Abstract Book

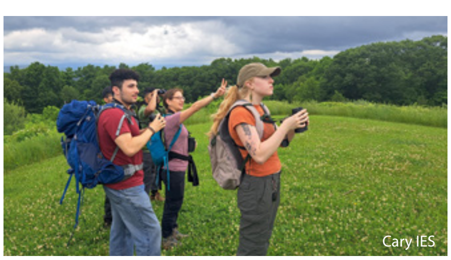
Catskill Environmental Research & Monitoring Conference

Shared Ground: Collaborative Approaches to Catskills Environmental Research

---

October 22-24, 2025

See www.cermconference.org for more information



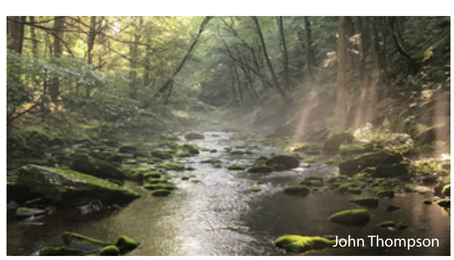


Table of Contents

Table of Contents

Keynote Address

October 22, 2025

Session:	Keynote Address
Title:	Does New York's path to 'net zero' go through the Catskills? Mapping and monitoring climate benefits of Catskill forests and their role in achieving statewide carbon neutrality.
Corresponding Author:	Dr. Colin Beier
Corresponding Author Affiliation:	SUNY College of Environmental Science in Forestry
Corresponding Author Email:	cbeier@esf.edu
Co-Authors:	

Presenter Bio:

Colin Beier is Director of the Climate & Applied Forest Research Institute (CAFRI) and Professor in the Department of Sustainable Resources Management at SUNY College of Environmental Science in Forestry (ESF), where he teaches forest ecology and coordinates the Forest Ecosystem Science degree program. He is an interdisciplinary ecologist who studies the resilience of forested landscapes in a rapidly changing world through applied and translational research meant to address complexity and support practical decision-making. Dr. Beier has co-authored over 75 refereed publications and has led or collaborated on dozens of research and service-oriented projects since joining ESF in 2007, often in partnership with state and federal agencies. Currently, he is lead investigator on long-term ecosystem monitoring programs at Huntington Forest in the Adirondacks (adk-ltm.org), as well as ongoing efforts building on and applying the outputs of the 2023 New York Forest Carbon Assessment. He received his PhD in systems ecology from University of Alaska-Fairbanks in 2007 and his MSc in forest ecology from Virginia Tech in 2002. He lives with his family on the unceded Onondaga territory currently known as Syracuse.

Abstract:

The CERM Conference keynote presentation will be delivered by Dr. Colin Beier. Dr. Beier will share a multifaceted look at the past, present, and potential future climate benefits provided by the forests of the Catskills region. Using high-resolution time-series maps developed in the NY Forest Carbon Assessment, he will reconstruct the last 30+ years of forest biomass, carbon, and land use dynamics across the region. Zooming in to local scales, he will explore how and why forest carbon storage and sequestration has varied over space and time due to both natural and anthropogenic factors. Zooming out, he will situate the Catskills in the context of the statewide forest carbon sink, the region's role in achieving 'net zero' by 2050 targets, and opportunities and obstacles along the way. Last, he will share updates on models, data products, decision-tools and how ongoing partnerships are leveraging these outputs to advance practical and sustainable climate solutions.

Session 1: Forests

October 22, 2025

Session:	Forests
Title:	Old-growth forest mapping and characteristics in the Catskills Forest Preserve
Corresponding Author:	Timothy Howard
Corresponding Author Affiliation:	New York Natural Heritage Program, SUNY ESF
Corresponding Author Email:	tghoward@esf.edu
Co-Authors:	Abigail Higgins, Greg McGee, Sara Hart, Max Henschell

Presenter Bio:

Tim Howard enjoys the many aspects of ecological assessment, modeling, and mapping that take place at the Natural Heritage Program. This certainly includes the efforts to characterize and understand the forests of the Catskills, from the extensive beech-maple mesic forests of the lower slopes to the mountain spruce-fir forests near many of the mountain summits. Tim obtained a PhD in plant ecology from the University of Michigan and appreciates the science-based applications to conservation and management in his current position. In his free time, he enjoys hiking and biking during the summer, and all kinds of skiing in the winter months, and woodworking and botanizing all year long.

Abstract:

With support from the NYS Department of Environmental Conservation, The New York Natural Heritage Program has embarked on a four-year project to better understand the character and extent of old-growth forests in the Catskill and Adirondack Forest Preserve. This project has three primary phases, beginning with a GIS-based modeling of potential old-growth areas. An initial model has been completed for the Catskills and we will present and compare these results with other mapping efforts in the Catskills. The second phase is to better understand the forest structure and characteristics of old-growth in the Forest Preserve. We sampled a suite of characteristics in old-growth and mature second growth forests, including tree epiphytic mosses and liverworts, tree size structure, and the volume of coarse woody debris. We will present on the factors most characteristics of these forests. The final phase, estimating above and below ground carbon storage in still in progress.

Session:	Forests
Title:	Forest Regeneration in the Wake of Beech Leaf Disease Along an Urban to Rural Gradient
Corresponding Author:	Justin Bowers
Corresponding Author Affiliation:	CUNY Graduate Center
Corresponding Author Email:	justintbowers@gmail.com
Co-Authors:	Richard Hallett, Max Piana, Andrew Reinmann

Presenter Bio:

Justin Bowers is a doctoral candidate in Earth and Environmental Sciences at the CUNY Graduate Center.

Abstract:

Beech Leaf Disease (BLD) is an emergent threat to forests of the northeastern United States. First identified in Ohio in 2012, BLD impacts American Beech (Fagus grandifolia), causing leaf damage, reduced photosynthetic capacity, and eventually mortality in as little as six years after infection. The disease is caused by the nematode Litylenchus crenatae mccannii, identified in 2017. The nematode lives within the buds, causing damage to leaves prior to their emergence. As of 2025 BLD has spread throughout the northeastern United States and adjacent areas of Canada.

Beech are among the most shade tolerant (and shade producing) native broadleaf tree species. The leaves of beech are high in lignan and are slow to decompose, often forming dense leaf beds in the understory. As a result, beech stands are often darker in the understory and more sparsely vegetated than the surrounding forest. Rapid decline in beech canopy caused by BLD will create forest gaps with relatively low vegetation density, but the composition of species that will replace beech in these gaps is undetermined.

We hypothesize that forest regeneration following BLD will vary due to - and be influenced by - stressors including invasive species, herbivory, and other pests and pathogens (e.g. Beech Bark Disease). We expect the prominence and role of these stressors to vary spatially along an urban to rural gradients, leading to differing compositions of native and invasive species in the understory following beech decline. Afforestation efforts begun prior to stand mortality may help to maintain native species richness and discourage the establishment of invasive species.

To test these hypotheses, in 2023 we established 31 monitoring plots in beech tree stands along an urban to rural gradient from New York City to the Catskills. Within each 1/10th acre plot, we collected data on the composition and health of the overstory, midstory and forest floor for three successive years. In addition, we planted 16 paired restoration plots in three locations in New York City and Westchester County. Within the restoration plots, we planted over 1500 locally sourced chestnut and white oak seedlings from known parent trees. These plots were then monitored to determine whether the presence of native seedlings suppressed invasive recruitment.

Here, we will present on three years of data from our BLD monitoring study and two years of data from our gap restoration study. Results from monitoring plots include the observed progress of BLD through New York State, evidence of decline in beech stands suggesting shorter timelines for mortality in the northeast than those observed in the Midwest, and variations in understory recruitment suggesting declining beech stands in suburban sites are more vulnerable to invasive species than either urban or rural sites. Results from our gap restoration plots show high survival rates in both existing and imminent gap sites for oak seedlings, as well as significant native species recruitment where deer exclusion is utilized.

Session:	Forests
Title:	A Revised Geospatial Analysis to Identify Candidate Sites for Designation as a Catskill Research Forest
Corresponding Author:	Daniel Bogan, Ph.D.
Corresponding Author Affiliation:	Department of Environmental Studies and Sciences, Siena University
Corresponding Author Email:	dbogan@siena.edu
Co-Authors:	Tiffany Chen, Ryan Strang, and Pine Roehrs

Presenter Bio:

Daniel Bogan is an associate professor with the Department of Environmental Studies and Sciences at Siena University where he enjoys integrating research with teaching undergraduate students. His research investigates the spatial ecology and behavior of wildlife in forested landscapes across the wildland-urban interface. Dan's applied research seeks to better understand human–wildlife interactions as a means to reduce, if not prevent conflicts to maintain human valuation of wildlife species. He holds a Ph.D. from Cornell University, a M.S. from SUNY University at Albany and a B.S. from SUNY Environmental Science and Forestry.

Abstract:

Research forests support long-term, collaborative approaches to interdisciplinary research and monitoring programs that are necessary to inform environmental policy and management. Unfortunately, the Catskill region lacks a designated environmental research facility. Therefore, we are conducting a geospatial analysis to identify top-tier candidate sites located within the Catskill ecoregion for possible designation and development into a research forest to facilitate long-term environmental research and monitoring in the region. Our geospatial analysis aims to update a previous study from 2014 and identify potential sites using revised preferential and exclusionary criteria while accounting for newly acquired public lands within an expanded study region. The new focal area for this analysis is the 1,839 km2 (710 miles2) overlap between the New York City Department of Environmental Conservation West of Hudson Watershed (4,100 km2 [1,583 miles2]) and the "Blue Line" boundary of the Catskill Park (2,817 km2 [1,088 miles2]). Using watersheds as the spatial framework for the site selection analysis, we subdivided the United States Geological Survey (USGS) Hydrological Unit Classification (HUC) 12 watershed boundaries by delineating smaller watershed drainages of approximately ≥4.047 km2 (1,000 acres). We are currently analyzing the newly delineated watersheds using preferential and exclusionary criteria. Preferential criteria include protected lands (NYSDEC forest preserve lands and NYCDEP in-fee and conservation easement lands), prevalent forest cover, including spruce/fir and first growth forests, site accessibility (e.g., interior hiking trails and dirt roads), presence of existing research and monitoring infrastructure (etc. stream gauges), and the presence of wetland complexes. Exclusionary criteria reduce the overall ratings of sites having extensive land in private ownership and exhibiting prevalent site fragmentation (e.g., housing and imperious roads). We are currently investigating additional criteria for their utility in guiding our siting study, and are seeking feedback from an advisory committee to refine our final criteria for selecting a research forest. Ultimately, our analysis will identify candidate sites that best represent the overall Catskills. The Catskill ecoregion has considerable potential to host a research facility for guiding environmental policy and management.

Session:	Forests
Title:	Interactions between Climate Change and Other Anthropogenic Drivers of Carbon Sequestration in Northeastern Forests.
Corresponding Author:	Charles D. Canham
Corresponding Author Affiliation:	Cary Institute of Ecosystem Studies
Corresponding Author Email:	canhamc@caryinstitute.org
Co-Authors:	

Presenter Bio:

Charles Canham is a forest ecologist and Senior Scientist, Emeritus, at the Cary Institute of Ecosystem Studies. His current research is focused on the drivers of change in composition, structure and carbon dynamics of forests of the eastern U.S.

Abstract:

Effects of climate change on carbon sequestration in northeastern forests play out in the context of other critical anthropogenic impacts, including air pollution, introduced pests and pathogens, and harvesting. Colleagues and I have linked those impacts into a spatially-explicit, individual-based model of forest dynamics (SORTIE-ND) under climate projections from a suite of alternate climate scenarios. The model has been parameterized using Forest Inventory and Analysis data for forests throughout the eastern United States, and includes our recent analyses that reveal that most eastern tree species show strong degrees of phenotypic acclimation or genetic adaptation to their local climate. The most significant impacts of climate change on forest structure, composition, and productivity occur in the currently coldest and driest regions. This reflects replacement over the next 200 years of many species with current northern distributions by species currently abundant in warmer and wetter climates. Many of the predicted changes in carbon sequestration, however, reflect successional dynamics given regional variation in land-use history and current logging regimes. The dynamics of species such as beech, hemlock, and the ashes will reflect the outcome of current threats from introduced pests and pathogens, within the context of dynamics that would otherwise be expected under climate change and harvest regimes.

Session:	Forests
Title:	Forest Ecosystem Response to Climate Change and Potential Water Quality Impacts in the NYC Watersheds
Corresponding Author:	Phoebe Aron
Corresponding Author Affiliation:	Hazen and Sawyer
Corresponding Author Email:	PAron@hazenandsawyer.com
Co-Authors:	Laurie Machung

Presenter Bio:

Dr. Phoebe Aron is a Senior Principal Scientist at Hazen and Sawyer. She is an expert in source water protection, water quality management, and water supply planning. Phoebe holds a BA in Chemistry and Environmental Science from Bowdoin College and a PhD and MS in Earth and Environmental Science from the University of Michigan.

Abstract:

Forests cover up to 90% of the NYC water supply watersheds and play a critical role in maintaining high water quality in the NYC water system. Climate change has already caused changes in temperature and precipitation in the NYC watershed region and in the coming decades will likely lead to more intense and frequent extreme precipitation events and a shift in seasonality toward warmer, wetter winters and hotter, drier summers. Despite well-established climate change projections and clear relationships between forests and water quality, shifts in water quality caused by forest ecosystem responses to climate change are not well known and may have significant impacts on NYC watershed management and water quality.

Climate projections indicate that the frequency and/or severity of drought, extreme runoff events, fire activity, infestations of invasive vegetation, and vegetation disease will increase in the NYC watersheds. In addition, winter temperatures likely will warm more than summer temperatures, leading to earlier spring snowmelt and an expansion of the growing season. These anticipated changes will likely stress high elevation montane spruce-fir forests, leading to high mortality and low regeneration of these species. In response, it is expected that oaks and other climate-adapted northern hardwood and central oak-pine species will expand into up-slope habitats.

To assess the potential treatment and source water management implications of forest ecosystem responses to climate change, this presentation will describe results of a literature review and modeling study on potential water quality changes under several possible climate-driven forest change scenarios in the NYC watersheds. The forest change scenarios include an increase in annual average temperature and precipitation, a reduction in forest compositional diversity through the introduction and/or expansion of generalist species or acceleration of impacts from disease and pests, intensification of summer drought, and structural disturbances in riparian zones, among others. Water quality impacts focus primarily on turbidity and dissolved organic carbon because these are important water quality constituents of concern for NYC, but also include an overview of potential changes to nutrients (nitrogen and phosphorus), acidity, and water temperature as these parameters can also cause regulatory, management, and treatment challenges. Findings suggest that in-stream turbidity, DOC, and water temperature will likely increase, especially during and after extreme hydrologic events. Export of the particulate forms of nutrients will most likely also increase with extreme precipitation events. Recovery from historic acid deposition will likely continue but it is challenging to disentangle the effects of recovery from climate change on acidity in water and soils.

Taken together, this presentation provides an introduction and overview of links among climate, forests, and water quality in the NYC watersheds. Importantly, the presentation will also include a discussion of critical uncertainties related to the magnitude and timing of potential water quality changes and next steps to better understand water quality in forested watersheds.

Session 2: Climate, Forests, Carbon and Hydrology

October 22, 2025

Session:	Climate, Carbon, Forests and Hydrology
Title:	How Has Carbon Shifted with Climate Change at Maplecrest Fen, Catskills During the Past 13,500 Years?
Corresponding Author:	Dorothy Peteet
Corresponding Author Affiliation:	NASA/Goddard Institute for Space Studies and Lamont Doherty Earth Observatory
Corresponding Author Email:	peteet@ldeo.columbia.edu
Co-Authors:	Ralph Ibe, Emily Stone, Catherine Zajac, Clara Chang

Presenter Bio:

Dorothy M. Peteet is a Senior Research Scientist at NASA/Goddard Institute for Space Studies and Adjunct Professor, Columbia University. She directs the Paleoecology Division of the New Core Lab at Lamont Doherty Earth Observatory of Columbia and in collaboration with GISS climate modelers is studying the Late Pleistocene and Holocene archives of lakes and wetlands (peatlands, salt marshes, tidal freshwater marshes, bogs, fens). Her research provides local and regional records of vegetational and climate history using pollen and spores, plant and animal macrofossils, loss-on-ignition, carbon, and charcoal in conjunction with accelerator mass spectrometry (AMS) radiocarbon dating and x-ray fluorescence (XRF).

Abstract:

How Has Carbon Shifted with Climate Change at Maplecrest Fen, Catskills During the Past 13,500 Years? Freshwater peatlands are generally recognized as one of the most important options for mitigating climate change due to their ability to sequester carbon over millennia. They are sites where plant productivity exceeds decay due to a combination of anoxia and cold temperatures, and thus are strong sinks for carbon dioxide and sometimes sources of methane. Unfortunately, in the United States they are increasingly unprotected due to the 2023 US Supreme Court Sackett decision. We investigate Maplecrest Fen in the eastern Catskill Mountains, NY to link the paleoeclimate/paleoecological history of the fen to carbon storage. The peatland record provides a 7.8 m record of carbon sequestration along with the paleoecology which reveals insights into the climate-vegetation-carbon interactions from deglaciation to the present. Following ice retreat, the wetland records an early boreal forest (Abies, Picea, Larix, Pinus banksiana, Betula) present with a Younger Dryas cooling. The early Holocene indicates a white pine (Pinus strobus)-dominated forest as oak expands. As pine declines, a moister beech (Fagus)-hemlock (Tsuga)-oak (Quercus) forest ensues, and we see shifts in moisture that affect hemlock in particular, with the dramatic species decline about 5200 years ago. The discovery of aquatics and emergent in the fen which are not present today (Chara, Callitriche, Isoetes, Menyanthes and Dulichium) enrich our understanding of the Maplecrest local vegetation and these changes through time due to moisture. Carbon storage is calculated for this pond that ultimately shifts to fen accumulation about 1000 years ago. Future climate change in the Catskills with further warming will restrict carbon storage unless substantial increases in moisture accompany this warming.

Session:	Climate, Carbon, Forests and Hydrology
Title:	Macrofossil Stratigraphy of Perch Lake from 14,000 years ago to present
Corresponding Author:	Jenna Black
Corresponding Author Affiliation:	Lamont Doherty Earth Observatory, Palisades, New York, USA
Corresponding Author Email:	Jenna.black95@gmail.com
Co-Authors:	Dorothy Peteet, Daniella Feistritzer, and William J. D'Andrea

Presenter Bio:

Jenna Black is a dedicated student and research assistant who has spent time on research projects focused in paleoecology and dendrochronology. She also has collected data for the NJ Department of Environmental Protection on stream health through macroinvertebrate identification during her time as an AmeriCorps NJ Watershed Ambassador. With this role she also focused on creating education programs for the community based on water quality topics and created volunteer opportunities for community members to get involved in to help improve the health of their local watershed.

Abstract:

This study creates a paleoecological history of a sediment core extracted from Perch Lake, a small lake located in the Catskill Mountains of New York, in February of 2022. The macrofossils from this sediment core were analyzed and identified to understand the vegetational changes of the area over time. The basal clay sediments have no plant fossils present, but do have cladoceran egg cases. Around 14,000 years ago the first plant macrofossils become present and are mountain avens (Dryas integrifolia) and Bryophytes along with cladoceran egg cases. Paper birch (Betula papyrifera) is the first tree to reach the site, followed by macrofossil remains of spruce (Picea) and alder (Alnus). During this time cladoceran egg cases increase along with the presence of a few charcoal pieces. When the boreal trees disappear, white pine becomes present until roughly 10,000 years ago. After white pine declines, hemlock (Tsuga) becomes strongly represented ca. 8,500 years ago in the form of cone scales, needles, and seeds; there is also a large increase in cladoceran egg cases, insects, and mineral debris at this time. At about 5,500 years the hemlock declines abruptly, typical of sites throughout the Northeastern US at this time. Finally, the upper 1.5 meters contains some hemlock but many fewer remains. These marked shifts in cladoceran eggs, insects, and minerals are suggestive of water table shifts that may involve temperature as well. This macrofossil data will be compared with pollen, LOI (loss on ignition) and XRF (x-ray fluorescence) data.

Session:	Climate, Carbon, Forests and Hydrology
Title:	Palynological History of Perch Lake in the Western Catskill Mountains, Andes, New York
Corresponding Author:	Amy Maria Menegay
Corresponding Author Affiliation:	Lamont Doherty Earth Observatory, Palisades, New York, USA
Corresponding Author Email:	amm2628@columbia.edu
Co-Authors:	Dorothy Peteet, William J. D'Andrea

Presenter Bio:

Amy Maria Menegay is a Bridge to Phd Scholar at Columbia University, working at Lamont Doherty Earth Observatory under advisor Dorothy Peteet. At Lamont, Amy studies paleoecology, with a specific focus on palynological analysis. Before coming to Columbia, Amy completed her Bachelor of Science in Biology at William and Mary in Virginia. During her time there, she researched harmful algal blooms at the Virginia Institute of Marine Science. Amy is planning to apply to PhD programs in earth and marine science this upcoming fall.

Abstract:

This study presents the palynological history of Perch Lake (42.12° N, 74.80° W), a small lake located at 548m in elevation in the Western Catskills of New York. The Catskill Mountains provide New York City with clean drinking water, so studying the climate and hydrological history of the area is important to inform our understanding of how future climate changes will impact accessibility to water for millions of people. Perch Lake is surrounded by a hardwood forest dominated by maple species, indicative of a generally cool and moist climate. A 4.7meter sediment core was collected and sampled for loss-on-ignition (LOI), macrofossils, and pollen to understand the post-glacial ecological changes of the area. The core was AMS radiocarbon dated to obtain the chronology of these changes. Sediment accumulation in Perch Lake likely began around 14,000 cal yr BP. Thus far, pollen data from the bottommost core shows that the area was dominated by pine (Pinus), spruce (Picea), and sedge (Cyperaceae) during the late glacial period. After an initial decrease in sedge, birch (Betula) and alder (Alnus) increase, indicative of Younger Dryas cooling. An abrupt spike of sedge up to 35% follows shortly after the birch and alder. This large and abrupt increase of sedge suggests a marked change in the water level of Perch Lake, which appears to be at the shift to Holocene conditions. Following this spike, sedge experiences a sudden decrease, and we see an increase of oak (Quercus) up to approximately 35%. This is characteristic of the Holocene transition zone, with an increase in hemlock (Tsuga) following that of oak, indicating a transition to a warmer, moister climate. Pollen counts have been completed up until approximately 10,000 cal yr BP, with oak, hemlock, and pine as the dominant species present during this time. LOI, comparison to macrofossil data, and further pollen analysis are currently ongoing.

Session:	Climate, Carbon, Forests and Hydrology
Title:	14,000 years of temperature and hydroclimate variability in the Catskill Mountains: New paleoclimate records from Perch Lake, Andes, NY
Corresponding Author:	William J. D'Andrea
Corresponding Author Affiliation:	Lamont-Doherty Earth Observatory of Columbia University
Corresponding Author Email:	dandrea@ldeo.columbia.edu
Co-Authors:	Caitlin Huntsman, Maura Mulholland, Redmond Stein, Dorothy Peteet, Nicholas L. Balascio

Presenter Bio:

Billy D'Andrea is a Research Professor at LDEO of Columbia University, where is also the Director of the Organic Geochemistry Facility and an Adjunct Professor in the Department of Earth & Environmental Sciences. Billy is a paleoclimatologist, an organic geochemist, and a sedimentologist who uses the geologic record to understand how Earth's climate has operated in the past. Earth's history is recorded in exquisite detail in the world's sediments and D'Andrea's research group works to recover, read, and understand this history. Billy has strong roots in the Catskills and is excited to be helping to understand their climate history.

Abstract:

The Catskill Mountains are a dissected plateau in southern New York marking the northeastern boundary of the Allegheny Plateau, and contain reservoirs that provide water to over 10 million people in the greater New York City region. The 20th century was characterized by abundant rainfall in the Catskills, but tree ring research (Pederson et al., 2013) suggests that the region has experienced much greater hydroclimate variability than is captured in the instrumental record, including prolonged drought conditions. Documenting the full range of climate variability in the Catskills is important to anticipate possible future climate changes. Here we report a quantitative temperature reconstruction of past lake water temperature based on alkenone paleothermometry (UK37) and a leaf wax-based reconstruction of hydrogen isotopes (∂2H) in precipitation from Perch Lake (42.12° N, 74.80° W), Andes, NY. The UK37-inferred summer lake water temperature record spans the late deglacial through the middle Holocene (~12,200 to 5,400 years before present (BP)). It documents warming at 11,300 years BP followed by a number of abrupt cooling intervals, each lasting a few centuries and coincident with previously documented episodes of meltwater discharge from Hudson Strait associated with Laurentide Ice Sheet (LIS) glacial events (Jennings et al., 2015). The early Holocene was an interval of volatile climate variability in the greater North Atlantic region, as the melting LIS impacted ocean circulation and regional climate. The new Perch Lake temperature record helps quantify the climate response in the northeastern US to meltwater input to the Labrador Sea and will be used to assess general circulation model results from freshwater forcing experiments. ∂2H values of leaf waxes (n-alkanes) capture intervals of inferred drying during the Holocene and, together with n-alkane distributions and macrofossil analyses, can be used to infer hydroclimate variability, ecosystem changes, and changes in atmospheric dynamics over the Catskill Mountains during the past 14,000 years.

Pederson, N., Bell, A.R., Cook, E.R., Lall, U., Devineni, N., Seager, R., Eggleston, K. and Vranes, K.P., 2013. Is an epic pluvial masking the water insecurity of the greater New York City region?. Journal of Climate, 26(4), pp.1339-1354.

Jennings, A., Andrews, J., Pearce, C., Wilson, L. and Ólfasdótttir, S., 2015. Detrital carbonate peaks on the Labrador shelf, a 13–7 ka template for freshwater forcing from the Hudson Strait outlet of the Laurentide Ice Sheet into the subpolar gyre. Quaternary Science Reviews, 107, pp.62-80.

Session:	Climate, Carbon, Forests and Hydrology
Title:	Estimated New York City Water Supply Reliability Over the Years 1450 to 2020 Using Paleohydrologic Reconstructions Derived From Tree Ring Sample Data
Corresponding Author:	John Clayton, PhD, PE
Corresponding Author Affiliation:	Hazen and Sawyer
Corresponding Author Email:	jclayton@hazenandsawyer.com
Co-Authors:	Naresh Devineni, PhD; Adao Matonse, PhD; Jerry Mead, PhD

Presenter Bio:

John Clayton, PhD, PE is a Senior Associate with the consulting firm Hazen and Sawyer. For the last 23 years he has been an SME in Hazen's Water Resources Management group focusing on basin water supply and urban water demand modeling and forecasting, with emphasis on statistical/stochastic approaches and incorporation of past and future climate change. His list of clients includes New York City DEP, Tampa Bay Water, Georgia Department of Environmental Protection, Kansas Water Office, San Diego County Water Authority, South Central Connecticut Regional Water Authority, Gwinnett County (GA) Department of Water Resources, and the Water Research Foundation.

Abstract:

There are indications within the last 100 years of flow records and 570 years of tree ring data that, over 1970 to present, climatic conditions governing NYC's water supply have been wetter than normal for longer than normal, potentially leading to overconfidence in long-term supply reliability. This presentation will describe efforts undertaken by NYCDEP to estimate their system inflows and responses according to tree ring observations over the paleo-period and compare supply reliability and water quality under extended and modern inflows. The primary focus of this presentation will be a method of synthesizing OST model inflows over a 570-year historical period using paleoclimatic tree ring records. The resulting OST inflow dataset extends back to the year 1450 AD, the beginning of the longest tree ring record, and places the modern pluvial within the context of likely flows over that period. As such, the dataset not only treats the pluvial as an outlier but indicates the extent to which it varies from historically evident hydrology. Hierarchical Bayesian Regression models were built that related tree ring widths for core samples within the Upper Delaware, Lower Delaware, Catskill, and Croton watersheds to annual streamflows at gages within those watersheds. These models also produced annual gage flow estimates for years prior to the flow record based on tree ring widths in those years. The presentation will explain these methods in greater detail and show how OST results vary between use of the standard historical and extended paleoclimate inflow datasets.

Session 3: Varied Presentations

October 22, 2025

Session:	Varied Presentations
Title:	Historical Climate Reconstruction for Drought Risk Modeling in NYC's Water Supply
Corresponding Author:	Niloofar Nejatian
Corresponding Author Affiliation:	City University of New York (CUNY), Department of Earth and Atmospheric Sciences, New York, USA
Corresponding Author Email:	nnejatian@gradcenter.cuny.edu
Co-Authors:	Allan Frei, Rakesh Gelda, Rajith Mukundan, and Reza Khanbilvardi

Abstract:

New York City's water supply system relies on watersheds in the Catskill and Delaware regions, which together provide more than 90% of the city's drinking water. These critical source areas represent dynamic environments influenced by interactions between climate extremes, water resource management, ecological processes, and human activities. However, the lack of continuous, long-term daily historical climate data has limited efforts to understand water supply and drought variability in these source watersheds. To address this gap, the study reconstructed daily minimum and maximum temperatures and precipitation time series from 1893 to 2025 for the NYC watershed using a combination of long-term station observations (12 temperature and 19 precipitation sites) and the PRISM dataset, which offers 4-km gridded daily climate estimates from 1981 onward. Station records were first gap-filled using deep learning models (e.g., LSTM) and then used to extend PRISM series backward in time through Random Forest-based reconstruction. Validation against independent NOAA gridded datasets (nClimGrid, Unified Gauge-Based) showed strong agreement, with low error and high temporal correlation across most reservoir basins. The resulting dataset will provide a robust foundation for improved drought modeling and forecasting efforts across the entire NYC watershed system, including the critical Catskill reservoirs. It will enable more accurate development of drought indices (such as SPI and PDSI), contributing to proactive drought preparedness and adaptive management strategies. Ultimately, this integrated AI-driven framework will be able to support more informed water resource management and enhance the resilience of NYC's water supply system under changing climatic conditions.

Session:	Varied Presentations
Title:	Modeling forest growth in the Biscuit Brook watershed, Catskill Mountains, New York, USA, using TASC-Forest
Corresponding Author:	Sijal Dangol
Corresponding Author Affiliation:	Institute for Sustainable Cities, Hunter College, City University of New York; Bureau of Water Supply, New York City Department of Environmental Protection, Kingston, NY
Corresponding Author Email:	sdangol@dep.nyc.gov
Co-Authors:	Rajith Mukundan, Rakesh K. Gelda, and Xuesong Zhang

Abstract:

New York City (NYC) water supply system has long depended on the Catskill Mountain watersheds to provide a reliable supply of high-quality drinking water. More than 80% of these watersheds are forested, playing a crucial role in maintaining and enhancing water quality. In recent decades, the ecosystem services provided by these forests are increasingly impacted by disturbances such as, droughts, wildfires, and extreme weather events. Ecosystem models such as TASC-Forest could serve as a valuable tool for understanding and assessing the impacts of these disturbances on the sustainable supply of drinking water from forested watersheds. While TASC-Forest incorporates a process-based representation of forest ecosystem processes, it is important to evaluate its performance in simulating water and carbon cycling processes within forested watersheds. In this study, we implemented and evaluated the TASC-Forest model in the Biscuit Brook watershed in the Catskill Mountains, New York, USA for simulating forest growth, streamflow, and evapotranspiration. Results indicate that TASC-Forest performs well in simulating annual aboveground live forest carbon across multiple forest biomes: evergreen, mixed, and deciduous and monthly streamflow, and evapotranspiration. These results suggest that TASC-Forest can serve as a valuable tool for assessing and projecting future changes in forest growth and water balance in forested watersheds.

Session:	Varied Presentations
Title:	Preserving the peaks: Does off-trail hiking imperil montane birds in the Catskills high peaks?
Corresponding Author:	Kara Belinsky
Corresponding Author Affiliation:	Biology Department, SUNY New Paltz
Corresponding Author Email:	belinskk@newpaltz.edu
Co-Authors:	Christopher Gabelman, Andres Barragan, Danielle Takacs, Samuel Mateo Jr., Becky Montoya, Pia Kinsella, Jason Hill, Pine Roehrs

Presenter Bio:

Kara Belinsky is an Associate Professor of Biology at SUNY-New Paltz where she teaches General Biology, Wildlife Biology, Animal Behavior, and Ornithology. Belinsky is currently studying how human development affects wildlife, including using MAPS bird banding stations to compare bird communities in forest fragments at Mohonk Preserve, assessing where nest boxes can be placed in the suburban Mill Brook Preserve to support native birds, how to manage bird and bee-friendly land fill caps in New Paltz, and if off-trail hiking is harming mountain-top breeding birds in the Catskill High Peaks.

Abstract:

The Catskill High Peaks are a popular hiking destination, and levels of use have spiked and stayed high since the COVID 19 pandemic. In addition, the rise of app-driven navigation and hiking club challenges has increased hiking off official trails maintained by The Department of Environmental Conservation (DEC). DEC has been monitoring and documenting the proliferation of unofficial trails on formerly trail-less peaks in the Catskills High Peaks since 2019, and DEC is currently drafting a new Visitor Management Use (VMU) plan for the Catskills that aims to lay out new management strategies for balancing this increase in hiking with the DEC's mandate to preserve wildlife in the Catskills. More research is needed to understand whether bird populations (particularly at-risk species such as Bicknell's Thrush and other montane-breeding birds) are negatively affected by current and future levels of human recreation on and off the official trails in the Catskill High Peaks. We asked if off-trail hiking has a detrimental effect on montane bird abundance and richness in the high peaks. We predicted that both official and unofficial trails with high human visitation will have a lower avian abundance and richness compared to low visitation unofficial trail sites (controls). We conducted point counts at dawn during the early summer months in 2023-2025 at 72 locations across 10 of the High Peaks. We detected a total of 2,059 birds over the three survey seasons. So far, our data indicate that overall species abundance and montane species abundance are negatively correlated with high human visitation, but species richness was similar among sites and samples sizes for individual species are too small for robust analysis. Our study will continue through 2027, and as our sample size increases, we hope to better evaluate the effects of hiking on species richness and particular species of concern, such as Bicknell's thrushes, and to aid DEC land managers in routing new official trails around montane bird habitats to protect montane birds and preserve the Catskills High Peaks for future hikers to enjoy.

Session 4: Streams and Sediment

October 23, 2025

Session:	Streams and Sediment
Title:	Collaborative rewards in the upper Esopus Creek watershed turbidity study
Corresponding Author:	Dany Davis
Corresponding Author Affiliation:	NYCDEP
Corresponding Author Email:	davisd@dep.nyc.gov
Co-Authors:	Jason Siemion, Jenny Wang, John Kemper, Matt Trueheart, Allison Lent, Leslie Zucker

Presenter Bio:

Dany Davis is a geologist working for the New York City DEP as the Stream Studies Coordinator and a fluvial geomorphologist. Prior to starting with DEP in 1997, Dany worked as a consulting groundwater flow modeler for 8 years. Dany studied geology in the 1980s at SUNY New Paltz and the University of Alaska.

Abstract:

Stream turbidity is a regulated water quality parameter in the unfiltered New York City drinking water supply. Elevated levels in the Ashokan Reservoir following flood events are an ongoing concern for maintaining filtration avoidance. The New York City Department of Environmental Protection (DEP) and the U. S. Geological Survey (USGS) began a 10-year collaborative investigation in 2016 into stream turbidity production and potential for turbidity reduction through stream management practices in the upper Esopus Creek watershed, the primary tributary to the Ashokan Reservoir. Turbidity production is the process and product of generating turbid streamflow through entrainment and transport of fine sediment in the stream channel network. The initial study goals used streamflow, turbidity, geologic, and geomorphic data to (1) investigate sub-basin scale distribution of turbidity production in the upper Esopus watershed, and (2) evaluate the efficacy of stream management practices to reduce turbid streamflow to the Ashokan Reservoir. Along the way, the study has expanded and intersected with stream management professionals, academic investigations, research internships, professional engineering consulting services, and streamside landowner engagement. The result is a network of investigations, and a cascade of findings that far exceed the original goals of the DEP-USGS study. In this presentation we: (1) simultaneously chart the course of research and management collaboration from study design through implementation periods, (2) turbidity production conceptual model development and testing, and (3) present preliminary findings to demonstrate the value of the coordinated efforts resulting from this extensive collaboration.

Session:	Streams and Sediment
Title:	Forecasting in-stream turbidity using machine learning and a high-frequency sensor network
Corresponding Author:	John T. Kemper
Corresponding Author Affiliation:	Utah State University
Corresponding Author Email:	john.kemper@usu.edu
Co-Authors:	Kristen L. Underwood, Scott D. Hamshaw, Dany Davis, Jason Siemion, James B. Shanley, Andrew W. Schroth

Presenter Bio:

John Kemper is a researcher in the Department of Watershed Sciences at Utah State University. He is a fluvial geomorphologist and watershed scientist who studies the transport of material – water, sediment, wood, nutrients, etc. – through river basins to understand how river landscapes act, react, and evolve as connected networks of processes. John received his PhD from Colorado State University and recently completed a postdoctoral fellowship at the University of Vermont. He is passionate about understanding and protecting streams and rivers.

Abstract:

As high-frequency sensor networks enhance our ability to monitor in-stream water quality conditions, process-based models like the U.S. National Water Model (NWM) are generating accessible forecasts of streamflow at increasingly dense scales. As such, there is a rich opportunity to leverage these products to generate actionable water quality forecasts. To that end, we couple streamflow forecasts from the NWM to a gradient-boosted decision tree algorithm (LightGBM) trained on 5+ years of high-frequency monitoring data to forecast in-stream turbidity levels in the Esopus Creek catchment of the Catskill Mountains, NY, USA, a large drinking water source catchment in the New York City Water Supply System (NYCWSS). Results indicate models are capable of relatively skillful predictions, producing robust forecasts for 13 days lead times. LightGBM models offer improvements over a simplified linear model across the entire forecast horizon, and more spatially complex models are more resilient to error at shorter lead times (1–3 days). Interpretation of model features emphasizes high flows as a driver of turbidity in the region. Results suggest that interpretable, flexible, and efficient machine learning algorithms can produce capable water quality forecasts from streamflow forecasts and expand understanding of process dynamics. In terms of direct management for the Esopus Creek catchment, Ashokan Reservoir, and broader NYCWSS, the newly constructed models presented here may be best used in conjunction with existing protocols to offer an ensemble forecast of turbidity across a variety of lead times. The use case illustrated here underscores the potential to employ the NWM to expand water quality forecasting capacity in the Catskills and can overall serve as a guide for similar efforts in basins across the country.

Session 5: Water Quality and Quantity

October 23, 2025

Session:	Water Quality and Quantity
Title:	Flow Path Based Spatial Analysis to Prioritize Riparian Buffer Placement in the Catskills
Corresponding Author:	Ashok Jacob
Corresponding Author Affiliation:	The Pennsylvania State University
Corresponding Author Email:	abj5710@psu.edu
Co-Authors:	Cibin Raj, Rajith Mukundan, Rakesh Gelda, Sijal Dangol

Abstract:

Riparian buffers protect stream water quality by filtering pollutants from adjacent farmland, roads, and developed areas. They account for 61% of the stream management projects implemented in the Catskills watershed by the state of New York, offering the least cost per unit length. Identifying the critical locations for future buffer placement would help the state prioritize and derive more value from stream management investments. Flow path-based loading metrics along stream banks were derived using Traversibility algorithm for Cannonsville watershed in Catskills, New York. Uniquely, the loading metrics integrated the effects of hydrology, landcover and soil. The impact of riparian buffers on reducing the pollutant load into the stream was considered using a buffer effectiveness factor. Points with loading beyond a predetermined threshold were identified as high-build-up and analyzed alongside buffer width to determine priority restoration points. The study further tested a Concentrated Flow Pathway approach to refine loading and buffer effectiveness estimates. The results identified more than 100 critical points in the West Branch Delaware River, Little Delaware River, West Brook, East Brook and Platner Brook subbasins, where urban areas are adjacent to the streams without riparian buffers. The automated, publicly reproducible workflow provides a scalable planning tool for prioritizing buffer restoration and improving stream water quality across the Catskills.

Session:	Water Quality and Quantity
Title:	Predicting Climate Change Impacts on Stream Flow and Flood Risk in the Catskills Region
Corresponding Author:	Mark Carabetta
Corresponding Author Affiliation:	SLR Consulting
Corresponding Author Email:	mcarabetta@slrconsulting.com
Co-Authors:	Matt Trueheart

Presenter Bio:

Mark Carabetta is US Manager of Climate Resilience Planning at SLR Consulting. As a scientist with over 30 years of experience in the US and Canada, Mark specializes in the science of wetlands, rivers, and climate change. He is a Professional Wetland Scientist and Certified Floodplain Manager with degrees in Botany, Natural Resources Management, and Engineering.

Abstract:

Rigorous planning and design efforts require consideration of climate change impacts, but there is considerable uncertainty associated with predicting future river flows in extreme flood events. Our team developed and implemented a four-step approach to estimate a range of potential future peak stream discharges and evaluate flood risk at specific locations in the Catskills Region. First, we used precipitation intensity-duration-frequency curves for projected future conditions, developed from 4 regional climate models and 25 downscaled global climate models by the Northeast Regional Climate Center, to estimate future changes in precipitation intensity for a range of time periods, emissions scenarios, and return intervals. Second, the future extreme rainfall projections were used in precipitation-runoff hydrologic models, which consider watershed features such as land cover, soil character, and the amount of wetland storage, to compute flood discharges. Third, the resulting peak discharge values were used in hydraulic models to assess potential future flood conditions. Fourth, modeled flood depths and extents were mapped on aerial imagery. The results were used to evaluate future flood risk under a range of time scales and emissions pathways, and reflect the uncertainty associated with these projections. Our four-step approach may have wider applications for evaluating projected changes in flood risk due to climate change, and in understanding the relationship between rainfall intensity, duration, and stream flow.

Session:	Water Quality and Quantity
Title:	The fate of disinfection byproducts precursors in Ashokan Reservoir
Corresponding Author:	Rakesh Gelda
Corresponding Author Affiliation:	New York City Department of Environmental Protection
Corresponding Author Email:	rgelda@dep.nyc.gov
Co-Authors:	Rajith Mukundan

Presenter Bio:

Rakesh Gelda is a research scientist at New York City Department of Environmental Protection where he is responsible for developing and applying reservoir water quality models and studying climate change impacts. Dr. Gelda has 30 years of experience in surface water quality modeling and has authored and co-authored more than 50 papers in peer-reviewed journals. Dr. Gelda holds Ph.D. from Michigan Technological University.

Abstract:

Natural organic matter (NOM), produced from the decay of plant litter in forested watersheds, is transported into receiving waterbodies through both surface runoff and subsurface flow. When water containing NOM is disinfected with chlorine during drinking water treatment, it reacts to form disinfection byproducts (DBPs), some of which are known to pose risks to human health. Because NOM serves as the precursor material for DBP formation, understanding the fate of these compounds in receiving waterbodies is critical for protecting water quality and public health. A key challenge in addressing this issue is that DBP precursors are a complex and heterogeneous mixture of organic molecules that are difficult to characterize and model directly. In this study, we use ultraviolet absorbance at 254 nm (UV254) as a surrogate for DBP precursors. UV254 is a practical and reliable indicator of the humic fraction of NOM, which tends to be more reactive with chlorine. Additionally, it can be measured rapidly and cost-effectively. We applied a two-dimensional hydrothermal and water quality model, CE-QUALW2, to simulate the transport and fate of UV254, serving as a proxy for DBP precursors, in Ashokan Reservoir. We modeled UV254 concentrations using first-order decay kinetics, with a net decay rate that depends on both temperature and UV254 levels. The calibrated first-order net loss rate coefficient, k, was determined to be 0.002 d^{-1} at 20 °C, corresponding to a half-life of approximately 347 days. This slow decay rate reflects the refractory nature of NOM exported from the watershed into the reservoir, indicating its resistance to biodegradation. Model results show good agreement with observed UV254 concentrations in the reservoir and in water diverted to the downstream Kensico Reservoir for treatment, suggesting that the approach is effective for understanding the fate of DBP precursors in New York City's water supply reservoirs.

Session:	Water Quality and Quantity
Title:	Potential Climate Change Impacts on Disinfection Byproduct Precursors in the Catskill Watershed
Corresponding Author:	Shannon Roback
Corresponding Author Affiliation:	Riverkeeper
Corresponding Author Email:	sroback@riverkeeper.org
Co-Authors:	Dan Shapley

Presenter Bio:

Shannon Roback, PhD. is the Science Director at Riverkeeper. Riverkeeper protects and restores the Hudson River from source to sea and safeguards drinking water supplies (including the NYC water supply), through advocacy rooted in community partnerships, science and law. Roback has a PhD. in Environmental Science and Engineering from UCLA. She was previously a research associate at Metropolitan Water District and Orange County Water District in California, where evaluated the efficacy of different strategies for reducing the formation of regulated and unregulated DBPs. Prior to joining Riverkeeper, she was a professor of environmental health science and has published over 20 peer-reviewed papers on DBP precursors, formation and control.

Abstract:

Disinfection byproducts (DBPs) are caused by chemical reactions between organic matter or anthropogenic chemicals and disinfectants used during drinking water treatment. Over 600 DBPs have been identified and many are carcinogenic. Disinfection byproducts are likely to increase as a function of a variety of factors associated with climate change including increases in algal organic matter, natural organic matter loading, water temperature increases and disinfection practices.

Harmful algal blooms (HABs) are likely to become more common as temperature increases spur algal and cyanobacterial growth. Increases in soil temperature will also increase nitrogen and phosphorous mineralization resulting in more nitrogen and phosphorous being released from soils, supporting this growth. Organic matter associated with the cyanobacterial biomass can serve as a disinfection byproduct (DBP) precursor, leading to increased likelihood of DBP formation when more cyanobacteria are present.

More extreme precipitation events are also expected, which will likely lead to an increase in the release of a variety of contaminants found in wastewater, including effluent organic matter. Agricultural run-off will also likely increase due to increasing precipitation, leading to nutrient and natural organic matter loading. Nitrogen addition from run-off can result in the formation of nitrogenated DBPs and natural organic matter increases will lead to the formation of carbonaceous DBPs. Drought may temporarily decrease runoff, but when followed by periods of deluge, can increase organic matter loading. These drivers could lead to highly variable increases in organic matter and water quality in reservoirs.

Wildfires, which may become more common in the NYC drinking water watershed as climate change progresses, can release pyrogenic dissolved organic matter (pyDOM.) PyDOM is relatively mobile and can be transported across long distances, contributing to the increased dissolved organic carbon (DOC) and nitrogen (DON) in forest watersheds following wildfires. Wildfire retardants (mainly composed of ammonium sulfate and/or ammonium phosphate fertilizers) have also been shown to increase eutrophication in water bodies receiving runoff from treated areas, increasing the likelihood of algal organic matter formation.

Increases in global temperature and increased drought and deluge events will all impact the quality of drinking water sources, including those in the New York City drinking water watersheds. A higher amount of organic matter is expected to enter waterways. Investments in source water protection strategies that can reduce organic matter loading and combat DBP formation are required to assure that drinking water sources remain safe as climate change progresses.

Session 6: New Technologies and Methods

October 23, 2025

Session:	New Technologies and Methods
Title:	Graph Neural Network for Turbidity Prediction in the Upper Esopus Creek Watershed
Corresponding Author:	George Harrison Myers
Corresponding Author Affiliation:	UVM
Corresponding Author Email:	ghmyers@uvm.edu
Co-Authors:	Aidan Hayes, Andrew Schroth, John Kemper, Kristen Underwood

Presenter Bio:

Harrison Myers is a PhD candidate in Civil and Environmental Engineering at the University of Vermont and a research fellow with the Gund Institute for Environment. His research focuses on the application of machine learning to improve predictions of water quality and ultimately guide effective water resources management.

Abstract:

New machine-learning algorithms have the potential to nimbly forecast water quality constituents in support of watershed and reservoir management. Deep learning algorithms, in particular, have evolved to analyze patterns in long-term and high-frequency data sets, and have shown great promise for predicting water quality trends (Appling et al., 2022). Distributed sensor networks, such as those deployed in the Upper Esopus Creek (UEC) watershed in the Catskills, have the added potential to capture tributary to tributary dynamics (Jia et al., 2021). Relying on the extensive sensor networks of the UEC, we illustrate the application of an emerging deep learning method - Graph Neural Networks (GNNs), or geometric learning - to generate predictions of suspended sediment loading to the Ashokan Reservoir and enable discrete event source tracing of suspended sediment throughout the watershed. Recently, GNNs have emerged as an efficient and robust approach to synthesize and learn patterns from spatially and temporally distributed information in a watershed, and to forecast at ungaged locations in the network (Sun et al., 2021). GNNs are a class of algorithms that represent the dendritic or branching structure of a river network using a series of nodes connected by edges. Relying on the spatially robust network of discharge and turbidity sensors maintained by USGS and NYCDEP, we use a GNN to predict turbidity at gaged and ungaged locations throughout the UEC network. We constructed a graph representation of the stream network with nodes centered at sensor gage locations and other points of interest (e.g., tributary junctions; management locations) and edges representing NHD reaches connecting the nodes. We compiled catchment and reach attributes pertinent to the forecast objectives (e.g., hydrometeorological, topographic) associated with each node and edge, relying on publicly accessible datasets (e.g., NLDI, AORC).

Once trained on historical data, the GNN will be capable of predicting turbidity at ungaged locations to forecast trends under a changing climate that is expected to bring more frequent and intense storms and droughts. By forcing the model with observed (or forecast) discharge we will predict suspended sediment concentration (at nodes) and sediment fluxes (edges) under varying management scenarios, including streambank and floodplain restoration projects. To understand how specific watershed or climatological features contribute to GNN predictions we will use interpretable machine learning techniques including SHAP values (Holzinger et al 2022), to determine feature importance (i.e., magnitude) and feature attribution (i.e., directionality) for each input variable as they relate to model predictions.

Session:	New Technologies and Methods
Title:	Deep Learning for Watershed Management: Nested Turbidity Forecasting in the Upper Esopus Creek
Corresponding Author:	Shaurya Swami
Corresponding Author Affiliation:	Department of Computer Science, University of Vermont, Burlington, VT
Corresponding Author Email:	sswami@uvm.edu
Co-Authors:	Kristen L. Underwood, Donna M. Rizzo, Patrick J. Clemins, Andrew W. Schroth, Harrison Myers, Julia Perdrial

Abstract:

Water quality in the Catskills directly influences the reliability of New York City's drinking water supply. Turbidity, in particular, remains a persistent management challenge for the Ashokan Reservoir and downstream systems, as it reflects both localized disturbances in tributaries and cumulative effects of upstream hydrologic, meteorological, and sediment processes. Accurately forecasting turbidity at multiple temporal scales is therefore essential for effective watershed management and drinking water supply operations.

This study develops and evaluates a scalable deep learning framework for turbidity forecasting across the Upper Esopus Creek watershed, with an emphasis on source tracing of tributary contributions to downstream conditions. Our architecture combines Gated Recurrent Unit (GRU) models trained at individual tributaries (e.g., Stony Clove Creek, Beaver Kill) with a downstream Long Short-Term Memory (LSTM) model at Coldbrook, enabling the system to assimilate localized predictions into an integrated outlet forecast. This nested design mirrors the hydrological structure of the Catskills, where tributary-specific influences converge to shape turbidity dynamics at critical management points.

To account for heterogeneity across sites, input variables for each tributary model are selected using Random Forest and SHAP-based feature attribution, ensuring that watershed-specific drivers such as discharge, precipitation, temperature, and soil moisture conditions are represented. To balance accuracy and efficiency, we apply a multi-objective evolutionary algorithm (MOEA) to tune hyperparameters with two simultaneous goals: maximizing predictive skill (Nash-Sutcliffe Efficiency, NSE) and minimizing training time. This dual optimization supports both operational feasibility and computational efficiency, especially when scaling across multiple sites.

The framework is evaluated at forecast horizons of 1, 3, 6, and 24 hours, with particular attention to threshold exceedance events relevant for turbidity management at Ashokan Reservoir. Preliminary results highlight the ability of tributary-level forecasts to improve downstream accuracy and provide managers with actionable lead time to anticipate and mitigate elevated turbidity levels.

Session:	New Technologies and Methods
Title:	A New Method for Mapping Beech Tree Distribution and Decline
Corresponding Author:	Andrew Reinmann
Corresponding Author Affiliation:	CUNY Advanced Science Research Center
Corresponding Author Email:	Rosemary McGuinness (lead author)
Co-Authors:	

Presenter Bio:

Associate professor of Environmental Science in the Environmental Sciences Initiative at the CUNY Advanced Science Research Center and in the Department of Geography and Environmental Studies at Hunter College in New York City. The research focus of my lab is aimed at understanding how forest ecosystems and the terrestrial carbon cycle respond to environmental changes such as land cover and climate change, forest fragmentation, urbanization, and invasive species.

Abstract:

Beech Leaf Disease (BLD) is an emerging forest pest that threatens American beech (Fagus grandifolia) trees throughout the Northeast U.S. While there is currently no feasible means for controlling the spread of BLD or its impacts on beech trees at forest and landscape scales, there are efforts to implement different management strategies to mitigate the ecological impacts of beech tree mortality. A key obstacle to implementing such strategies is knowing where beech trees are across the landscape and where they are declining. An efficient, landscape-scale remote sensing-based method of mapping beech distribution and monitoring the spread of BLD can greatly aid efforts to manage for BLD. Typically, hyperspectral data are used for remotely detecting specific species as its many hundreds of spectral bands can pick up the unique spectral signatures of different species. However, hyperspectral data are expensive, difficult to acquire, and have limited temporal and spatial coverage. Here, we will present on a method we developed for detecting beech trees that instead relies on publicly and globally available data from the Sentinel-2 satellite constellation, which captures imagery every 5 to 10 days throughout the year. Though Sentinel-2 has coarser spectral and spatial resolution, the high temporal resolution allows our model to take in the distinct phenological cycles displayed by different tree species. Our method combines a remote-sensing technique called spectral unmixing with a machine-learning algorithm to achieve accuracies of between 60 – 80% at a 10-m spatial resolution across two forests in New Hampshire and the Adirondacks and we have developed preliminary maps of beech distribution across the Catskills. Moving forward, we plan to use these maps and Sentinel-2 satellite imagery to track changes in beech tree health over time.

Session 7: Human Induced Impacts on Public Lands

October 23, 2025

Session:	Human Induced Impacts on Public Lands
Title:	Barcoding Bycatch - Exploring techniques to maximize knowledge gained from trapping efforts
Corresponding Author:	Amanda Dillon
Corresponding Author Affiliation:	NYS Department of Environmental Conservation
Corresponding Author Email:	amanda.dillon@dec.ny.gov
Co-Authors:	Jess Cancelliere, Marc Digirolomo, Liam Somers, Erica Culbert

Presenter Bio:

Dillon is a research scientist with the New York State Department of Environmental Conservation. She manages the Forest Health Research lab for the Division of Lands and Forests.

Abstract:

Targeted trapping for a particular insect species or groups inevitably results in the capture of nontarget insects, sometimes in large quantities. Due in part to the taxonomic bottleneck created by a paucity of taxonomists, identifying this bycatch has historically presented a significant logistical hurdle and resulted in these specimens being discarded. This represents a potentially significant loss of records especially for traditionally data-deficient taxonomic insect groups. In addition, it is a potential loss of records for rare and declining species of conservation concern as well as a missed opportunity to early detect and react to potentially damaging invasive species. Our lab, working with other researchers in the region, worked with the Advanced Identification Methods Laboratory in Germany to delineate methods to genetically barcode this bycatch. By grinding the specimens into a homogenous slurry, aliquots could be taken for DNA extraction and, using insect-specific primers, compared to genetic databases like BOLD. Using this method about 30% of our bycatch could be successfully identified to species, a large improvement from zero. The downside of this method is that when rare or concerning species were detected with limited genetic confidence, the specimens no longer remained for morphological confirmation resulting in more trapping to re-detect and confirm records. Our lab is now working with the Core Genomics Facility at Cornell University to explore other methods to extract DNA from bycatch while leaving the specimens intact. Our hope is that after barcoding, we will be able to confirm target identifications by returning to the bycatch sample.

Session:	Human Induced Impacts on Public Lands
Title:	Wood Turtle Habitat Use and Mortality at a Catskills Farm Landscape
Corresponding Author:	Erik Kiviat
Corresponding Author Affiliation:	Hudsonia
Corresponding Author Email:	kiviat@bard.edu
Co-Authors:	Jason Tesauro, Kathryn Natale, Lea Stickle

Presenter Bio:

Erik Kiviat PhD PWS has studied turtles and other biota of conservation concern in the Hudson Valley region for 50 years. He is executive director of Hudsonia, a nonprofit institute for research and education in the environmental sciences.

Abstract:

The wood turtle (Glyptemys insculpta) is a semi-aquatic freshwater turtle associated with rivers in rural landscapes of the Northeast, Mid-Atlantic, and Upper Midwest regions of the United States and southern Canada. It is listed as Special Concern in New York and is currently under review by the U.S. Fish and Wildlife Service for protection under the Endangered Species Act. Habitat loss, road mortality, nest predation, and illegal collection are major causes of wood turtle decline. In substantial portions of the species range the wood turtle uses agricultural landscapes. Farms can be productive for turtles in general, providing sunny, non-forested habitats suitable for thermoregulation, nesting, and egg incubation. Because wood turtles are primarily terrestrial during the summer months, they are more vulnerable to encounters with farm machinery than other turtles. The Hudson Valley Farm Hub (HVHF), a 1600-acre organic farm and nonprofit educational and research center for regenerative agriculture, lies within the broad valley of lower Esopus Creek. To understand how wood turtles interact with ongoing farming practices and assist the HVFH with reducing on-farm mortality, we annually radio-tracked 10-12 wood turtles during April-October for 4 years (2019-2022). Radio-tracking documented farm-related mortality of wood turtles which was mostly associated with the use of a roller-crimper tractor implement on cover crops planted in organic legume and maize fields. In places where there were larger areas of the favored terrestrial forbshrub thicket between stream channel and crop fields, the turtles were less likely to move into hazardous cultivated areas. Turtles were more likely to move into those hazardous areas during nesting forays, when summer temperatures were high, during periods of high streamflow, and when crossing crop fields from overwintering habitats to active-season habitats. Ashokan Reservoir releases cause sudden flooding in the lower Esopus Creek and when these events occur in summer they can potentially drown wood turtle nests in some areas and also stimulate turtles to approach crop fields. We are currently working with the farmers at HVFH to reduce farm related risks, including establishing buffers along crop fields that border the river, retiring portions of fields used as travel corridors during nesting migrations, and converting high turtle-use crop fields to agroforestry, which requires less farm machinery.

Session:	Human Induced Impacts on Public Lands
Title:	Do hikers facilitate the spread of invasive plants along Catskill Mountain hiking trails?
Corresponding Author:	George Kraemer
Corresponding Author Affiliation:	Purchase College (SUNY)
Corresponding Author Email:	george.kraemer@purchase.edu
Co-Authors:	Daniel Kraemer

Presenter Bio:

Kraemer is a broadly trained ecologist with experience in physiological ecology, aquaculture, and non-native species impacts in terrestrial forests and the marine intertidal and nearshore zones. Projects were sited on the California coast, the Mediterranean island Ischia, southern Florida, Long Island Sound, and the Catskill Mountains.

Abstract:

Catskill Mountain forests are threatened by the continuing increase in the diversity, distribution and abundance of invasive species. The distributions of invasive Garlic mustard (Alliaria petiolata), Japanese barberry (Berberis thunbergii), and Periwinkle (Vinca minor), and the abundance of reproductive stems of Garlic mustard were mapped along 26 Catskill Mountain hiking trails and at trailheads. Garlic mustard was present on 73% of trails surveyed, though abundance varied widely both between and within trails. Japanese barberry was recorded on 38% of trails. Periwinkle was found on only one trail, though it was locally abundant. Both Garlic mustard and Japanese barberry have penetrated up to ca. 5 km into Catskill hiking trails (median = 2.5 km and 2.7 m, respectively). Penetration uptrail by garlic mustard increased significantly between 2006 and 2024. Long distance ("jump") dispersal of the two invasives appears have occurred; 5% (n = 38) of distances between sequential garlic mustard records, and 21% (n = 17) of distances between sequential records of Japanese barberry, exceeded 100 m. Roughly half of garlic mustard and Japanese barberry recorded on imapinvasives.org between 2004 to 2022 persist today. However, GPS position uncertainty places a limit on investigation of small (< 5 m) scale phenomena.

Session 8: Environmental Management: Challenges and Success Stories

October 23, 2025

Session:	Environmental Management: Challenges and Success Stories
Title:	Northern Snakehead in the Delaware Basin
Corresponding Author:	Steven Pearson
Corresponding Author Affiliation:	NYSDEC
Corresponding Author Email:	steven.pearson@dec.ny.gov
Co-Authors:	

Presenter Bio:

Steven Pearson is a research Scientist with the New Yorks State Department of Environmental Conservation. His work focuses on aquatic invasive species issues including tracking distributions, determining impacts and developing large scale management projects.

Abstract:

Aquatic invasive species present a threat to New York fish communities and habitats through predation and competition. The northern snakehead (Channa argus) threatens to alter fish communities if they establish populations. Historically, northern snakehead in NY State have been managed through eradication efforts and monitoring of populations in isolated ponds. In the summer of 2019, 2020, and 2021, reports of northern snakehead were made from the Hudson River, Delaware River and Bashakill WMA. These reports led to rapid response surveys using electrofishing and environmental DNA. Hudson River watershed surveys have been negative while some Delaware River watershed surveys have been positive. In the Bashakill WMA, eDNA surveys have shown widespread habitat use and in 2022 and 2024, YOY were documented and adults captured. eDNA surveys track northern snakehead’s potential dispersal through the Delaware and Hudson Canal and in the East and West Branches of the Delaware River. In 2024, the temporary barrier was improved, and a permanent barrier is being considered. In 2024, studies on the potential impacts of northern snakehead to the foodweb were initiated and samples were collected for genetic studies. Continued surveying will determine the D&H Canal barrier efficacy and determine habitat use within the Delaware River.

Session:	Environmental Management: Challenges and Success Stories
Title:	Change in NYS Wetlands Regulations: State-wide and Catskills Impacts
Corresponding Author:	Brian Drumm
Corresponding Author Affiliation:	NYS DEC
Corresponding Author Email:	brian.drumm@dec.ny.gov
Co-Authors:	
Presenter Bio:	
Abstract:	

Federal protection for wetlands under the Clean Water Act has been contested for the past half century. In 2023 the Supreme Court's ruling in Sackett v. EPA significantly narrowed federal protection for wetlands under the Clean Water Act, ruling that only wetlands with a "continuous surface connection" to a traditional "water of the United States" are subject to federal regulation, and rejecting the prior "significant nexus" standard. Estimates indicate a significant reduction in the wetland area requiring federal permits for activities that would discharge pollutants, with studies estimating losses ranging from 19 million acres to over 90 million acres nationwide. Wetlands in New York State, however, are also protected under NYS's Freshwater Wetland Act (FWA). The NYS FWA was modernized as part of the 2022-2023 Enacted State Budget. Updated NYS FWA regulations as of January 2025 will protect an additional estimated one million acres of wetlands in the state and clarify the jurisdictional status of smaller wetlands of "unusual importance" that meet one of 11 specific criteria. In addition, the revised regulations provide a streamlined wetlands classification system and process for the public to request and appeal jurisdictional determinations. This presentation will discuss these amendments and their significance for wetlands protection in the Catskills and throughout NYS.

Dinner Speaker

October 23, 2025

Session:	Dinner Speaker
Title:	Catskills, Porcupines, Fishers
Corresponding Author:	Uldis Roze
Corresponding Author Affiliation:	Professor Emeritus, Queens College, CUNY
Corresponding Author Email:	uldis.roze@verizon.net
Co-Authors:	

Presenter Bio:

Dr. Uldis Roze is Professor Emeritus of Queens College at the City University of New York and a foremost expert on the North American porcupine. Dr. Roze was faculty in the Department of Biology at Queens College from 1964-2003. He holds Ph.D. from Washington University St. Louis and a B.S. from the University of Chicago. In addition to numerous peer-reviewed publications, Dr. Roze has written several popular books on porcupine, including The North American Porcupine (2009) and Porcupines, the Animal Answer Guide (2012). Dr. Roze lives in the Catskills region of upstate New York where his studies continue. Listen to a podcast of Dr. Roze with host Brett Barry exploring the fascinating world of the North America porcupine at https://www.kaatscast.com/porcupine-pursuits-with-uldis-roze/.

B.S. University of Chicago 1959
Ph.D. Washington University Medical School St. Louis 1964
Queens College CUNY Dept. of Biology 1964-2003
CUNY Doctoral Program in Ecology, Evolutionary Biology and Behavior, 1990

Abstract:

The Catskills region of New York is a region where humans and wildlife coexist. Humans typically occupy the river valleys, wildlife such as the porcupines occupy the forested mountains. Female porcupines have home ranges that are relatively small, permanent, and defended against other females. Male home ranges are large, changeable, and undefended. I present the life history of a radiocollared female who was followed for 21 years and remains the oldest recorded wild porcupine. in 1976-79 the fisher, a porcupine predator, was introduced in the Southern Catskills. They reached my study area in the Northern Catskills in the 1980s. Porcupines of Northern Catskills have proved more resistant to fisher attack than shown in other studies of fisher-porcupine interactions.

Poster Session

October 22-23, 2025

Session:	Poster Session
Title:	A Desktop Approach to Septic Systems Vulnerability Assessment
Corresponding Author:	Rajith Mukundan
Corresponding Author Affiliation:	NYC Department of Environmental Protection
Corresponding Author Email:	rmukundan@dep.nyc.gov
Co-Authors:	Rakesh Gelda

Abstract:

In New York State, approximately 22% of homes rely on septic systems, which will continue to serve as a long-term method of wastewater treatment for many residents. While properly designed, constructed, and maintained septic systems offer a safe and effective means of treating and disposing of wastewater, failures due to improper siting, design, or maintenance can lead to contamination of nearby waterbodies. Traditionally, identifying septic system failures has relied on field-based household inspections—a process that is both labor-intensive and logistically challenging. A more efficient approach involves conducting targeted inspections based on the likelihood of failure, which requires identifying predictive site characteristics and reliable methods for detecting them.

Few studies have examined the potential of machine learning methods to identify sites or conditions where septic systems are likely to fail or require replacement. In this study a desktop approach combining machine learning and statistical modeling is used to assess the vulnerability of septic systems in New York City's west-of-Hudson watershed region. The method utilized two septic inventory datasets: one representing "failed" septic systems, identified through notices of violation, and another representing "new" and properly functioning systems. A machine learning model was trained using climatic, soil, and topographic data, along with parcel information as predictor variables. The model was trained using 13 predictor variables on 80% of the dataset, with the remaining 20% used for testing. The training and testing process was repeated 100 times with random splits of the data. The model achieved a mean accuracy of 81% in predicting septic system status (failed vs. new).

To further investigate the effects of statistically significant predictors, a conditional inference tree statistical model was applied. The conditional inference tree was built with septic system status as the dependent/response variable and all predictors as independent variables. This analysis revealed that only three predictors were statistically significant (p-value < 0.05) and were included in the final tree. Topographic wetness index, a metric indicating the likelihood of a location to saturate and generate surface runoff emerged as one of the significant predictors.

Preliminary test of a desktop approach using machine learning shows promise in its ability to identify key factors contributing to septic system failures and isolate locations at high risk. This approach has the potential to complement existing criteria for identifying areas less suitable for new septic system siting and target locations where older systems are likely to fail in the region.

Session:	Poster Session
Title:	Wildfire and Fire Management
Corresponding Author:	Todd Matthew S. Padilla
Corresponding Author Affiliation:	Sam's Point Area of Minnewaska State Park Preserve
Corresponding Author Email:	padilla.t.1997@gmail.com
Co-Authors:	Olivia Castañeda

Abstract:

The Sam's Point Area of Minnewaska State Park Preserve is a globally rare fire-adapted ecosystem of dwarf pitch pine ridges and pitch-pine oak heath rocky summit with a long history of fire. Through regular monitoring done in areas affected by the wildfire in 2016, staff at Sam's Point have been able to confirm that species such as Pinus rigidus, Vaccinium cormbosum, Gaylussacia baccata, and Quercus ilicifolia are reliant on regular exposure to fire in order to effectively flourish (Schiafo et al, 2017). Because of the necessity of fire for the ecosystem to maintain balance, it's vital to develop tools and design management plans in anticipation for fire behavior. Sam's Point stewardship staff are developing and producing a detailed fire map that combines a variety of plant communities, and park infrastructure to be utilized by fire mangers or incident command and demonstrate what methodologies had worked in the past, what could be done to prepare areas for prescribed burns, and how to best utilize fire as a tool to maintain and manage an area like Sam's Point.

Overall the poster would be a showcase of Sam's Point Area of Minnewaska State Park Preserve, the fires that took place in 2008, 2016, and 2022, the site's unique ecosystems and species and how the wildfire was an unexpected tool that helped us understand the nature of how better to steward Sam's Point.

Session:	Poster Session
Title:	Habitat Suitability Modeling for Sparse Presence-Only Emerging Invasive Plants in New York
Corresponding Author:	Dan Snider-Nerp
Corresponding Author Affiliation:	Catskill Regional Invasive Species Partnership
Corresponding Author Email:	dsnider-nerp@catskillcenter.org
Co-Authors:	

Abstract:

Invasive species are most easily managed early in an infestation's timeline, before a species' core population has spread or established satellite populations. However, locating invasive species for early intervention can be difficult and time consuming for land managers and researchers. Habitat suitability models can help prioritize areas for early detection surveys by identifying areas on the landscape most likely for a given species to grow and thrive, and can rule out areas for survey as not suitable for the species' growth. Some habitat suitability models can face challenges accurately constructing suitability predictions for novel invasive species that are sparse on the landscape due to extreme class imbalance, sparse presence data, and potentially a lack of absence data. This project compared one statistical method, three machine learning models and two deep learning models in their abilities to predict suitable habitat for five sparse presence-only invasive species in New York State. Species tested included black jetbead (Rhodotypos scandens), Chinese silvergrass (Miscanthus sinensis), Japanese angelica tree (Aralia elata), kudzu (Pueraria montana var. lobata), and scotchbroom (Cytisus scoparius). Across all species tested, the vision transformer model performed best, with the convolutional network and logistic regression models performing acceptably.

Session:	Poster Session
Title:	Tracking the DNA of the Catskills' Wild Brook Trout: A Community-Based Genetic Survey of the Ashokan Watershed
Corresponding Author:	Chester Karwatowski
Corresponding Author Affiliation:	Ashokan-Pepacton Watershed Chapter of Trout Unlimited
Corresponding Author Email:	chester.karwatowski@gmail.com
Co-Authors:	Chester Karwatowski, John Yanzek, Ed Ostapczuk, Mark Loete (Trout Unlimited), Bobby Adams NYSDEC, Dr. Spencer Bruce (NYSDOH)

Abstract:

Brook Trout (Salvelinus fontinalis), New York State's official freshwater fish, are integral to the ecological integrity of the Catskills. This poster presents findings from a multi-year genetic survey conducted by APWCTU and partners, revealing significant genetic diversity and distinct populations within the Ashokan-Pepacton Watershed. By integrating genetic analyses with habitat assessments and geospatial mapping, the study offers insights into the relationship between genetic variation and environmental factors. The collaborative approach underscores the importance of community involvement in conservation efforts. The poster will showcase methodologies, key findings, and management recommendations, aligning with CERM 2025's theme of "Shared Ground: Collaborative Approaches to Catskills Environmental Research."

Session:	Poster Session
Title:	Patterns in flux and flow of various solutes in streams within the Catskill Region of New York
Corresponding Author:	Mark Bauerschmidt
Corresponding Author Affiliation:	Syracuse University
Corresponding Author Email:	mbauersc@syr.edu
Co-Authors:	Chris Johnson, Mary Margaret Koppers

Abstract:

Within a watershed, water travels through different soil layers, resulting in the mobilization and/or immobilization of various solutes. The export of solutes in streams therefore depends both on the movement of water through watershed soils and the chemical processes that release or retain those solutes. The relative importance of these processes can be characterized by the equation: Solute Flux = $(aQ)^b$, where “Q” is the stream discharge, and “b” indicates the degree to which the solute is either transport-limited ($b>1$) or source-limited ($b<1$). We analyzed monthly stream data from 27 streams in the Catskills Mountains of New York and included consideration of both biogenic solutes (dissolved organic carbon, dissolved organic nitrogen, and total nitrogen) and geogenic solutes (calcium, dissolved silica, and sodium). The slope of a line fitted to the relationship between log(flux) and log (Q) was used to estimate “b”. We found that biogenic compounds typically had slope values greater than 1, while geogenic compounds typically had slope values below 1. Biogenic compounds are largely mobilized from surface soil horizons, which tend to dry out during the warm summer months. When there is increased flow, greater connectivity between surface and subsurface areas allows these solutes to be mobilized and enter the stream, suggesting that these compounds are transport-limited. Conversely, geogenic compounds are derived from mineral weathering and may be mobilized throughout the soil profile, contributing to stream loads year-round. The concentrations are dependent on the rate of production, so periods of high flows may result in a dilution of these elements, indicated source-limitation. These patterns of transport processes were fairly consistent across all 27 study streams.

Session:	Poster Session
Title:	15000 Years of Catskills Vegetation and the Climate Change it Suggests
Corresponding Author:	Michael Kudish
Corresponding Author Affiliation:	Professor Emeritus Paul Smith College
Corresponding Author Email:	mkudish@catskill.net
Co-Authors:	

Abstract:

Since 1995, peat from 128 Catskills bogs and fens has been exhumed, fossil plants identified, and radiocarbon-dated. This abstract is for a timeline poster that will summarize events at the 2025 CERM Conference. A period of what looks like Arctic tundra existed between 15000 and 14000 years B.P., followed by a rapid invasion of not only boreal species, but of north temperate species as well, suggesting an early rapid warm up almost simultaneously throughout the region. There was no prolonged period when the northern Catskills had boreal forest and the southern Catskills already had northern temperate species. During the last almost 14000 years, the forest in the Catskills interior - the vast oakless region - was very stable, suggesting little climate change. From this bog study, we now know when most of almost 200 lakes and ponds filled in with bog vegetation and fen forest. We also know when Native Americans started burning the forests in earnest, and exactly where and to what degree. We know that the hemlock "crash" in the Catskills was either non-existent or very minor. The Catskills are very different today from other regions of the Northeastern United States, and always have been. One prime example is how red spruce and balsam fir migrated into the region from the Poconos about 14000 years ago, skipping over large portions of the western Catskills. A detailed chronology of 15000 years of vegetation will be found in the second edition of "The Catskill Forest: a History", to be published by the Purple Mountain Press. POSTLUDE: Charcoal has been collected in clay from Clarksville Cave, Albany County, by Paul Rubin. A preliminary identification of the burnt wood yields perhaps the first insight into New York State forests between the Devonian and the end of the Pleistocene.

Session:	Poster Session
Title:	Catskill First Growth Forest Map - 2025 Update
Corresponding Author:	Michael Kudish
Corresponding Author Affiliation:	Professor Emeritus Paul Smith College
Corresponding Author Email:	steve.parisio@outlook.com
Co-Authors:	Steve Parisio

Abstract:

"First Growth" refers to forests which have never been logged, barked, burned by people, farmed, or quarried. The mapping of first growth forests in the Catskills is part of a larger project to reconstruct the forest history going back to deglaciation 15,000 years ago. (A separate poster presented by the principal author at this conference will focus on vegetation changes predating European colonization using evidence derived from sampling of peat deposits in high elevation wetlands throughout the region.)

Field work to delineate the boundaries of first growth forest tracts has been carried out by the principal author for more than fifty years and is ongoing. The first published map (Kudish 2000) showed 37 tracts totaling 95 square miles. For presentation at the CERM conference in 2022, a revised map was developed by importing hand-drawn maps prepared by the principal author into Arc-GIS Pro to create a shapefile which can be readily edited as new data is collected and shared with other researchers. The 2022 map showed 54 tracts totaling 114 square miles, an increase of 17% based on 22 years of field work. In the 3 years which have passed since the last conference, 8 of the 54 tracts have been field-checked and, as a result, have had adjustments to the 2022 acreage. Most adjustments are small, but two stand out: A 670-acre addition was found at the south end of Woodpecker Ridge in Tract #101. The small tract #142 atop Bearpen Mountain is over 4 times as large as originally mapped and is now 117 acres in size. An updated map will be presented for the 2025 CERM conference and interested parties may contact the second author (S. Parisio) for access to the revised GIS shapefile.

Session:	Poster Session
Title:	From Source to Sip: Using Stable Water Isotopes to Track Water from the Catskills to the Tap in New York City
Corresponding Author:	Maanal Chowdhury
Corresponding Author Affiliation:	City University of New York School of Public Health and Health Policy
Corresponding Author Email:	maanal2001@gmail.com
Co-Authors:	Sara Omer, Ivy Mininger, James Ross, Adelina Rolea, Jean Grassman, Steven Chillrud, Mason O. Stahl, and Benjamin C. Bostick

Abstract:

Surface water is a critical source of drinking water for many urban water supplies. New York City (NYC) is the largest urban water supply in the United States, and obtains its water from the Hudson and Delaware River watersheds. Stable isotopic analysis of oxygen ($\delta^{18}O$) and hydrogen ($\delta^{2}H$) in water serves as a useful tracer to understand how water passes from the watershed through the water system and to the household tap. In this research, we compare the chemical and isotopic composition of water from NYC tap water with their source waters to understand how source water impacts water quality. We collected a series of tap water samples throughout NYC and across multiple seasons to link trends in stable water isotopes and chemical composition to water system residence time. We find that tap water isotopic composition varies seasonally, indicating that the seasonal signal from the water source in the source waters in the Catskills (the dominant source) is preserved. Water isotopes were lightest in early spring, when runoff of winter water (which is also lightest) was extensive. The delay between this minimum in source water isotopic composition and tapwater isotopic composition was a few months (about 2-3 months) and varied significantly with location. This data suggests different areas of the city have different municipal water sourcing and usage patterns that influence the residence time of the water in the water system. The residence time of water within the pipe network could affect water quality given that longer residence times provide more time for potential contaminants to leach from pipes (e.g., lead, copper) as well as additional time for growth of potentially harmful microorganisms. To test for this effect, we also analyzed the lead concentrations of these tap water samples to probe the relationship between residence time and tap water lead concentrations. We did not find evidence for increased lead levels with increasing residence time in this limited study, possibly because it would be limited to homes with lead service lines. This work demonstrates the potential of using water isotopes to trace water usage and examine water quality risks in urban water supplies. The same methods could be applied to learn more about mixing and the residence time in reservoirs, and to source water quality. We suggest that regular monitoring of the water sources for water isotopes should be conducted to more conclusively relate water quality and source attributes, and to understand how water supplies recover from disturbance.

Session:	Poster Session
Title:	Streambank Project: Japanese knotweed uses to support restoration
Corresponding Author:	Timothy Furstnau
Corresponding Author Affiliation:	Parsons School of Design, The New School
Corresponding Author Email:	timothy.furstnau@gmail.com
Co-Authors:	

Abstract:

Streambank is an ongoing biocultural restoration project and field-based research study focused on non-chemical management methods for Japanese knotweed and uses of desiccated biomass to support ongoing restoration. Itadori, aka "Japanese knotweed ("JKW"), is well established along many Catskills streams, forming dense thickets that erode critical streambanks and spread via small root fragments. Our project investigates the potential for uses of knotweed biomass desiccated onsite to help support ongoing management, while offering a side-by-side comparison of chemical and non-chemical management methods—an approach not well represented in current scientific literature on management practices.

Municipal-scale collection and regional circular economy pilot projects for JKW are underway in parts of Europe, where JKW is also a highly regulated species, however no such research has been initiated in the US. After recently securing a permit from NY DEC for transport of JKW biomass for research and education, we have begun materials research and design prototyping that shows great promise for viable applications of an abundant local resource that is typically wasted via burning or burial, using a holistic approach to the plant that includes:

- core material of structural panels for use in architecture, utilizing the exceptional strength-to-weight ratio of JKW stalks
- extracts for use in health supplements and pharmaceuticals, utilizing the high resveratrol content and welldocumented medicinal qualities of JKW rhizome
- biomass for feedstocks, biochar, mulch, myco-substrate, and other agricultural applications, utilizing the rapid growth of JKW leaves and branches
- paper, packaging, biofilms, bioplastics, and other biocomposites utilizing the unique chemical properties of JKW mucilage and aerial biomass

Our work prioritizes uses of JKW that demonstrate the economic viability of biomass utilization in ways that can support ongoing ecological restoration, while showing the safety and effectiveness of long-term non-chemical methods and the role of traditional agroforestry in scalable solutions to invasive species management. Replacing knotweed at our restoration site with native willow, our project uses the dynamic juxtaposition of one species with a rich ecocultural heritage of human cohabitation and use in riparian communities, with another relative newcomer to Catskills stream ecosystems, in a way which might inform future land management and adaptation in a region undergoing rapid change. Our approach addresses the urgent need for sustainable stewardship models that create resilient circular economies, support disadvantaged rural communities, and repair damaged ecosystems.

Session:	Poster Session
Title:	A Revised Geospatial Analysis to Identify Candidate Sites for Designation as a Catskill Research Forest
Corresponding Author:	Tiffany Chen
Corresponding Author Affiliation:	Siena University
Corresponding Author Email:	DBogan@siena.edu
Co-Authors:	Ryan Strang, Daniel Bogan, Pine Roehrs

Abstract:

We conducted a geospatial analysis to identify potential locations for establishing a future research forest in the Catskills, a region which currently lacks a large-scale environmental research facility. Our effort aims to recreate and update previous analyses by using current and revised selection criteria and geospatial data. Developing a research facility or research forest in the Catskill ecoregion will empower researchers to conduct long-term ecological research and monitoring to learn about nutrient cycling, watershed dynamics, climate change impacts, and biodiversity. We focused our study on the area of overlap between the NYCDEP West of Hudson Watershed and the Catskill Park boundary. The study area is approximately 1839 km^2 and spans 24 towns, the counties of Greene, Ulster, Delaware, and Sullivan, and NYSDEC management regions R3 and R4. We used ESRI ArcGIS Pro to conduct all geospatial analyses and implemented a watershed-based spatial framework derived from the USGS Watershed Boundary Dataset. Beginning with the Hydrologic Unit Classification (HUC) system, we subdivided HUC14 watersheds within the study area by delineating smaller, approximately equal sized watersheds. We further characterized the Catskill study area and its watersheds based on selective criteria, a set of preferential and exclusionary criteria, to identify candidate sites for a research forest. By carefully selecting "pour points" along rivers to delineate watersheds, we subdivided HUC 12 watersheds (n = 23) to create HUC 14 watersheds (n = 140) for further analysis. Our watersheds correspond with the watershed boundaries used in the original 2014 analysis. Further geospatial analyses will characterize the overall Catskill study area and each watershed, developing a profile of each based on the preferential and exclusionary criteria. The final candidate set will be identified by selecting individual watersheds that best represent the overall study area profile. Our research forest siting study is beneficial to inform decision makers of the potential benefits of developing a future research facility in the Catskill ecoregion of New York by identifying specific sites for consideration.

Session:	Poster Session
Title:	Does rainfall affect water quality across the Hudson River watershed? Evidence from long-term monitoring of fecal indicator bacteria
Corresponding Author:	Julian Damashek
Corresponding Author Affiliation:	Riverkeeper
Corresponding Author Email:	jdamashek@riverkeeper.org
Co-Authors:	Juliana Hanle, Justin C. Touchon, Sebastian Pilliterri, Shannon L. Roback

Abstract:

Fecal contamination is a common cause of decreased water quality in streams and rivers worldwide, having been linked to oxygen depletion, algal blooms, gastrointestinal disease, and the spread of antimicrobial resistance. Unlike many other pollutants, waterways often receive both urban and rural sources of fecal matter, including raw or treated waste from humans, wildlife, and domesticated animals. This complicates source attribution and remediation of fecal pollution in many ecosystems. We analyzed a time series of Enterococcus counts (a common measure of fecal bacteria) in the Hudson River and its tributaries. Samples were collected by Riverkeeper and numerous citizen scientists from 2010-2023, including sites along Catskill Creek and Esopus Creek in the Catskills. Our primary objective was to determine how Enterococcus in this system is affected by rainfall. Comparing data between sampling sites revealed that while Enterococcus changed significantly based on rainfall in nearly half of the Hudson River Estuary sites, only ~10% of tributary sites show comparable changes. There was only one Catskill or Esopus Creek site with significantly elevated Enterococcus related to rainfall, suggesting fecal bacteria levels in these creeks are primarily driven by other factors. We also used a variety of logistic regressions and mixed models to further investigate ecosystem-level relationships between precipitation and Enterococcus over time. These analyses highlight the importance of long-term monitoring across the watershed to understand the complicated factors driving fecal pollution and water quality.

Session:	Poster Session
Title:	The effects of shoreline complexity and water flow on mating and cannibalism dynamics in the striped fishing spider, Dolomedes scriptus.
Corresponding Author:	Luna S. Lopez
Corresponding Author Affiliation:	Hartwick College
Corresponding Author Email:	lopezl@hartwick.edu
Co-Authors:	Alexander Sweger

Abstract:

A large variety of environmental factors have driven the evolution of extreme behavioral interactions, and conversely, many behaviors are plastic in response to variations in habitat structure and complexity. Fishing spiders (Genus: Dolomedes) are known for their high rates of sexual cannibalism, and many species are also found in semi-aquatic habitats, raising questions about the role of the environment in these aggressive, seemingly maladaptive, interactions. Several hypotheses have been suggested for the evolution of sexual cannibalism, including female choice, optimal foraging and aggressive spill-over. Evidence supporting any of the various proposed hypotheses for sexual cannibalism remains conflicting and highly dependent on taxon-specific factors, and few (if any) studies have investigated the role of habitat structure in mitigating these interactions. Our goal in this study was to examine how environmental factors, such as shoreline complexity and water flow, influence the mating success and cannibalism rate in the striped-fishing spider, Dolomedes scriptus. We collected subadult male and female spiders from stream habitats in areas around Oneonta, NY. Spiders were reared to maturity, then placed in four distinct environmental set ups to test the effect of different habitat conditions across two independent variables- standing or flowing water, and the presence/absence of a large rock for shoreline complexity. We recorded trials for a minimum of 30 minutes, adding an additional 10 minutes if pairs were still interacting. We then analyzed male and female courtship, copulatory, and aggressive behaviors and assessed the incidence of mating and/or cannibalism in each pairing. We hope that the results of this study will contribute to a broader understanding of the role environmental conditions play in shaping mating dynamics and survival strategies in Dolomedes scriptus.

Session:	Poster Session
Title:	Spider community composition across multiple habitats at Pine Lake, Davenport NY
Corresponding Author:	Brynita (Bryn) Haas
Corresponding Author Affiliation:	Hartwick College
Corresponding Author Email:	haasb@hartwick.edu
Co-Authors:	Alexander Sweger, Ph.D.

Abstract:

Arthropod community composition is often influenced heavily by differences in ground cover, soil characteristics, and light level, and these features in turn can vary with dominant vegetation types. Hemlock and other evergreen stands may differ in branching pattern, leaf structure, and chemical properties compared to deciduous forests. Spiders represent a substantial subset of the arthropod community in forest ecosystems, and as obligate predators, they also occupy a different trophic level than the majority of other groups in the community. Despite this, spiders are relatively under-studied, and biodiversity data on both richness and diversity are often lacking for this subset of the community. Knowledge of how spider abundance and species distribution differ between different habitat types may be useful in conservation efforts, understanding trophic dynamics, and furthering knowledge on species ranges and ecology. We conducted a biodiversity survey of arboreal and ground-dwelling spider species at Hartwick College's Pine Lake Environmental Campus in Davenport NY. This site contains a variety of temperate forest stands and wetland habitats over its small area. Spiders were collected in June and July of 2024 at three main sites: a predominantly hemlock stand, a predominantly deciduous stand, and in a deciduous stand with a white pine canopy. We conducted controlled pitfall trapping and beat sheet sampling twice per week over a 7-week period in each of the three sites. We conducted additional haphazard collections from various locations around the Pine Lake Campus and the adjacent Robert V. Riddell State Park, and with the beat sheet from a predominantly deciduous forest on the other side of Pine Lake property. All collected spiders were individually isolated and identified to the lowest taxonomic rank possible. We then calculated a variety of indexes for diversity and evenness and compared spider community composition between the different habitats.

Session:	Poster Session
Title:	The Impact of Hemlock Woolly Adelgid on Forest Communities in the Catskills
Corresponding Author:	Ryan Schmidt
Corresponding Author Affiliation:	Pace University
Corresponding Author Email:	rs85367p@pace.edu
Co-Authors:	Matthew Aiello-Lammens

Abstract:

Eastern hemlocks (Tsuga canadensis) are an important species in northeastern forest ecosystems. The health of these trees is negatively impacted because of hemlock woolly adelgid (HWA, Adelges tsugae). As these infestations drive hemlock decline, canopy openings may create opportunities for non-native invasive plants to establish and spread. Land managers in the Catskill region and beyond need more information on how HWA will impact plant communities to help them allocate limited resources for forest protection. This study assesses forest structure, species composition, and hemlock health in the Catskills Forest region. We examined the health of hemlock trees, assessed community composition for both trees and ground cover, and carefully noted the presence of non-native invasive plants at 10 sites across the Catskill region. Sites were selected to represent a gradient of low to severe HWA infestation as determined by previous surveys. At each site, these observations were taken at 3 separate plots. Preliminary analysis shows a negative correlation between the number of trees and diameter at breast height (DBH), with plots containing small trees (i.e. younger stands) having many more individuals. As expected, hemlock was the most common tree species across all plots, followed by yellow birch (Betula alleghaniensis) and red maple (Acer rubrum). Across plots, average tree richness was approximately 6 species. Ground coverage showed very high levels of diversity with approximately 85 species observed across plots and average plot richness of approximately 11 species. Overall, there are very few observations of non-native invasive plants. Considering hemlock health, transparency scores, and HWA counts were consistent with previous studies. Future analysis will examine these patterns while considering hemlock health within the plots. These results provide insight into forest structure under varying degrees of HWA infestation.

Session:	Poster Session
Title:	Measuring and monitoring fluvial geomorphic turbidity source sediment connectivity in a Catskill Mountain watershed
Corresponding Author:	Dany Davis
Corresponding Author Affiliation:	NYCDEP
Corresponding Author Email:	davisd@dep.nyc.gov
Co-Authors:	Telemak Olsen, Matthew Trueheart, Kiah Parmelee

Abstract:

Fluvial geomorphic connectivity to Pleistocene glacial legacy sediment in the Stony Clove Creek watershed of the Catskill Mountains in New York State, USA controls chronic and acute sub-basin scale turbidity production. Stony Clove Creek is the largest tributary in the Esopus Creek and Ashokan Reservoir watershed. The Ashokan Reservoir is susceptible to very turbid streamflow inputs (>103 FNU) during and following high magnitude-low frequency floods forcing changes in operational management of the unfiltered drinking water supply for over 9 million people. The glacially conditioned mountain valley corridor surficial stratigraphy includes a “messy” assemblage of autochthonous and allochthonous glacial legacy sediment packages that function as fine sediment stocks. When these sources of fine sediment are accessed by erosion in the channel network and adjacent hillslopes, turbidity production is locally amplified, especially during the falling flood stage. Confined reaches linked to hillslopes with chronic erosional connectivity to pro-glacial lacustrine sediment can function as turbidity production hotspots. Geomorphologic and geologic investigations into channel access to turbidity source sediment is used to help parameterize a conceptual model of Catskill stream turbidity production. This poster presents a set of recent past and ongoing efforts to (1) quantify spatial and temporal variations in erosional connectivity to turbidity source sediment, (2) quantify the range of percent fine sediment in glacial and alluvial suspended sediment sources, and (3) measure geomorphic adjustment and fine sediment flux at the reach to sub-basin scale using a time series of digital terrain models and the USGS stream monitoring network. These geomorphic investigations helped inform subsequent ongoing investigations by USGS and have successfully guided site selection for further monitoring and stream turbidity reduction projects designed to remove and prevent erosional contact with the fine sediment source.

Session:	Poster Session
Title:	Using Structure from Motion Photogrammetry to Quantify Streambank Erosion of Pleistocene Glacial Deposits in Catskill Streams
Corresponding Author:	Declan Chase-Salerno
Corresponding Author Affiliation:	SUNY Ulster
Corresponding Author Email:	chasesad55@my.sunyulster.edu
Co-Authors:	Telemak Olsen, Michelle McDonough, Emily Polinsky, Dany Davis

Abstract:

Streambank erosion and mass wasting are often coupled geomorphic processes in confined mountain streams. Stream erosion at the toe of channel connected hillslopes can activate geotechnical failures, linking channel processes with hillslope instability. In the Catskill Mountains, mass wasting of stream-coupled hillslopes composed of fine sediment-rich Pleistocene glacial legacy sediment is a detectable chronic source of elevated suspended sediment loads and associated turbidity that can impair New York City's unfiltered drinking water supply. Identifying and monitoring these turbidity production "hotspots" in the Schoharie Reservoir watershed is a critical component of a turbidity reduction management strategy through stream channel restoration practices that remove erosional contact with glacial legacy sediment. This poster summarizes preliminary results of a structure from motion (SfM) photogrammetry-based approach to monitoring streambank erosion. We conducted pole-mounted SfM surveys in 2024 and 2025 at actively eroding channel-coupled hillslopes along the East Kill, Schoharie Creek, and West Kill in the Schoharie Reservoir watershed. Point cloud differencing of annual SfM datasets yields estimates of sediment volume loss and rates of bank retreat at each site. In addition to presenting monitoring results, we identify limitations of pole-mounted SfM photogrammetry surveys and provide recommendations for its effective application in geomorphic monitoring. Multi-year SfM photogrammetry is a valuable tool to improve channel monitoring methods, guide turbidity reduction efforts, and provide insight into the geomorphic and hydrologic processes that drive landscape evolution in Catskill streams.

Session:	Poster Session
Title:	Assessment of Nitrate Variability Influenced by Forest Phenological Shifts in the Neversink Watershed under climate change
Corresponding Author:	Xinghua Cheng
Corresponding Author Affiliation:	Department of Natural Resources and the Environment, University of Connecticut
Corresponding Author Email:	xinghua.cheng@uconn.edu
Co-Authors:	Gelda Rakesh, Mukundan Rajith, Dangol Sijal, Yingying Xie

Abstract:

Understanding the water quality (e.g., nitrates in stream water) variability and its driving factors is essential for improving water resource management and ensuring the long-term sustainability of natural resources. The nitrates variability in forested mountain watersheds can be attributed to biological processes including ecosystem productivity and soil biogeochemical cycling. Serving as indicators of ecosystem productivity, timing of forest seasonal events (i.e., phenology) —such as leaf emergence in spring and autumn leaf fall have been significantly altered corresponding to environmental changes in recent decades. However, the effects of forest phenology shifts on nitrates variability in the West of Hudson (WOH) watershed remain understudied. In this study, we aim to address the question: how was nitrates variability influenced by phenological shifts and climate change? We hypothesized that (i) advanced forest greenup, delayed senescence, and a longer growing season mainly driven by warming increase forest carbon uptake and water use, while reducing Nitrate levels in stream and (ii) Extreme events, such as drought and heavy rainfall, can increase nutrient runoff and stress tree metabolism, weakening their abilities to redistribute nutrients, depending on the intensity and frequency of the events. Leveraging longterm water quality measurements, satellite observations, and topographical and climate metrics, , we examined the phenology shifts (greenup and senescence) across WOH watersheds using linear mixed-effect models. We further explored the annual and seasonal variation in nitrates in the Neversink watershed, and the effects from phenological shifts and extreme events including droughts and heavy rainfall. This study will improve our understanding in the role of deciduous forest in affecting the spatiotemporal variation of water quality and inform resource management under climate change.

Session:	Poster Session
Title:	Analysis of spectral absorbance measurements to explore disinfection byproduct formation potential in Neversink and Cannonsville reservoirs
Corresponding Author:	David Van Valkenburg
Corresponding Author Affiliation:	NYC Department of Environmental Protection
Corresponding Author Email:	vanvalkenburg@dep.nyc.gov
Co-Authors:	

Abstract:

Disinfection byproducts formation potential (DBPfp) within watersheds that supply New York City and upstate communities is monitored to ensure that the customers receive the highest-quality drinking water. During 20172025, S::CAN UV-Vis Spectro::lyser units were deployed for inline monitoring of absorption spectra ($a\lambda$; $\lambda = 200 – 700$ nm) as proxy measurements for DBPs to provide near real-time information and guide reservoir operations. The S::CAN units were installed at downstream aqueduct locations of Cannonsville, Pepacton, Neversink, and Rondout reservoirs. DBPfp, UV-254, dissolved organic carbon (DOC), and a suite of supporting analytes were collected in conjunction with the absorption spectra to determine relationships between in-situ absorption measurements and laboratory analyses. In this study, we present results from Neversink and Cannonsville reservoir sites.

Over 25 spectral indices (absorbance ratios, spectral slopes, and spectral slope ratios) were compared to DBPfp. Additionally, a machine learning technique was used to determine which group(s) of spectral indices provided the most predictive information for estimating DBPs. Organic matter quality may change seasonally and can influence the strength of spectral indices-DBPfp relationships, potentially resulting in a weaker relationship when observations are combined for all months. In the future, we will expand this work to other locations in the watershed and link spectral properties to DBPfp. Ultimately, real-time sensor measurements are expected to be used to guide reservoir operations and deliver source water that will minimize the formation of disinfection byproducts in the distribution system.

Session:	Poster Session
Title:	Assessing Condition of Seasonal Pool Wetlands of the Ashokan Reservoir Watershed Through Multiparameter Monitoring Techniques
Corresponding Author:	Frank Parisio
Corresponding Author Affiliation:	NYC Department of Environmental Protection
Corresponding Author Email:	parisiof@dep.nyc.gov
Co-Authors:	

Abstract:

Seasonal pool wetlands are relatively small and shallow basins that are water filled through most or part of the year and void of fish. Common types include vernal and isolated woodland pools, micro topographical depressions in swamps, and successional farm ponds. These wetlands host a diverse array of plant and animal species and serve to store and discharge fresh water throughout the watershed. NYC Department of Environmental Protection (DEP) has been monitoring seasonal pool wetlands within the 660 km2 Ashokan Reservoir basin since 2010. Yearly monitoring is conducted to characterize baseline water quality and water level, and seasonal variations of breeding caudates (salamanders) and anurans (frogs). DEP has also utilized NYS Natural Heritage Program vernal pool survey protocol on Ashokan sites to characterize both pool basins and surrounding contributing upland ecosystems. This project has increased the collective understanding of changes in seasonal pool wetland conditions in response to changes in forest and climate in the Catskills and West-of-Hudson watershed. It also informs DEP's planning and operations on its holdings to better protect sensitive aquatic resources.

Session:	Poster Session
Title:	Genetic Structure of Elliptio complanata in the Susquehanna and Delaware River Watersheds
Corresponding Author:	Rowan Mentley-Peters
Corresponding Author Affiliation:	SUNY Oneonta Biology
Corresponding Author Email:	Mentrs635@oneonta.edu
Co-Authors:	Paul Lord, Alex Sotola

Abstract:

The Eastern Elliptio (Elliptio complanata) hereinafter referred to as Elliptios, play an integral role in freshwater ecosystems of the Susquehanna River Watershed (SRW) and Delaware River Watershed (DRW). Once the most abundant and widespread Freshwater Pearly Mussel (FWPM) in the Mid-Atlantic region, densities ranged from 10 mussels/m2 to 100/m2 in beds of large rivers. Dense assemblages of FWPM can stabilize substrates, increase habitat heterogeneity and provide physical habitat for other organisms such as smaller, faster growing FWPM species who have greater effects on nutrient cycling due to high production and therefore increased effects on nutrient cycling. FWPMs are ecologically different and can coexist by utilizing distinct niches. The decline of Elliptios in the SRW has been documented. USGS surveys conducted in 2008-2010 at 12 sites in the SRW found mussel populations declining, with densities ranging from .02- 6.90 mussels/m2. SUNY Oneonta reported declines in FWPM species of the SRW region as well. Persistent diminished populations of Elliptios in the SRW are isolated and consist primarily of older individuals. Eastern Elliptios decline in the SRW is driven by the obstruction to host fish Anguilla rostrata (American eel) migration. Lack of recruitment and decreasing population in the most prominent FWPM species is cause for concern. Without the primary host fish, reproduction is hampered and Elliptios are subject to reproductive isolation. Alternatively, the upper DRW supports over 124 mussels/m2 accredited to zero main stem dams. However, juveniles in the DRW rarely survive to 1/3 of their typical SRW lifespan. Following surveys conducted in the DRW and SRW, genome wide sequencing can provide a comprehensive insight into the potential genetic divergence of these mussels. We plan to survey known Eastern Elliptio beds in the SRW, DRW and St. Regis River to sample Elliptio DNA via non-lethal visceral swabbing. A true genome-wide sequencing approach will be utilized for genetic sequencing which will produce a reducedrepresentation genomic library for each individual. Digestion of genomic DNA will be done with two restriction enzymes, followed by ligation of adapters that include an 8-10 base pair barcode and Illumina priming sequences. These DNA fragments will then be amplified with PCR, and individuals will be combined into a multiplexed library which will be sent to SUNY Upstate Medical for sequencing on an Illumina NextSeq 2000 P3 machine. Subsequent data processing and analysis will be done either on the AiMOS Computing Cluster at Rensselaer Polytechnical Institute or on a high-performance computer housed at SUNY Oneonta. We suspect Elliptios to have diverged genetically between watersheds. An analysis could highlight genetic differentiation necessary to outline historical and current geneflow. Genetic data could answer a long-asked question and be the crucial steppingstone for conserving these animals of great need.

Session:	Poster Session
Title:	X-Snow: A Catskill citizen-science project for snow
Corresponding Author:	Margie Turrin
Corresponding Author Affiliation:	Lamont-Doherty Earth Observatory of Columbia University
Corresponding Author Email:	mkt@ldeo.columbia.edu
Co-Authors:	Marco Tedesco, Marisa Annunziato, Kali Bird, Brent LeRash

Abstract:

X-Snow is a citizen science NASA partner project led by Lamont-Doherty Earth Observatory in collaboration with regional partners located in critical areas, the Catskill Center, Schoharie River Center and W!ld Center. X-Snow is a network of volunteer samplers working with simple tools to collect a series of photos and measurements on snow depth, albedo and density that will enhance our understanding of snow properties, improve remote sensing estimates and modeling outputs, and connect community members with their environment. These data will increase our ability to capture spatial and temporal variability in mountainous regions where complex terrain and microclimates lead to significant variations in snow properties over short distances and timeframes. Snow Mesonet stations and camera installations are also being employed. Snow is an integral part of the climate system that has undergone unprecedented changes within the past decades (Rantanen et al., 2022). Despite its importance, accurately measuring and projecting future snowpacks presents significant challenges. Snow is a complex phenomenon influenced by temperature, wind, humidity, and topography (Hall et al., 2017; Tedesco, 2014). These factors combine to create a uneven distribution of snow on the ground, making it difficult to get a true picture of the snowpack properties. Estimating snow properties in mountain regions is prohibitive from a remote sensing perspective due to obscuration by vegetation or clouds and challenges in topography, slope, deep snow. Models used to provide estimates of snowpack structure and predictions about how the pack will evolve over time suffer from limitations related to the granular nature of the processes characterizing the spatio-temporal variability of snow processes in mountain regions, which require ground measurements for evaluation and improvement.

Winter tourism in the Catskills is an important economic resource for the area. Additionally, the Catskills provide critical drinking water storage for NYC. However, our ability to estimate water storage and changes is limited by the number of local measurements of snow cover and snow properties. Using satellites, and models we can gather estimates of snowpack structure and predictions about how snowpack will evolve over time. However, both models and satellite-derived estimates require ground measurements for evaluation and improvement and are strongly limited in mountain areas by limitations arising from spatial resolution, influence of vegetation, and cloud masking.

Citizen or community science has emerged as a powerful tool in many scientific applications (Fraisl et al., 2022), such as validation of model outputs and remote sensing products as well as early warning systems (See, 2019). The absence of in-situ observations can be complemented by data collected by citizens equipped with proper tools and properly educated on standardized measurement techniques and processes. Engaging community members in sampling expands project capacity through increased spatial 'reach' and temporal ability to gather regular in situ snow measurements, while empowering individuals and communities to contribute to scientific research, fostering a deeper connection to their local environment while advancing our knowledge of crucial snow-related phenomena.

Session:	Poster Session
Title:	When Cities Flood: Legal Frameworks, Human–Environment Interactions, and the Global Search for Resilience
Corresponding Author:	Omoyeni, Bayode Tade
Corresponding Author Affiliation:	Brandenburg University of Technology Cottbus-Senftenberg
Corresponding Author Email:	omoyebay@b-tu.de
Co-Authors:	

Abstract:

Flooding is no longer a distant risk but a lived reality in climate-vulnerable cities. Lagos, Nigeria, one of the world's fastest-growing coastal metropolises, illustrates how human–environment interactions intensify flood hazards while exposing the limits of existing governance frameworks. Wetlands and natural drainage systems once buffered the city against seasonal flooding, yet unregulated urban expansion, weak enforcement, and fragmented institutional mandates have undermined these protective ecosystems.

This research investigates how legal and governance structures shape flood management and climate adaptation in Lagos, with broader implications for resilience in other vulnerable landscapes. Using Institutional Theory, Multilevel Governance, and the Policy Coherence for Sustainable Development (PCSD) framework, the study combines policy analysis, semi-structured interviews with government and community stakeholders, and spatial mapping of flood-prone areas.
Findings reveal a striking gap between policy ambition and implementation. Legal provisions for climate adaptation and environmental protection exist but often overlap, creating jurisdictional conflicts and weakening accountability. Political pressures and limited institutional capacity further constrain enforcement. At the community level, residents deploy pragmatic coping strategies, raising foundations, clearing drains, and pooling resources for recovery. These actions demonstrate local ingenuity but also highlight inequities, as the most vulnerable populations bear the highest risk.

The Lagos case offers lessons beyond its borders. Like the Catskills, Lagos shows that ecological buffers; wetlands, streams, and forests cannot endure unchecked human pressure without coherent governance and legal safeguards. Resilience requires more than infrastructure; it demands integration across institutions, recognition of local knowledge, and policies that reflect both ecological and social realities. By framing Lagos as a global case study, this paper underscores that resilience is not solely ecological but institutional. The capacity to align law, governance, and human behavior is central to safeguarding communities and ecosystems facing intensifying climate risks.

Session:	Poster Session
Title:	Catskill Science Collaborative: A “bright spot” in the research-implementation gap
Corresponding Author:	Joy Damon
Corresponding Author Affiliation:	Catskill Science Collaborative at Cary Institute
Corresponding Author Email:	damonj@caryinstitute.org
Co-Authors:	Ava Goodale

Abstract:

What could the Catskills Region of New York State look like in 50 years with a team science approach to environmental research and conservation? All too often, conservation is limited by scientists and practitioners operating in isolated tracks, resulting in a mismatch between research topics and implementation needs. This mismatch can limit evidence-based strategies and create a research-implementation gap (Dubois et al., 2019; Salafsky et al., 2019). Team science, which champions collaborative, interdisciplinary, multi-institutional research approaches (Read et al., 2019), can strengthen and create partnerships between land-use managers, academia, scientists, and community members. The Catskill Science Collaborative, launched in 2018, seeks to fill these gaps in coordination, communication, and collaboration by providing a locus of exchange across agencies and institutions, data sharing platforms, and public engagement forums. This presentation will use interview data and case studies to assess how the Catskill Science Collaborative’s team science approach to their fellowship program has helped bridge the research-implementation gap. This analysis will inform transferable recommendations to amplify conservation successes in the Catskills Region now and into the next 50 years.

Session:	Poster Session
Title:	The ecological case for size-based management of American ginseng
Corresponding Author:	Presenting: Anna Plattner Lead: Karam Sheban
Corresponding Author Affiliation:	Wild Hudson Valley
Corresponding Author Email:	whv@wildhudsonvalley.com
Co-Authors:	Nat Burr, Anna Plattner, Marlyse Duguid, Mark Bradford

Abstract:

The sustainable harvest of American ginseng (Panax quinquefolius L.) remains a central ecological and policy challenge across its native range in eastern North America. International demand for wild ginseng roots continues to exert harvest pressure, with the United States exporting tens of thousands of pounds annually (Chamberlain et al., 2018; Burkhart et al., 2021). Current U.S. federal regulations, established under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), require plants to be at least five years old and to bear three or more leaves prior to harvest. These criteria are intended as proxies for reproductive maturity, yet accumulating evidence suggests that age and leaf number are weak predictors of root biomass and reproductive potential (McGraw et al., 2010; Van der Voort & McGraw, 2006).

This study evaluates the ecological validity of transitioning from age-based to size-based harvest criteria for ginseng management, with a focus on wild-simulated populations cultivated in Catskill forests of New York. In collaboration with a farm partner, Wild Hudson Valley, we sampled 219 plants harvested in 2024 across multiple sites and age classes. We tested relationships between plant age, leaf number, leaf area, and root biomass. Age explained only a small fraction of the variance in root mass ($R^2 = 0.08$), while leaf number performed moderately better ($R^2 = 0.32$). In contrast, leaf area proved a robust predictor of root biomass ($R^2 = 0.66$), with models incorporating leaf area explaining nearly 80% of root mass variance. These findings confirm that size-based indicators—particularly leaf area—better capture ecological performance and harvest sustainability than federal criteria based on age.

We extend these results with new 2025 data on ginseng reproductive output, including counts of ripe and unripe seeds per plant. These data allow us to directly assess the link between plant size (dry root mass) and reproductive capacity, addressing a critical gap in current regulatory frameworks.

Preliminary analyses reveal a strong positive correlation between root biomass and seed production, indicating that larger plants contribute disproportionately to population regeneration. Notably, while some five-year-old plants satisfied current regulatory thresholds, many had not produced viable seed, underscoring the inadequacy of age as a proxy for reproductive maturity.

By explicitly linking root biomass to both aboveground size (leaf area) and reproductive capacity (seed production), this research provides new empirical evidence supporting size-based harvest regulation. For management, a shift to size thresholds—such as minimum root mass or central leaflet width—could improve conservation outcomes by ensuring that harvested plants have reached reproductive maturity. Such criteria would also offer forest farmers more flexibility, aligning harvest timing with site quality and plant performance rather than arbitrary age thresholds.

In sum, transitioning to size-based harvest regulations represents a promising pathway to reconcile ecological sustainability with the economic viability of wild and wild-simulated ginseng production. Our results highlight plant size—not age—as the most reliable indicator of biomass and reproduction, offering practical tools for regulators, conservationists, and forest farmers seeking to sustain ginseng populations and the livelihoods they support.