geological Survey (USGS). Water quality samples will be collected at 30 different locations throughout the Mohawk River watershed this sampling season, April – October 2016. Sampling of Mohawk River will consist of water chemistry and discharge. Water samples will be collected and analyzed for field parameters, nutrients, suspended sediment,

physical properties, chlorophyll-a, and carbonaceous biological oxygen demand (CBOD) samples will be collected.

An Overview of the Mohawk Watershed: Progress, Problems, and Future Directions

John I. Garver
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Geology Department, Union College,
Schenectady NY

The Mohawk River bisects the Appalachians, and thus was the route for glacial meltwater and the Erie Canal. The West Canada Creek is the principal south draining tributary from the Adirondacks, and the Schoharie Creek is the principal south-draining tributary from the Catskills: each annually carries about 20% of the total volume of the Mohawk. The peak discharge in the basin is dominated by spring freshets or break up floods, usually in March and April, and also in late season tropical storms. Permanent impoundments along the River (eg. Vischer Ferry Dam) exacerbate ice jamming by allowing significant sheet ice to form. Upon breakup the lower Mohawk is thus subject to damaging ice jams that cause significant and spectacular backup flooding. Dams have undoubtedly had a dramatic impact on the ecosystem of the Mohawk River, and currently the basin supports nearly a hundred Class B (intermediate hazard) and Class C (high hazard) dams used for water supply, navigation, and hydropower. Historic use in a changing world has complicated dam use and dam operation: examples include the Gilboa Dam (water supply), the Hinckley Dam (water supply) and dams/locks in the Erie Canal (navigation). Breaches of the dams/locks and impairment of several others during the Irene/Lee events were important and profound in terms of flood preparedness and attitudes toward operation. The last decade has been unusually wet, especially in the Catskills, and this has had an effect on sediment mobility as well as flooding. Thus an emerging concern is aimed at quantifying sediment load especially on the Schoharie because it is suspected as being the primary source of sediment in the Hudson. The NYSDEC Mohawk Basin action agenda, the SCWD Watershed management plan, and the Mohawk Watershed Symposium have had tremendous impacts on current and ongoing efforts in the basin.

Response of Fish Assemblages to Seasonal Drawdowns in Sections of the Mohawk River-Barge Canal System

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Barry Baldigo
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Scott Wells
NYS Department of Environmental Conservation, Bureau of Fisheries, Region 4, Stamford, NY

The Mohawk River and New York State Barge Canal run together as a series of permanent and temporary impoundments for most of the distance between Rome and Albany, NY. The downstream section is composed of two permanent impoundments, the middle section is composed of a series of temporary (seasonal) impoundments, and the upper section is composed of a series of permanent impoundments. In the middle section, movable dams are lifted from the water during winter and the wetted surface area decreases by 36 to 56%. This investigation used boat electrofishing during spring of 2014 and 2015 to compare the relative abundance of fish populations and the composition of fish communities between the permanently and seasonally impounded sections of the Barge Canal to determine the effects of both flow-management practices. Excluding migratory Blueback Herring (*Alosa aestivalis*), a total of 3,264 individuals from 38 species were captured and total catch per unit effort (CPUE) ranged from 46.5 to 132.0 fish/h at sites in the seasonally impounded section compared to 89.9 to 342.0 fish/h in the permanently impounded sections. Mean CPUE in the seasonally impounded section was significantly lower (by about 50%) than that of the permanently impounded sections and community composition differed significantly between sections. The abundance of many lentic species including Yellow Perch (*Perca flavescens*), Largemouth Bass (*Micropterus salmoides*), Bluegill (*Lepomis macrochirus*), and Pumpkinseed (*Lepomis gibbosus*) decreased markedly in the seasonally impounded section and even a number of species that are well adapted to large riverine habitats such as Smallmouth Bass (*Micropterus dolomieu*) and Walleye (*Sander vitreus*) were less abundant. The proportion of native individuals captured, however, was highest in the seasonally impounded section and large increases in the abundance of a few native cyprinids were observed. Overall, the winter drawdowns in the seasonally impounded section appear to reduce the relative abundance of fish and may adversely affect angling opportunities, but may also create more natural riverine conditions that favor some native species.

The Erie and Champlain Canals: Agents of Transformation

Bob Radliff

Brian Yates

Erie Canalway National Heritage Corridor

New York's canal system, including the Erie Canal and its laterals – principally the Champlain, Oswego, and Cayuga-Seneca Canals – are the most successful and influential human-built waterways in North America. The canals facilitated and shaped the course of settlement of the Northeast, the Midwest, and the Great Plains; knit together the Atlantic Seaboard with the area west of the Appalachian Mountains; and became a central element forging the national identity.

Constructed between 1817 and 1825, the Erie and Champlain Canals were heroic feats of early 19th century engineering and construction. At 363 miles long, the Erie Canal was more than twice the length of any canal in Europe. At 60 miles long, the Champlain Canal, simultaneously constructed with the Erie Canal, connects the tidal portion of the Hudson River with Lake Champlain and eventually the Saint Lawrence Seaway. They can trace direct ancestry to short canals and navigation improvements to the Mohawk and Hudson Rivers built during the 1790s, and to the network of natural waterways that had been used for centuries for travel and commerce by members of the Iroquois Confederacy and other native peoples. Both canals are part of the New York State Canal System and the Erie Canalway National Heritage Corridor.

The federally appointed Erie Canalway National Heritage Corridor Commission and its non-profit partner the Erie Canalway Heritage Fund, Inc., in partnership with the National Park Service and numerous local, state, and federal partners, work to preserve and share our extraordinary heritage, to promote the Corridor as a world-class tourism destination, and to foster vibrant communities connected by the waterway. This presentation will provide a history of the Erie Canal; explain its importance to local, regional, and national identity; and discuss many of the efforts to maintain, interpret, and educate the public about its historical and cultural significance through heritage preservation and sustainable development.

The Role of the Mohawk River in Hudson River Sediment Dynamics

David Ralston

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Woods Hole Oceanographic Institution

The supply of sediment from the Mohawk River watershed and other tributaries of the Hudson River Estuary is highly nonlinear, with suspended sediment concentrations increasing rapidly with river discharge. As a result, much of the sediment load to the estuary is delivered during relatively brief, intense discharge events associated with storms or the spring freshet. In the estuary, the tides provide the primary source of energy for sediment resuspension and transport, varying with

the spring-neap cycle over a much narrower range than the orders of magnitude variation in river discharge at seasonal to interannual time scales. This mismatch in the amplitude and time scales of forcing variability between the sediment supply from the Mohawk and the sediment transport in the tidal Hudson leads to interesting consequences for sediment residence time in the system that we have only recently begun to appreciate through a combination of observations and modeling. We examine the coupling between watershed sediment supply and fluxes in the tidal river and saline estuary over a range of forcing conditions, finding that the time scales of transport of sediment from the Mohawk River through the tidal Hudson to the coastal ocean may extend from multiple years to decades, much longer than the annual cycle that was previously assumed to dominate.

How's the Water?
Riverkeeper's Community Science Water Quality Monitoring Projects

Dan Shapley
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Riverkeeper Water Quality Program Manager

The public is greatly interested in the quality of the Hudson River and its tributaries, and whether water supports uses including swimming and other primary contact recreation, yet data has been lacking to demonstrate the degree to which we have achieved the Clean Water Act goal of “swimmable” water. To fill this data gap and better answer questions from the public, in 2008, Riverkeeper partnered with Columbia University’s Lamont-Doherty Earth Observatory and CUNY Queens to launch a fecal indicator bacteria water quality monitoring project in the Hudson River Estuary, gathering data at 74 locations monthly from May to October. Since 2012, we have extended monitoring utilizing a community science model in Hudson River tributaries and along shorelines, partnering with more than two dozen community groups, municipalities, universities and other organizations; and more than 130 individuals who collect water samples at least monthly. In 2015, Riverkeeper and partners collected 6,718 water samples for measurements of water quality, including 2,559 measurements of the fecal indicator bacteria *Enterococcus* (Enterococcus). In 2015, we piloted a water quality monitoring project partnered with SUNY Cobleskill in the Mohawk River watershed, gathering 113 Enterococcus samples from 33 locations. In addition to providing data useful for informing the public and regulators, the community science model has empowered citizens to be better stewards of their creeks and rivers, and provided Riverkeeper a stronger voice as an advocate for improved water quality through infrastructure investments, notification of sewage discharges, enforcement of violations, and wastewater infrastructure funding.

The Mohawk River and Erie Canal as a Corridor for Biological Invasions

David Strayer
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Cary Institute of Ecosystem Studies

The Mohawk River connected the Great Lakes and the Hudson River twice, once during early post-glacial times, and now via the Erie Canal. These connections allowed for a substantial but selective exchange of aquatic species between the two drainage basins. I will briefly discuss likely paleo-immigrants such as the fantail darter and the creek heelsplitter mussel; likely canal immigrants such as the blueback herring, freshwater drum, zebra mussel and faucet snail; and possible future immigrants such as the round goby and grass carp. As long as the canal is freely open, both the Great Lakes and the Hudson will be subject to uncontrolled immigration of species already in the other drainage basin, as well as future introductions of species to either drainage basin. I will close by discussing the need for a study of canal barriers to prevent such future immigration.

The Role of the Mohawk in Hudson River Nutrient Dynamics

Dennis P. Swaney
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Bongghi Hong
Robert W. Howarth

Dept of Ecology and Evolutionary Biology
Cornell University

The Mohawk River, the Hudson's largest tributary, drains an area of 8800 km², nearly ¼ of the Hudson watershed. Anthropogenic nutrient inputs to the Mohawk watershed are dominated by agriculture, including fertilizer and N fixation from crops like alfalfa, so nutrients from agricultural sources are an important contribution to the upper and mid-Hudson River. However, these are small in comparison to nutrient inputs to the watershed of the highly urbanized lower Hudson, largely due to imports of food from outside the watershed. Apart from direct impacts of nutrient inputs, the contribution of water discharge from the Mohawk has implications for the extent of flushing of nutrients through the estuary, and so how efficiently they are consumed by the river and estuarine ecosystem. These river flows appear to be changing in response to climate. Here we discuss the relative importance of nutrient sources in the Mohawk and Hudson, the potential impact of flow on nutrients in the river, and recent projections of climate change and their potential effects.

POSTER ABSTRACTS

Downstream Passage of Juvenile Blueback Herring in the Presence of an Ultrasonic Fish Guidance System at a Hydroelectric Project on the Mohawk River

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Christopher W.D. Gurshin
Michael M. Taylor
Normandeau Associates

Benjamin E. Lenz
New York Power Authority, White Plains

At the Crescent Hydroelectric Project (Crescent) on the Mohawk River, New York, ultrasound was produced to deter out-migrating Blueback Herring adults and juveniles to sea from entering the intake channel to the Crescent headrace and turbines where mortality may occur. To increase the previously reported deterrence rate of 31%, the sound field was extended further upriver to expose juvenile Blueback Herring to an increasing sound gradient as they migrate downriver and allow them more time to avoid the intake channel. During the peak migration period of 20 September through 14 October 2012, data from continuous fixed-location horizontal echosounding indicated 77% of the net downstream passage of juvenile Blueback Herring at the upriver site bypassed the intake channel with peak downstream activity occurring during daylight morning hours. Repeated pelagic trawling and mobile echosounder surveys corroborated these results by showing Blueback Herring density was significantly higher in the main channel than in the intake channel. Echograms indicated juveniles were most abundant in the upper water column and exhibited stronger schooling behavior during the day than at night. This study demonstrated that pulsed ultrasound, when properly directed, can be used effectively as a fish guidance system to provide safe downstream passage of juvenile Blueback Herring at hydropower dams.

The success of American glass eel citizen science monitoring in the Hudson River estuary

Chris Bowser
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NYS DEC, NYS Water Resources Institute at Cornell University
Education specialist
Education Coordinator

Grace Ballou
SCA Hudson Valley Corps/Americorps
Citizen Science Educator

Hudson River Estuary Program
Hudson River National Estuarine Research Reserve

The catadromous American eel (*Anguilla rostrata*) completes two incredible migrations between the Sargasso Sea and east coast watersheds. Historic population declines and our lack of understanding have been obstacles for conservation biologists and policy-makers in the Hudson River estuary. Since 2008, the citizen science glass eel monitoring project has helped us understand these obstacles while emphasizing education and stewardship. This poster presents three of the many data stories that have resulted from this project. We have a collection of participant evaluations that attest to the power of citizens collecting scientific data. This glass eel data has identified trends that suggest temperature is indicative of eel arrival in the Hudson River. We consistently see a spike in glass eel catches when the river reaches 40°F. When eels do arrive, they swim quickly upriver but slow as they reach northern stretches. These trends provide a valuable insight into the mysterious glass eel migration, aiding biologists in management decisions.

The Hudson River Flooding Decision Support System

Greg Yetman
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Kytt MacManus
Alyssa Fico
Jane Mills
CIESIN

The Hudson River Valley and Long Island are vulnerable to storm surge and rainfall flooding due to coastal storms. Future sea level rise associated with climate change will increase the risk of these flood events. Climate change impact mitigation and adaptation measures must be implemented across a wide variety of scales and sectors to maximize their effectiveness.

In order to better understand the Hudson River Valley's vulnerability CIESIN at Columbia University partnered with the Stevens Institute of Technology in a New York State Energy Research and Development Authority (NYSERDA) funded project to produce a web mapping application: Hudson River Flooding Decision Support System version 1.

The CIESIN team is now working to expand and improve upon this web application. This project will produce a complete set of building footprints for the counties along the Hudson River Estuary, which will be integrated with current critical infrastructure data. Buildings will be evaluated individually for potential storm surge and sea level rise impacts, and adaptation and mitigation strategies will be developed. Users can explore the interactive map to estimate the potential environmental, social, and financial impact of future flooding in order to inform planning decisions. They can download maps and statistical estimates of flooding impacts on populations, facilities, and buildings. The project website and mapping tool will help to inform community planners, public officials, resource managers, and others looking to assess risk.

Tracking aquatic invasive species in New York with iMapInvasives

Jennifer Dean
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Colleen Lutz
Brent Kinal
Heidi Krahling
Meg Wilkinson

New York Natural Heritage Program

Managing and preventing aquatic invasive species requires coordinated regional efforts that collect and share data effectively. The New York Natural Heritage Program manages the invasive species database for the state using iMapInvasives, an online mapping tool for reporting locations and management efforts. Trained users, from citizen scientists to natural resource experts, can report new infestations via computer or smartphone for verification. Many agencies and organizations have also contributed existing datasets for the Hudson and Mohawk River watersheds, giving an aggregated view of what species have been detected, and are approaching, these areas. Using the GIS-based reports from iMapInvasives, we are able to compare the detected and approaching species lists for the HUC 8 watersheds along the Mohawk and Hudson Rivers for aquatic invasive species. This system can be used by organizations working to protect our aquatic resources.

Analysis of diurnal pH fluctuations and primary production in two urban streams in the Hudson Valley

Yasi Hassanzadeh
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Dr. Marshall Pregnall
Vassar College

The Casperkill and its tributary the Fonteynkill are small streams that are part of the Hudson Direct Drainage watershed in Dutchess County, New York. As urban streams, both are highly affected by factors such as storm water runoff and road salt, which result in generally low water quality. To monitor the specific impacts of urban landscapes on water quality, The Vassar Environmental Research Institute has placed sondes along both streams that continuously collect data on a number of stream properties, including pH, dissolved oxygen, and discharge. This project used three years of the sonde data to explore and analyze the diurnal pH fluctuations of both the Casperkill and Fonteynkill streams as well as to estimate primary productivity using diel oxygen techniques. Diurnal pH fluctuations in the Fonteynkill were highest during the spring and summer, though variation between sampling sites was observed. In the Casperkill, the highest pH fluctuation as well as gross primary production occurred in the spring and winter. The influence of extreme precipitation events was also observed. Overall, these analyses contribute to the understanding of small urban stream ecosystems in the Hudson Valley.

Identification of microplastic particles from the Mohawk and Hudson Rivers using Raman spectroscopy

James L. Hodge
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Jacqueline A. Smith
Bryan Barry
Emma Ervolina
The College of Saint Rose

John I. Garver
Union College

Microplastics are commonly defined as plastic particles <5 mm in diameter and include both particles deliberately manufactured to that size (e.g., polyethylene “microbeads” found in personal care products such as facial scrubs) and fragments and fibers resulting from breakdown of larger plastic items and fabrics. Because of their small size, microplastics commonly pass through wastewater treatment systems and are discharged along with treated wastewater, ultimately reaching major waterways. Once within waterways, microplastics may attract hydrophobic

contaminants such as PCBs and be mistaken for food by organisms, thereby entering the food chain. Although a 2015 federal ban on microplastics in personal care products will eventually end one source of microplastic pollution in NYS waterways, particles originating through breakdown of larger fragments will persist as long as plastic waste enters the natural environment. The focus of our study is microplastic particles <1 mm in diameter found in the water column in the Mohawk and Hudson Rivers. In 2013, we collected samples of floating and suspended material <1 mm in diameter from 16 near-shore sites in the lower Mohawk River and the Hudson River near Albany. Sampling began again in 2016 with a concentration on sites along the Hudson River. We are using Raman spectroscopy to identify suspected plastic particles. Thus far we have found particles consisting of the same polymer in samples from both the Mohawk River at Rotterdam Junction (2013) and the Hudson River at Selkirk (2016), indicating the persistence of a contaminant problem that transcends time and space.

Determining the Provenance and Life Histories of Blueback Herring in the Mohawk River

Cara Ewell Hodkin
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Karin Limburg

Department of Environmental and Forest Biology

SUNY College of Environmental Science & Forestry

Blueback herring (*Alosa aestivalis*) demonstrate a strong linkage between the Mohawk River, Hudson River, and Atlantic Ocean. Previous studies have indicated that blueback herring (1) can overwinter somewhere in the system as sub-adults, but (2) eventually all recruits to the spawning stock migrate out to sea before returning to spawn (KL, unpublished). In a collaboration between SUNY ESF and Region 4 DEC (Scott Wells), funded by the NYS Water Resources Institute at Cornell, adults were collected in 2012 and 2013, but there were no funds available to complete the work-up, leaving a dataset of morphometric characteristics, scales, otoliths, stomach contents, and 230 additional individuals preserved for analysis that have been left incomplete. We plan to complete the work-up and analyze the data set.

This work requires expansion and updating to assess both the population status, the degree of homing to the Mohawk for spawning, and the Mohawk's overall importance as a nursery habitat. We are left with four basic questions: (1) What is the relative importance of the Mohawk River nursery, relative to nurseries in the Hudson River estuary? (2) What is the provenance of blueback herring spawners in the Mohawk River? (3) What is the degree of overwintering and within-Mohawk habitat use? (4) What are demographic characteristics of the Mohawk River spawning population?

NOAA Bay Watershed Education and Training B-WET: New York Upper Susquehanna Watershed

*Susan Hoskins
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*Institute for Resource Information Sciences
Cornell University*

Water quality monitoring is brought to the classroom in this educator training program. Teachers are introduced to water quality parameters in the context of watershed land use and land cover. Easy to use water quality testing kits are explained and made available to classes on loan. Watershed characteristics are explored through maps and aerial photographs for a historic perspective. ArcGISOnline and Pictometry mapping interfaces are used to enhance understanding of the connected nature of activity on the land, water quality and aquatic system impacts. The program was initially focused on the Chesapeake Bay Watershed in New York, and now is available to educators in other watersheds in New York.

Continuous Monitoring on the Hudson and Mohawk Rivers with HRECOS: The Hudson River Environmental Conditions Observing System

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The Hudson River Environmental Conditions Observing System (HRECOS) is a robust river monitoring network operated and managed by a consortium of 14 governmental, academic, and private institutions with shared interest in high-frequency monitoring in the Hudson River watershed. Monitoring stations geographically distributed along the Hudson and Mohawk Rivers are equipped with sensors that continuously record a suite of water quality and weather parameters, with most stations operating year-round. Remote telemetry at each station transmits data in near real-time for the public to download and plot graphs at www.hrecos.org. HRECOS works to improve the capacity of regional river and watershed stakeholders to: understand the ecosystem and manage water resources, provide baseline monitoring data for applied research and modeling, promote the use of real-time data in educational settings, provide policy makers and emergency managers with data products to guide decision making, and provide information for safe and efficient commercial use and recreational activities. HRECOS synergizes upon long-standing

monitoring programs of its partner organizations, such as the Hudson River National Estuarine Research Reserve (HRNERR), NYSDEC's Rotating Integrated Basin Studies (RIBS), USGS monitoring programs, Stevens Institute of Technology's New York Harbor Observing and Prediction System (NYHOPS), Cary Institute of Ecosystem Studies monitoring, and several others.

HRECOS expanded into the Mohawk River in 2011 with funding from the New York State Department of Environmental Conservation's (NYSDEC) Mohawk River Basin Program to help satisfy the water quality goals of the program's Action Agenda. There are currently three Mohawk HRECOS stations—Ilion, Lock 8, and Rexford. The data are used in conjunction with existing water quality data in the development of a Total Maximum Daily Load for the Mohawk River to limit the discharge of pollutants and restore the impaired waters, while also monitoring improvements resulting from Combined Sewer Overflow Long-Term Control Plans—ultimately leading to the improvement and conservation of the Hudson River's largest tributary.

Water Quality Sampling Along 121 Miles of the Mohawk River in 30 Hours

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Abstract: In 2015 Riverkeeper and SUNY Cobleskill monitored water quality on four occasions across more than 121 miles of the Mohawk River and its major tributaries. Water samples were sampled from boat or shore within a 12- to 30-hour window. The 33 sampling sites were tested for Enterococci, a bacterial indicator of fecal contamination, using the IDEXX Enterolert method. Four of the sampling sites indicated elevated levels of fecal contamination on at least one occasion. Of the 113 total samples taken only 17.7% exceeded values for safe recreational use, as described by U.S. EPA Recreational Water Quality Criteria. The water sampling efforts provide a 24-hour snapshot of the Mohawk River's water quality, however further study will be necessary to establish long term data sets to determine if any areas indicate patterns of chronic contamination. In 2016, similar surveys will be conducted monthly from May to October and will include modified and additional site locations along the river and its tributaries to capture a representative snapshot of the river's water quality.

Hudson River Sustainable Shorelines: Identifying Potential Shores for Ecologically-Enhanced Designs

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The Hudson River Sustainable Shorelines Project (HRSSP) aims to develop science-based recommendations for shore zone management that preserve or enhance ecological value. HRSSP Demonstration Site Network shows innovative shoreline designs and best management practices to enhance habitat value and shoreline resiliency for the challenges of climate change and sea level rise. Additional candidate shore zones for the Demonstration Site Network are now being identified through the Priority Shoreline Inventory to show the efficacy of these shoreline designs for multiple land uses, wave energy levels, and locations along the Hudson River. Priority Shoreline assessments are conducted by land or boat utilizing a LEICA Geosystems handheld Zeno 5 GPS. Measurements and observations are recorded which include biological and physical characteristics, adjacent land use, and presence and condition of infrastructure. The data gathered from the inventory will provide decision makers with spatial information to more easily identify higher priority locations for potential Sustainable Shoreline demonstration projects.

The New York State Community Risk and Resiliency Act: Mainstreaming climate change

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The purpose of the Community Risk and Resiliency Act (CRRRA), enacted in 2014, is to ensure that certain state monies, facility-siting regulations and permits include consideration of sea-level rise, flooding and storm surge. This poster will describe state sea-level rise projections adopted by the Department of Environmental Conservation pursuant to CRRRA and DEC's approach to implementing CRRRA through adoption of a state flood risk management standard and its incorporation into DEC programs. The poster will also describe DEC's development of new guidance for review of culverts and bridges, on the use of natural measures to enhance resiliency,

on consideration of flooding in smart growth assessments and on model local laws to enhance resiliency.

A Study of Zebra Mussel Shell Morphology in the Hudson River

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Invasive species play a large role in the nature of ecosystems and for several decades have been a source of investigation and concern for many scientists. Not only do they have an impact on the ecosystem in which they currently live, but they tend to spread to other ecosystems, often causing substantial changes in the environment. A well-studied species, zebra mussels have been found to have significant ecological and economic impacts. In this study, we looked at the long-term changes in a zebra mussel population with a specific focus on shell morphology and looked for trends in their shell thickness over time. One main aspect was to determine whether the change in shell thickness was a result of increasing predation in the Hudson River or some other factor in the water. Using statistical methods, we were able to conclude that shell thickness has been increasing significantly over the past 25 years. We present our findings and discuss possible explanations for this behavior.

Reconnecting Waters for Eels and River Herring: A Mediated Modeling Approach to Assess Receptivity to Dam Removal in the Hudson-Mohawk Watershed

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Channelization of rivers via the construction of dams has been one of the most profound drivers of population declines in diadromous fishes such as river herring and the American eel. Within the Hudson River watershed there currently exist 1,968 dams, of which 481 are found in the

Mohawk River (National Inventory of Dams). The objective of this study is to increase receptivity towards dam removal projects among stakeholder groups within the Hudson-Mohawk watershed through educational interventions including the co-construction of a systems dynamics model. We will be working with stakeholder groups in tributaries within the Hudson River (Quassaick Creek and Wynant's Kill) and the Mohawk River (Sauquoit Creek or Steele Creek). A set of three educational workshops will be used to assess stakeholder's attitudes toward dam removal decision making processes. These interventions will include community meeting presentations, field trip experiences and mediating model processes. A systems dynamics model will be co-created with stakeholders in small groups using STELLA, a dynamic ecosystem modeling platform, to elicit the underlying behavior and functioning of receptiveness attributed to dam removal decision making. A suite of policy scenarios will then be tested using model products developed from each workshop. Ultimately, interventions will provide learning based outcomes that have the ability to increase consensus and trust in model findings. A summative systems model can additionally be used as a tool for managers and restoration agencies in river connectivity and dam removal project considerations.

Reconnecting Our Streams- Barrier Mitigation within the Hudson River Estuary Watershed

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Improperly installed and undersized road stream crossings within the Hudson River Estuary Watershed are barriers to aquatic organisms moving up- and downstream. These barriers contribute to habitat fragmentation, degradation, and serve as flood risk hazards to communities during severe precipitation events. The NYS DOT estimates there are over one million culverts in NYS on state and local roads. Using protocols developed by the North Atlantic Aquatic Connectivity Collaborative (NAACC), and in partnership with the New York State Water Resource Institute (WRI), the Hudson River Estuary Program (HREP) has partnered with municipalities to assess culverts and bridges to evaluate and rank their flow capacity and aquatic passability impacts. We define passability as the ease that aquatic and riparian species have to access up and downstream habitats, ranging from Full Passage to Severe Barriers. Capacity modeling determines the maximum return period storm a structure can successfully pass without water over topping the road. Crossings are modeled under current precipitation levels and

projected 2050 levels under the influence of climate change. The HREP works with municipalities and other interested partners to advance potential mitigation projects to implementation and construction. By identifying crossings that are both barriers to organism passage and flooding hazards for communities, the Culvert Prioritization Project seeks to link infrastructure and ecological restoration best practices. During the 2013-2015 field seasons, over 2,000 crossings in 19 focal sub watersheds were assessed and a number of partners are now moving forward to implement mitigation construction projects.