New York Sea Grant Research:
2026 Ongoing Projects

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A member of the NYSG field team samples young-of-year (born in the current year) northern pike in the wetlands of the upper St. Lawrence River in NY. SUNY ESF researchers are studying how juvenile pike are impacted by wetland habitat conditions. (Credit: Emily Arsenault)

Ben Spitz (a SUNY ESF graduate student and member of the NYSG field team) holds an adult northern pike captured in annual netting surveys by the Thousand Islands Biological Station in NY. (Credit: Emily Arsenault)

Characterizing Vegetative Zones as Functional Refugia to Improve Ecosystem Resilience and Fish Reproduction in Coastal Wetlands *(R/CE-36, Dr. Emily Arsenault, SUNY ESF)*

Coastal wetlands are ecosystems that support both aquatic and terrestrial environments. Along with providing key resources to local fauna like food, refuge, and nesting habitat, wetlands sustain coastal communities. They improve water quality, reduce carbon, prevent erosion and flooding, and provide a space for people to recreate safely. Unfortunately, New York coastal wetlands face threats from invasive aquatic plants and changes in precipitation, temperature, and water levels. Each of these problems affects the natural water-mediated exchange of materials (hydrologic connectivity) with surrounding waterbodies, potentially disrupting the ecosystem and introducing instability. Examining key species and how they move through these spaces may offer solutions to and ways of approaching these problems.

This research project seeks to investigate wetland habitat conditions through studying the ecology of juvenile northern pike in the St. Lawrence River, where pike are native, and in Cranberry Lake, where they are invasive. Determining how northern pike use habitats is crucial to understanding the environmental health of the complex food web present in many coastal wetlands. By evaluating how hydrology, invasive plants, and oxygen levels influence the behavior of pike, researchers hope to gain a greater understanding of how local ecosystems are impacted by external threats.

Researchers visited several wetland sites across two waterbodies throughout the annual hydroperiod (seasonal flooding that many coastal wetlands experience throughout the year). During these visits, the team collected fish, benthic invertebrates, and zooplankton samples; surveyed wetland vegetation; and logged water quality information. While data collection and analysis are ongoing, early preliminary results identified a core reproductive habitat in Cranberry Lake for the first time, as well as a potential shift towards spawning earlier in the spring.

This research is providing new information on the ecology of northern pike in the watershed and will be valuable for state fishery managers. Once the research is complete, data on how factors such as invasive wetland plant species, changing hydrology, and oxygen levels impact wetland ecosystems will be useful for managing these valuable spaces.

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A researcher from the Chen Lab of Fisheries Science and Management at Stony Brook University holds a juvenile striped bass against the Hudson River in NY. Researchers are developing a model to understand the dynamics of the HRE-NYB ecosystem. (Credit: Natalia Castro)

Developing an End-To-End Ecosystem Model to Inform Management of Hudson River and New York Bight Ecosystem *(R/FBF-27, Dr. Yong Chen, Stony Brook University)*

The Hudson River Estuary (HRE) acts as a vital corridor linking critical habitats in the Hudson River and the New York Bight (NYB). Spanning freshwater, brackish, and marine environments, this region includes important spawning, nursery, and foraging grounds for local species, including fish that supply many of the area's major fisheries. These fisheries face numerous stressors that have impacted population levels.

In response, fisheries managers are adapting their management strategies to maintain the viability of HRE fisheries. As fisheries managers adopt more Ecosystem-Based Fisheries Management (EBFM) approaches, it is apparent that managers must begin to view the HRE and NYB as a single, integrated ecosystem. Understanding how these areas interact is vital for meeting management goals and avoiding ecological setbacks.

In this project, researchers are working to develop and test an end-to-end ecosystem model (EEM) that simulates the dynamics of the HRE-NYB ecosystem. An EEM with physical and biological processes, like the one being developed in this project, offers the ability to understand the complexities of estuarine ecosystems. It can be used to explore how long-term changes in environmental variables might influence ecosystem functions, providing methods to support EBFM and marine conservation in the HRE-NYB ecosystem.

The research team has made progress developing the EEM, including preparing data input for the model and consulting with the architects of a physical-biogeochemical model for ideas on combining the two approaches. The outcome is expected to be a model that can simulate and test different management strategies before they are deployed. This EEM will eventually be able to inform stock assessment for fisheries in both qualitative and quantitative ways using an ecosystem-based approach, which will benefit both commercial and recreational fisheries.

A Queens, NY, road flooded after a heavy rainfall. Stony Brook University researchers are working to improve risk communication for similar coastal communities. (Credit: Martin Grillo)

Improving Risk Communication for Extreme Rainfall Events in Vulnerable Coastal Communities: A Case Study for Jamaica Bay *(R/CHD-20, Dr. Christine Gilbert, Stony Brook University)*

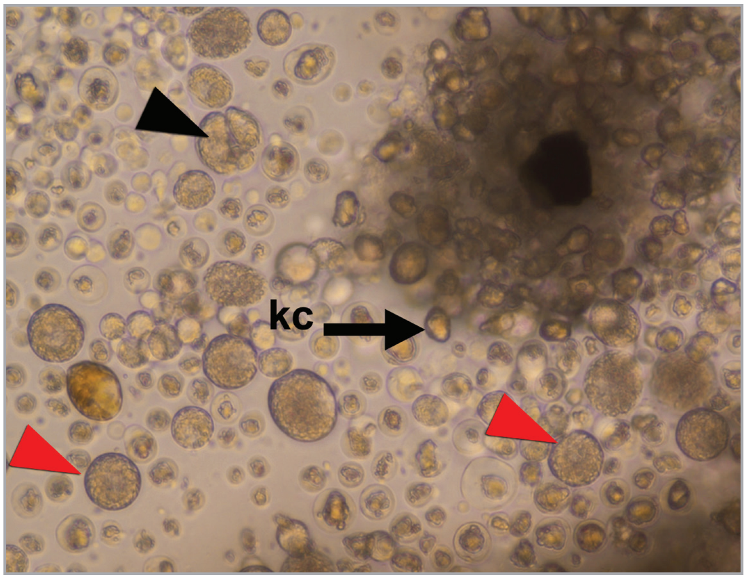
The Jamaica Bay region of New York has been historically vulnerable to the impacts of extreme weather. Flooding events (such as those caused by 2012's Hurricane Sandy) and flood risks from compound events (for example, the extreme rainfall coupled with storm surge seen during 2022's Winter Storm Elliott) are especially harsh on Jamaica Bay and similar coastal communities. Older or inadequate infrastructure, proximity to bodies of water, and lack of resources mean that coastal communities are subject to excessive damage due to extreme rainfall, storm surges, or high tides.

While concerns may seem straightforward, it can be challenging to adequately communicate flood risk in a way that addresses the needs of the community and remains accessible. New communication strategies, particularly those co-developed in partnership with community members, are crucial for mitigating the risks to the public from future flood events. Improved and updated risk communication increases a community's capacity to be better prepared.

This project uses Jamaica Bay neighborhoods as a case study for examining how to accurately communicate hazards (such as flooding, infrastructure damage, and unsafe transportation) and how to improve communication strategies for coastal communities. Researchers are developing a combined approach that utilizes environmental modeling to build on a concept of risk communication called "storylines" — presenting problems and solutions as a human-centered narrative to inspire engagement and action.

So far, data collected from focus groups suggest that residents experience flooding as a part of everyday life in Jamaica Bay. Most participants already use multiple forms of technology to access weather information, including TV and the internet. Historically extreme storms such as Hurricane Sandy have a continued legacy in the area, with participants regularly using it as an example during discussions; this suggests that future extreme weather events may have a similar negative impact.

The research team continues to engage community stakeholders in Jamaica Bay to evaluate current knowledge around risk and develop risk communication strategies. Eventually, they will test and refine the storyline toolkit with the public, which will be done by working closely with the Jamaica Bay Community Advisory Board and interested residents. The final goal is to communicate findings through practical application, community outreach, and peer-reviewed publications.



Stony Brook University investigators are helping to identify risk factors associated with shellfish disease outbreaks such as the bay scallop Marosporida (BSM), an emergent parasite of adult bay scallop seen here in a mixture of crushed scallop kidneys. Red and black arrowheads represent single and dividing BSM, respectively. The notation "kc" refers to kidney concretions — also known as stones. (Credit: Emmanuelle Pales Espinosa)

Characterization and Dynamics of Bay Scallop Marosporida (BSM), an Emergent Parasite of Argopecten Irradians Irradians *(R/FBM-45, Dr. Emmanuelle Pales Espinosa, Stony Brook University)*

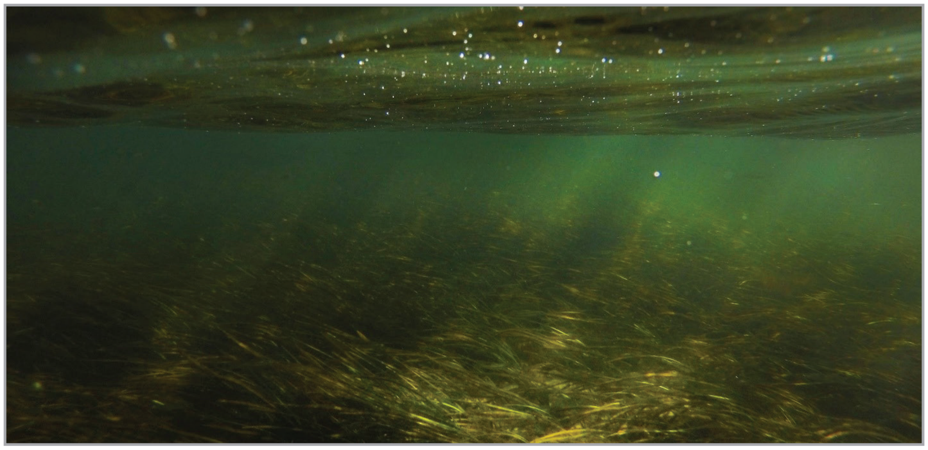
Adult bay scallops (*Argopecten irradians* subsp. *irradians*) in Long Island's Peconic Estuary have suffered severe mass mortality events since 2019. These mortality events are now associated with annual outbreaks of a new class of apicomplexan parasite, dubbed bay scallop Marosporida (BSM), that disrupts the tissues of infected animals.

BSM outbreaks and the subsequent mass bay scallop die-offs have severely threatened the historically successful bay scallop fishery on Long Island, jeopardizing its economic viability. Despite the urgency of the threat it poses, there is still much to learn about BSM and how it actually functions. Researchers know that exposure to heat promotes the growth of the parasite, accelerating the infection and subsequent death of the affected animal. However, details of the parasite's ecology, biology, distribution, environmental dynamics, and transmission are largely unknown. Knowing these details is necessary to better manage the impacts of this parasite.

This project seeks to learn about the basic biology and ecology of this emergent parasite by studying key traits of how it functions in the environment. Researchers intend to use findings to understand how BSM outbreaks happen, how their effects might be mitigated, and how to prevent spread to uninfected scallops. They have begun doing this by investigating current BSM distribution, environmental dynamics (such as temperature), and potential reservoirs for infection.

Initial results suggest that the environment does not represent a source of parasite cells capable of infecting unaffected scallops. Instead, there is evidence of successful individual-to-individual BSM transmission via exposure to infected kidney tissue. These findings support the idea that the main (and possibly sole) source of BSM in the environment is from infected scallops and not from any other external factors. Scallops from North Carolina also showed a higher prevalence of positive testing for the parasite, which suggests that this scallop lineage may be more susceptible to infection.

The results of this research will aid management and be beneficial to the scallop industry, offering a path forward for the fishery.



Eelgrass *(Zostera marina)* can be found in the Long Island South Shore Estuary. The seagrass canopy (made up of the leaves of the plants) soaks up CO2 from the water column as it photosynthesizes. A NYSG-funded research team is attempting to quantify the amount of CO2 that eelgrass stores over time. (Credit: Kaitlyn O'Toole)

Quantifying the Carbon Sequestration Stocks, Sources and Accumulation Rates of Eelgrass (*Zostera marina*) in the South Shore and Peconic Estuaries of Long Island
(R/CMC-22, Dr. Bradley J. Peterson, Stony Brook University)

Eelgrass (*Zostera marina*) is a marine plant that grows along shallow coastal areas, forming underwater meadows. Eelgrass meadows serve as important habitats that provide nurseries, shelter, and food for marine fauna, while also impacting water quality within and adjacent to the eelgrass beds. During photosynthesis, eelgrass naturally removes carbon dioxide from the water and stores it within its biomass in a process called carbon sequestration. This process may moderate ocean acidification within and near eelgrass beds. Studying eelgrass carbon sequestration might offer solutions for other marine challenges caused by excess carbon dioxide in seawater.

The objective of this project is to quantify the carbon sequestration rates of eelgrass found in both the South Shore and the Peconic Estuary system on Long Island. Through collecting, processing, and analyzing sediment samples collected from 50 sites across the target area, the research team is attempting to estimate the rates of carbon storage in eelgrass meadows. By doing so, they hope to understand this plant's ability to store carbon in coastal and marine environments.

Preliminary results suggest organic carbon values close to what is expected from marine sediments, with some variation both geographically and across sediment depths. Sediment dating is still in progress, but initial results suggest extremely low sediment deposition rates in large regions of the project area. This might imply older stocks and slower carbon accumulation rates than anticipated, which may mean that researchers will have to use a different dating process (such as radiocarbon dating) that is more suitable for evaluating older material.

Moving forward, researchers are continuing to examine potential abiotic and biotic environmental factors that may explain the variation between different sample sites. The final results of the project are expected to be useful to the NYSDEC for assessing the use of eelgrass meadows in ocean acidification mitigation.

Restoring cisco populations in Lake Ontario is the focus of an international (U.S./Canadian) collaborative effort. Recent NYSG research has provided critical information on cisco population genetics and current and potential breeding locations. (Credit: Ellen George)

Navigating Lake Ontario Coregonine Restoration: Analysis of Contemporary and Future Food Web Structures *(R/FBF-28, Dr. Lars Rudstam, Cornell University)*

Many factors threaten native species in aquatic ecosystems, including aquatic invasive species (AIS), habitat loss, and contaminant pollution. Restoring native species has the potential to mitigate disruption from invasive species and other impacts, leading to improved food web function. However, this process and its potential repercussions have never been evaluated for Great Lakes ecosystems.

This research project intends to use an innovative food web modeling approach, Linear Inverse Modeling (LIM), to quantify the potential food web effects of native species restoration in Lake Ontario. The proposed model would provide a visualization of what would happen to contemporary and future food webs if restoration were to move forward in the area – specifically, the research team will use the modelling approach to test the food web effects of restoring native coregonine species (ciscoes).

So far, researchers have developed the preliminary Lake Ontario food web model structures. This process involved identifying species for the model, evaluating food web data availability, and identifying key food web metrics. Now that this step is complete, researchers plan to create a future food web to start creating a visual of Lake Ontario post-restoration. They have also formed a technical working group and advisory panel to explore potential fishery management benefits from the application of the model. These outreach efforts are intended to promote collaboration and engagement between different agencies and stakeholders, as well as raise awareness and interest in native species restoration.

Upon completion, the team plans to potentially expand this project to explore the effects of restoring other native species. The model produced by this project is expected to benefit fisheries managers, recreational anglers, and the local communities that anglers visit.

New York Sea Grant (NYSG) is a partnership program of the State University of New York, Cornell University, and the National Oceanic and Atmospheric Administration that delivers science-based solutions for environmental stewardship, economic vitality, and resilience across New York's marine and Great Lakes regions.

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