

Margaret A. Davidson Graduate Fellowship

This two-year fellowship is designed to build the next generation of leaders in estuarine science and coastal management by affording qualified graduate students the opportunity to conduct collaborative science within the National Estuarine Research Reserve System. You will work with a reserve mentor, fellow scientists, and local communities to help address coastal management challenges. The fellowship also includes networking opportunities and career-readiness training.



The **North Carolina National Estuarine Research Reserve** (NC NERR) represents the unique biogeography of coastal North Carolina at four geographically disparate sites (Currituck Banks, Rachel Carson, Masonboro Island, Zeke's Island) with diverse estuarine habitats.

Contact: Brandon Puckett, Research coordinator. Brandon.puckett@ncdenr.gov, (252) 838-0851

NC NERR welcomes applicants to the Davidson Fellowship interested in researching one of the Reserve's key **management needs**:

Ecosystem services. The NCNERR sites provide ecosystem services AND the habitats that provide these services are impacted by factors including climate change, invasive species, and coastal development, BUT we have limited information on how these factors influence the provision of ecosystem services. THEREFORE, research is needed to quantify and better understand the services our habitats provide and how they may change in association with these factors to inform future management strategies.

Vulnerability. Habitats at the NCNERR sites are vulnerable to climate change impacts (e.g., sea-level rise, increases in storminess and temperature) AND the vulnerability of habitats to climate change is influenced by human activities (e.g., sand placement, dredging), BUT it is not clear how vulnerable the habitats are to climate and human impacts and how to best mitigate vulnerability. THEREFORE, more information is needed to understand habitat vulnerability and evaluate future management strategies to enhance habitat resilience.

Dredge monitoring. Hopper dredging has typically been restricted to an environmental window from November through April to avoid potential natural resource impacts during biologically productive and ecologically important time periods AND this restriction along with increasing demand for dredging is making it increasingly difficult to complete dredging activities important for commerce. The Army Corps of Engineers has asked for and been granted a 3-year moratorium on the environmental window for dredging NC's two state ports at Beaufort and Cape Fear River inlets (proximal to and within the watersheds of the Rachel Carson and Zeke's Island sites of the NCNERR, respectively) BUT the potential impacts of dredging outside of environmental windows on water quality, protected species, coastal habitats, and fishery species are largely unknown. THEREFORE, resource managers need targeted research that builds on existing studies and addresses one or more of the following knowledge gaps to make informed decisions regarding seasonal closures associated with hopper dredging:

- Synthesis of research of inlet utilization by various species and regional studies of marine dredging impacts
- Spatiotemporal patterns of ichthyoplankton abundance and composition and potential interactions with dredging
- Spatiotemporal patterns of staging, migration, and spawning activity of commercially and recreationally important species and potential interactions with dredging
- Characteristics of the sediment plume associated with dredging and implications for i) water quality, ii) sedimentation of nearby habitats, or iii) impacts on benthic communities.

Management needs (cont):

Habitat mapping and assessment. As part of the NERRS System-wide Monitoring Program, Reserve habitats are mapped from the uplands to the intertidal marsh-water edge AND Reserve staff have used remote sensing, including use of Unoccupied Aerial Systems (drones), to map select areas of intertidal habitats BUT we have not applied remote sensing approaches to assess the 'condition' of intertidal oyster reef habitat. THEREFORE, Reserves within the Southeast are interested in developing novel methods and workflows to remotely assess the condition of intertidal oyster reef habitat at user-defined spatial (e.g., patch reefs to landscape) and temporal scales (e.g., before and after events). *This need was co-developed with staff from the North Inlet-Winyah Bay, ACE Basin, Sapelo Island, and GTM NERRS.*

Monitoring applications (multi-reserve priority hosted by GTM NERR). Significant investments in the NERRS System-wide Monitoring Program (SWMP) have led to high-quality environmental data available for coastal management AND SWMP data play an important role in several coastal policy decisions BUT many states and local governments either do not use SWMP data or do so in a limited way. THEREFORE a stakeholder-driven project that examines lessons learned from relevant case studies and makes recommendations for enhancing the relevance of NERRS monitoring data in policy decisions in the GTM and other southeastern US and Caribbean NERR watersheds would significantly increase the broader utility, funding, and significance of SWMP.

*Note, this is only listed in the management needs of GTM NERR, but was co-developed with staff from NERRs in the Southeast and Caribbean: North Carolina, North Inlet-Winyah Bay, ACE Basin, Sapelo Island, and Jobos Bay. Applicants interested in addressing this management priority should contact Guana Tolomato Matanzas NERR, but we anticipate the applicant potentially working with all of the Reserves listed. **Contact: Nikki Dix, Research Coordinator, Nikki.Dix@FloridaDEP.gov, (904) 823-4500.***

Natural resource use (multi-reserve priority hosted by North Inlet-Winyah Bay NERR). Provision of natural resources is a key ecosystem service provided by coastal habitats and growing human populations along the coastlines of the southeast US and Caribbean are likely putting increasing pressure on populations of key natural resource species, but we need improved understanding of the effects of natural resource use to implement ecosystem-based management. Therefore, assessment of the ecological effects and human dimensions of natural resource use (e.g., harvest of bivalves, crustaceans, or finfish, among others) is needed for North Inlet-Winyah Bay, and could be compared among other NERRs in the SE and Caribbean.

*Note, this is only listed in the management needs of North Inlet-Winyah Bay NERR, but was co-developed with staff NERRs in the Southeast and Caribbean: North Carolina, ACE Basin, Sapelo Island, Guana Tolomato Matanzas, and Jobos Bay. Applicants interested in addressing this management priority should contact North Inlet-Winyah Bay NERR, but we anticipate the applicant potentially working with all the Reserves listed. **Contact: Robert Dunn, Research Coordinator, North Inlet-Winyah Bay, robert@baruch.sc.edu, (843) 904-902***

Collaborative science

Each fellowship project will employ the tenets of collaborative science. The goal of collaborative science is to ensure that information generated from research is useful for decision-making. This requires that the users of the research be integrated into the research process, which increases trust and legitimacy in the research product. The [collaborative process](#):

- Identifies intended end users
- Engages end users throughout, from project idea to product development through focus groups, an advisory committee, or a collaborative team.
- Disseminate research results to end users

Benefits and professional development opportunities

Applications are due December 10, 2021

Professional development - Training will be offered at the required in-person fellows meeting as well as at required and optional virtual events in areas such as project management, leadership, coastal management skills, and career planning.

Funding– Fellows receive up to \$45,000 per year in direct support through the fellow's academic institution. A travel budget allocation of approximately \$7,000 per year is recommended to cover travel to one fellows meeting (location TBD), NERRS/NERRA Annual meeting during the first year (Seattle, Washington in 2022), and a professional conference in the second year (location TBD).

Eligibility – Eligible applicants must be citizens or permanent residents of U.S. states or territories admitted to or enrolled in a full-time graduate program at a U.S. accredited college or university, working to obtain a master's or doctoral degree. Applicants must plan to be enrolled for all of the first year, and the majority of the second year, of funding.

Time at the Reserve - Fellows are expected to spend as much time as possible at the reserve during the two-year fellowship. The minimum requirement for on-site engagement is 6 weeks (consecutive or nonconsecutive) each year.

Mentoring – The NC NERR will determine an appropriate mentor based on expertise and availability. All parties will agree to and sign a mentoring plan to ensure that responsibilities are clear.

Research assets

May be dependent on availability of equipment and staff.

- **Four national reserve sites** – Currituck Banks (CB), Rachel Carson (RC), Masonboro Island (MI), Zeke's Island (ZI)
- **Reserve offices** - Beaufort, Wilmington, Manteo; office and lab space available in Beaufort and Wilmington
- **Data** – surface elevation tables, habitat maps, water quality (RC, MI, ZI), water level (RC, soon at MI and ZI), emergent vegetation (RC, MI, ZI)
- **Equipment** – RTK GPS, laser level, drone, fluorometer (Wilmington), drying oven (Wilmington, Beaufort), water quality sondes (Beaufort)
- **Boats** – 16-23' skiffs (RC, MI, ZI)
- **Basic scientific and safety equipment** - hood, chemical storage, cold storage and freezer space, balances, pipettes, safety equipment, and some glassware
- Access to a variety of **subject matter experts**

Fellow panel webinar

The NERRS Science Collaborative hosted an [informational webinar](#) in June featuring a panel discussion among current fellows (including NC NERR's current fellow Marae Lindquist!), highlighting their experiences and lessons learned working collaboratively with reserves and end users to design and complete their research.