Baseline Conditions & Success Rates of NNBF – Virtual Forum I
October 26, 2023

Hosted by New York Sea Grant & The Science & Resilience Institute at Jamaica Bay

With funding through the US Coastal Research Program, our team is convening this forum to bring together practitioners and stakeholders (researchers and policymakers) from New York State, with experts on natural and nature-based features (NNBF) to facilitate the exchange of experience, insights and innovative solutions that address identified knowledge gaps pertaining to the implementation and management of nature-based solutions in New York State.

To put us one step closer to addressing these gaps, we have invited experts in the field to present case studies from their own work, on how they've managed to tackle these problems.

Speakers:
Dr. Rachel K. Gittman, Dr. Jon Miller, & Dr. James O'Donnell

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Dr. Rachel K. Gittman

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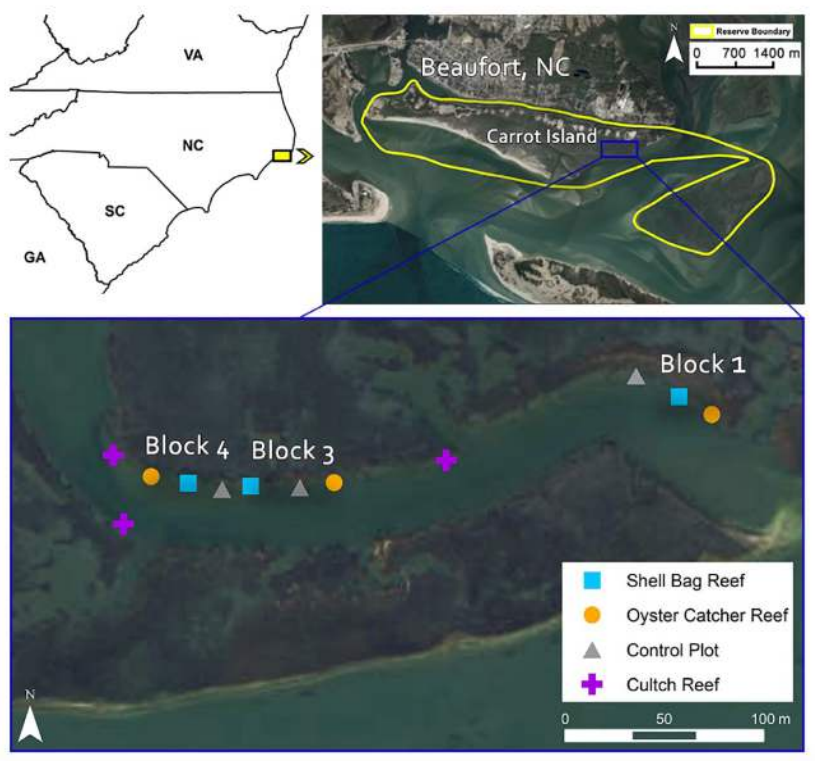
Dr. Rachel K. Gittman currently serves as an Assistant Professor in the Department of Biology and the Coastal Studies Institute at East Carolina University. Gittman's research seeks innovative solutions for preserving and restoring coastal habitats in developed areas, such as designing and implementing living shorelines and evaluating successful ecosystem restoration methods. In 2020, Gittman received funding from the US Coastal Research Program for "Evaluating the Coastal Protection and Ecological Co-Benefits of Novel Marsh-Oyster Restoration Approaches" and presently works with a team of researchers aiming to develop an evidence map for the performance of nature-based solutions in biogenic, shallow ecosystems.

Dr. Gittman will present recent research on several newly created oyster-based natural and nature-based infrastructure (NNBI) projects in the Beaufort, North Carolina region. This research explores the effects of different substrates and designs of oyster-based NNBI on shoreline protection, considering varying environmental settings such as wave-energy regimes. The results highlight the potential of specific NNBI substrates and configurations to reduce erosion rates and enhance vertical accretion along threatened marsh shorelines, emphasizing the importance of deliberate decisions in NNBI deployment. In addition, her work delves into ecological monitoring after oyster-based NNBI implementation. This study involved sampling resident and transient fauna in newly created oyster reefs and comparing different restoration treatments, including control plots, oyster shell bags, and reefs made from a novel design. The research showcases an increase in taxonomic richness and shifts in species assemblages post-restoration, with parasite abundance serving as a valuable indicator of trophic complexity in structured habitats.



Relevant Links

- Dr. Gittman's Laboratory Site
- USCRP 2020 Recipients
- Dr. Gittman's Google Scholar
- Dr. Gittman's Profile - ECU

- Wellman EH, Baillie CJ, Puckett BJ, Donaher SE, Trackenberg SN, Gittman RK (2021) Reef design and site hydrodynamics mediate oyster restoration and marsh stabilization outcomes. *Ecological Applications – ESA* 32(2)
- Moore CS, Gittman RK, Puckett BJ, Wellman EH, Blakeslee AMH (2020) If you build it, they will come: Restoration positively influences free-living and parasite diversity in a restored tidal marsh. *Food Webs* 25

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Dr. Jon Miller

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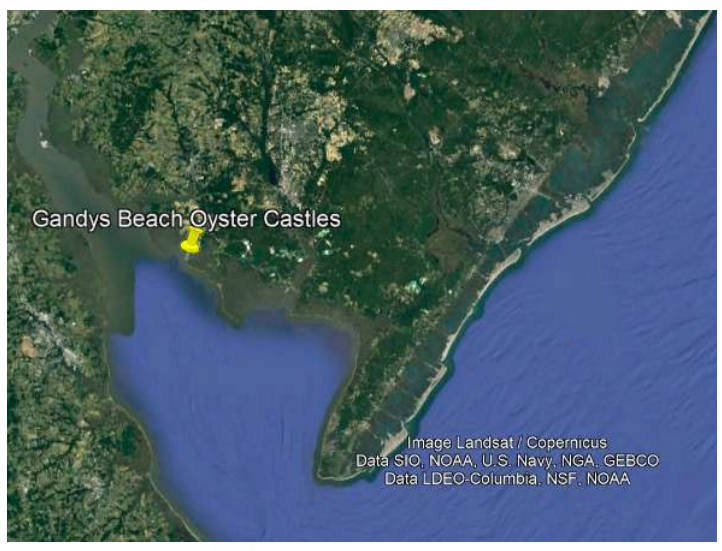
Dr. Jon Miller is a coastal engineering expert, Director of the NJ Coastal Protection Technical Assistance Service, a Coastal Processes Specialist with New Jersey Sea Grant, and a Research Associate Professor at Stevens Institute of Technology in the Department of Civil, Environmental, and Ocean Engineering. Dr. Miller's work combines numerical modeling and field data to assess resilience in built and natural systems. His research on the effect of low-crested living shorelines on wave attenuation received funding from the US Coastal Research Program in 2021. In a recent publication with his team, Dr. Miller provided a framework on guiding principles and design elements for engineering natural and nature-based features along New Jersey's developed shorelines.

Dr. Miller will present research pertaining to the Gandy's Beach project, a collaborative effort between The Nature Conservancy and the U.S. Fish and Wildlife Service to protect and enhance shoreline habitats at Gandy's Beach Preserve in Downe Township, New Jersey. The project employed a structural living shoreline, which applied traditional wave attenuating breakwater concepts to shoreline protection, while also utilizing materials that allowed for attachment and growth of oysters. This technique aimed to reduce erosion and enhance nearshore oyster habitats. The results of this research will speak to observed seasonality of wave attenuation, differences in emergent versus submerged structures, and rates of performance for oyster castle breakwaters. Collected morphological data details wave attenuation measurements between investigated oyster castle segments. The project underscored the need for technical expertise in utilizing low-cost pressure gauges as well as the limitations of drone imagery in measuring elevations through dense marsh vegetation. While the oyster castle breakwaters at Gandy's Beach only had limited success in slowing the rapid erosion at the site, the detailed monitoring program put in place post-installation has provided a unique opportunity to study the impact of these structures on wave attenuation, varying with seasons and structural submergence.



Relevant Links

- Dr. Miller's Laboratory Site
- USCRP 2021 Recipients
- Dr. Miller's Profile - Stevens Institute of Technology
- Dr. Miller's Google Scholar

Dr. James O'Donnell

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Dr. James O'Donnell serves as the Executive Director of the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) and is a Professor in the Department of Marine Sciences at the University of Connecticut. His research focuses on coastal ocean processes, involving numerical modeling, fluid dynamics and ocean observations. As CIRCA's Executive Director, he unites academic research with practical expertise to develop sustainable strategies for enhancing coastal resilience while protecting natural ecosystems in Connecticut and the northeast. O'Donnell's work directly pertains to the state of New York. Since 2004, he has coordinated the development and operation of the Long Island Sound Integrated Coastal Observing System (LISICOS). This system combines an observational network, a data system, models, and analyses to understand and predict processes in Long Island Sound.

Dr. O'Donnell will present research pertaining to the deployment of linear arrays of Reef Balls at Stratford Point, CT, with the goal of reducing the rate of coastal erosion by waves in the intertidal zone as compared to submerged breakwaters of similar scale. By deploying high-resolution current meters, Dr. O'Donnell and his team measured the amplitude and direction of waves, including wave height, dominant wave period, and mean water level. Results show that transmission coefficients altered in response to water level versus height of the structure, and marsh edge erosion rates were shown to scale with the square of the incident wave height. Thus, trends in Dr. O'Donnell's field observations show that Reef Ball systems are more effective at reducing wave heights than previously thought. The results presented will provide valuable guidance in the design and evaluation of proposals for new coastal protection strategies, particularly in the implementation of Reef Balls as NNBF.

Relevant Links

- Dr. O'Donnell's Profile - UCONN/CIRCA
- Dr. O'Donnell's Google Scholar

- O'Donnell, J. (2017) Living Shorelines: A Review of Literature Relevant to New England Coasts. *Journal of Coastal Research* 33(2)

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