

2025 Completed Projects

New York Sea Grant Research: Results and Impacts

Against All Odds: Development of Bay Scallop Strains That Resist Temperature and Disease Stress (R/XG-34, Dr. Bassem Allam, Stony Brook University)

Over the past decade, adult bay scallop (*Argopecten irradians* subsp. *irradians*) populations in eastern Long Island's Peconic Estuary have suffered mass mortality events due to an endemic apicomplexan (single-celled) parasite known as bay scallop Marosporida (BSM). The effects of these mass die-offs have been economically devastating to the Peconic Bay scallop fishery and raise concern about the possibility of the parasite spreading to other bay scallop populations. While researchers have identified that exposure to heat accelerates the animal's infection and subsequent death, there is still work to be done to understand how animals can resist the parasite.

The overarching objective of this research was to identify scallops that better resist infection by BSM and temperature stress to help restore local bay scallop populations. To evaluate whether large-scale mortality events have resulted in survivorship being a heritable trait, the research team compared the performance of adult scallop offspring that had little exposure to mortality events with those that had. Offspring from both a high mortality strain (Peconic Bay, NY) and a no mortality strain (Martha's Vineyard, MA) were monitored for temperature changes and dissolved oxygen, while seed scallops from two New York aquaculture strains were subjected to temperature challenge experiments. The research team also worked to identify genetic markers associated with enhanced scallop performance. This was done through restriction site-associated DNA sequencing (RADSeq), which tracked how the genetic composition of wild and aquaculture groups changed over the course of a summer mortality event.

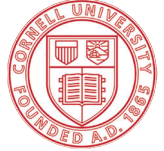
Research results show significantly higher survivorship in wild scallops, with survivors from the aquaculture line found to be genetically similar to wild survivors. This indicates that, over time, all survivors develop a similar genetic resistance to BSM and environmental stressors. The Martha's Vineyard scallop line is particularly



An adult bay scallop (*Argopecten irradians*) is set up for an experiment evaluating the effect of temperature on disease development and mortality in the Stony Brook University Marine Animal Disease Lab. A NYSG-funded project is trying to identify a scallop line resistant to both disease and heat stress. (Credit: Bassem Allam)

resistant to parasite infection. While researchers discovered that scallops spawned in the fall experienced minimal disease and mortality levels, a particularly promising outcome was the identification of scallop stocks with high survivorship under stressful summer conditions.

Now that researchers have identified and collected scallop lines showing the highest field survivorship, the next steps include the specific development of a bay scallop line resistant to BSM infection. The identification of genetic markers associated with survivorship will aid in targeted stock selection in the future. Future yield will be evaluated to determine whether survivability is heritable and to develop resistant strains for future enhancement and aquaculture programs. All findings offer renewed hope that strong, resilient scallop populations can recover in New York.



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Participants use VR headsets to escape a virtual rip current during a July 2025 event at the Long Island Aquarium in Riverhead, NY. Hofstra researchers are using new technology to improve Spanish-language materials on rip currents. (Credit: Jase E. Bernhardt)

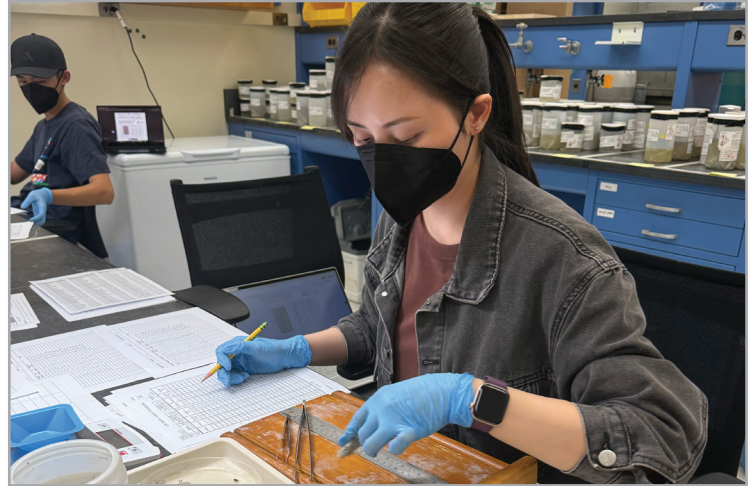
Enhancing Rip Current Risk Communication in English and Spanish (*R/CHD-16, Dr. Jace Bernhardt, Hofstra University*)

Rip currents are one of the most dangerous hazards for beachgoers. Cited by lifeguards as the leading cause for surf rescues, these currents are a potentially fatal hazard to inexperienced and skilled swimmers alike. While there are a variety of educational materials on rip currents available in English, Spanish-language material is not as easily accessible. Existing materials translated into Spanish may not be accurate due to poor translation or inaccurate word choices, leading to limited comprehension and increased risk. Since Spanish is the second-most spoken language in the United States, this puts a significant portion of the population at unnecessary risk whenever they visit the beach.

In this study, researchers examined how effective existing rip current public safety materials are in communicating with Long Island Latino populations. They also evaluated the effectiveness of brochures and virtual reality (VR) simulations as alternative, immersive methods for conveying rip current safety information to Spanish-speaking audiences. To do so, researchers reviewed National Weather Service (NWS)-published safety brochures available in both English and translated into Spanish. The team collaborated with local Latino organizations to design a culturally relevant survey evaluating how participants perceived text and visual information in these brochures. Meanwhile, the VR headset was used to present beach hazard information in a non-text-dependent way, potentially bridging language or literacy difficulties while examining how effective they are in communicating rip current information.

Survey results indicate that while both the English and Spanish versions of the NWS brochure were considered

effective by participants, they could be improved further. Spanish speakers reported problems with the Spanish translation, especially when it came to terms related to rip currents. Safety hazards not being communicated as intended to non-English speakers was identified as a general problem. However, preliminary results from the VR demonstrations have shown that VR may be an effective tool to help users understand both the dangers of rip currents and the steps beachgoers can take to escape them. This project's findings are being used by the NWS and other agencies to update their rip current safety materials.



Anh Nyugen (a Ph.D. student with the Chen Lab of Fisheries Science and Management at Stony Brook University) measures juvenile fish. A research team is studying stock recovery methods for American shad in the Hudson River. (Credit: Natalia Castro)

Evaluating the Changing Biogeography of American Shad in a Changing Hudson River Ecosystem (*R/BBF-26, Dr. Yong Chen, Stony Brook University*)

The American shad has historically been a significant species for both recreational and commercial fishing in the Hudson River Estuary (HRE). Once plentiful, the American shad population severely declined by the early 2000s, leading the New York State Department of Environmental Conservation (NYSDEC) to impose a fishing moratorium in 2010. Over a decade later, the stock has still not recovered, posing a threat to local fisheries that depend on shad as a crucial species.

To investigate the causes of the decline of shad in this area, this project studied the changes in the timing and location of American shad spawning in the HRE to find out whether environmental conditions and fishing pressure may be affecting their recovery. Researchers compiled shad and environmental data from the Hudson River Biological Monitoring Program (HRBMP) and other

sources. By monitoring shad egg and larvae distribution, determining how environmental conditions affect them, and using modeling and simulations to determine shifts in salinity, the research team attempted to investigate how these factors affect stock recovery.

So far, results suggest that external forces, such as offshore fishing or ocean warming, may play a larger role in shad population dynamics than previously thought. Simulations showed that even small increases in fishing pressure outside the HRE can sharply reduce the spawning potential of this already-declining population. The research team also discovered a trend towards northward egg distribution and a shift towards laying eggs at shallower depths, with salinity being the most significant factor for these trends. Key spawning areas are concentrated around river kilometer 200 and 245, with sandy, shallow habitats being particularly important. These findings underscore the importance of preserving sandy, shallow habitats and maintaining minimum fishing mortality outside the HRE to support stock recovery.

A moratorium on the American shad fishery in the HRE may not be enough to support stock recovery without also addressing fishing pressure outside the HRE. Results from this research will help organizations and fisheries decide how to proceed with protecting this important species.



In an effort to help prevent erosion, signage encourages beachgoers to keep off coastal bluffs. A NYSG-funded project is gathering information that will allow for improved prediction of bluff erosion that informs planning by coastal communities. (Credit: Cornell Extension Marine Program)

Erosion and Recession of Coastal Bluffs: Characterizing Erodibility of Bluff Materials under Various Land- and Sea-Based Conditions (R/CCP-20, Dr. Ali Farhadzadeh, Stony Brook University)

Bluffs – soft cliff formations along coastal areas – are a common feature of sandy beaches. Composed of soft

layers of sediment, rocks, and boulders, bluffs help support coastal stability while providing a habitat for local flora and fauna. However, their composition means that they are prone to erosion, which can lead to bluff failure. Long Island’s coastal bluffs are eroding rapidly. This poses a significant risk to public safety, especially for bluff-top and bluff-adjacent communities and properties. By understanding the technical processes that might cause bluff failure, scientists and community members can better prepare for and prevent problems before they happen.

This project studied some of the processes and factors involved in bluff erosion. The project team identified and quantified some of the sea- and land-based processes that lead to coastal bluff erosion to create a modeling framework for more accurate predictions of coastal bluff recession. Researchers conducted geotechnical testing of soil samples from two bluff shorelines and laboratory experiments to simulate daily wave movement, the heights reached during storms, and bluff behavior under certain water conditions. Meanwhile, the investigators tested soil properties to see how factors like density and geomechanical makeup could influence erosion, while using historical recession data collected from Long Island and Great Lakes bluffs (recession measurements, wave and storm surge records, and soil property data) to test the model.

Results show that the mechanical behavior of soil, moisture content, and density are the highest predictors of erodibility. This means that bluffs made of poorly compacted sand erode and recede much more quickly than those with greater density. Storm surges and increased wave activity increase the water content of bluffs, weakening them from the inside out. This offers potential evidence of how storms might accelerate or cause bluff failure in real-life scenarios. This project produced an easy-to-understand fact sheet offering guidance on reducing erosion risks and protecting bluff-top properties. Attempts to pinpoint a process-based model to determine an erodibility parameter for soils are in progress, but need more time and study.

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.