



North Inlet-Winyah Bay

National Estuarine Research Reserve

2020 in Review

Erik Smith
Reserve Manager



As with so many, 2020 has been a challenging year here at the Reserve. The on-going pandemic forced us to curtail a great many of our activities, especially our K-12 and public education programs and a number of exciting new citizen science programs that were just spinning up. Nonetheless, the Reserve successfully maintained all its core programs, and even established a number of new efforts, thanks to a dedicated and resourceful staff, our many program partners, and our wonderful friends and volunteers.

As you can read below, reserve staff effectively pivoted to virtual platforms where necessary to offer programs and trainings; were able to provide some socially distant outdoor activities to let folks get away from screen-time and stay connected with nature; and managed to maintain our priority long-term monitoring efforts, which are an essential contribution to NOAA's nation-wide coastal monitoring network. In addition, thanks to both long-standing and new partnerships, we were able to engage in several new opportunities and programs this year. The Reserve was proud to be one of several entities that partnered with the South Carolina Maritime Museum to bring the Smithsonian Institution's traveling Water/Ways exhibit to Georgetown this past fall and contributed a real-time environmental data exhibit that is now part of the Museum's permanent collection. A new collaboration with long-standing partners Clemson Extension and SC Sea Grant Consortium is providing stormwater pond management training to diverse audiences in Georgetown and Horry counties. A partnership with SC DNR to bring Family Fishing Clinics to North Inlet has been a great way to introduce kids and adults alike to the joys of fishing, the bounty of species in the estuary, as well as sustainable fishing practices and resource conservation.

Although our undergraduate summer internships were cancelled this year, we were able to continue our support of several graduate students working with Reserve staff on research related to a variety of locally relevant coastal management issues. In addition, this year saw us welcome the very first Margaret A. Davidson Fellow to our Reserve – we are extremely excited about this new national fellowship program and the research that Johanna L'Heureux will conduct over the next two years in North Inlet. Read more about the great work our graduate students are doing in the article on page 8.

We look forward to continuing these and many other new projects in 2021, as well as planning for when we can welcome back more of our friends and members of the public to more in-person events and citizen science opportunities. The virtual world is never as much fun as getting out into the estuary in real life and much work remains to be done!

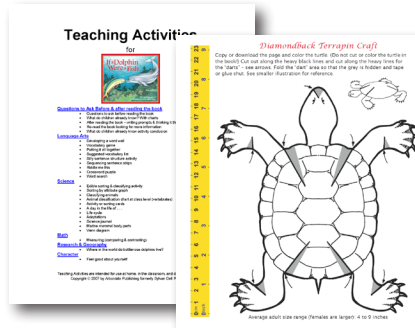
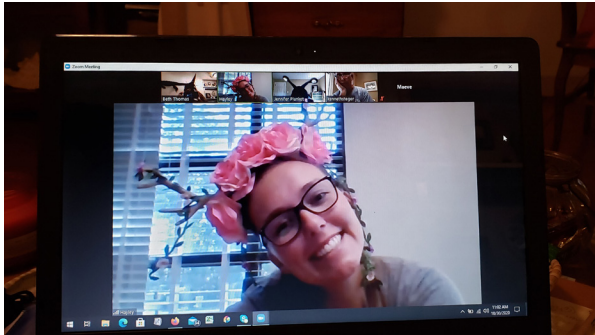
Education

Program Notes

Beth Thomas
Education Coordinator



With ongoing limitations for in-person programming due to the pandemic, this year's programming experienced lots of challenges, but also discovered some silver linings! Education programs transitioned to virtual last spring and the Reserve hosted several on-line activities, created topical content for summer library programs for kids, and became wizards at filming, editing, and the Zoom platform.



Our teacher professional development, 'Watersheds to Wetlands' was hosted virtually in July and advertised statewide, and the geographic range of teachers increased with almost half of the 18 participants attending from mid and upstate; teachers also received an invitation to an in-person field activity to Winyah Bay aboard the SCDNR EV Discovery education vessel in October. During the EV Discovery's visit to Georgetown, school field trips were offered for 5-12th grade Georgetown County students, but with Covid-19 field trip restrictions only a very limited number could participate. The groups that could attend trawled for marine life in Winyah Bay with SCDNR and visited the traveling Smithsonian Water/Ways exhibit at the South Carolina Maritime Museum where the Reserve has a real-time SWMP water quality monitoring display.



New this year, the Reserve's Family Fishing Clinics with SCDNR Aquatic Education program have proved wildly popular and have engaged multi-generational families eager to learn ethical fishing techniques, saltwater fish species, and resource conservation; other ongoing outdoor activities such as biking and marsh walks were also well attended.



- 🔗 **Upcoming Reserve Public Programs**
- 🔗 **SCDNR Family Fishing Clinics**
- 🔗 **NI-WB Reserve Education Program**

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Research and Monitoring

Program Notes

Robert Dunn
Research Coordinator



The Research & Monitoring staff at North Inlet-Winyah Bay NERR continues to make investigating the environmental conditions, flora, and fauna of North Inlet Estuary and Winyah Bay our top priority. Despite the challenges we all faced in 2020, there is plenty of exciting news to share about R & M activities over the past year.



In November, we took our 500th sample of water column nutrients! Since 1993, NERR staff have been monitoring nutrient concentrations in our local waters, sampling every 20 days. What a herculean effort, now led by our technical staff Julie and Baker!

We're airborne! We recently started testing unoccupied aerial systems (AKA drones) as a way to monitor the health of our salt marshes. We're really excited about the possibilities for this technology, and our results could have impacts for marsh monitoring methods in estuaries all over the country.



In August, we conducted our annual marsh vegetation survey, which marked the 15th year of data on the status of our marsh plant community. Tracy Buck was our leader, but it was a full team effort (see picture)!

We started two new monitoring programs for invertebrate animals in 2020. Small-bodied crabs, like the fiddler crab pictured (photo credit: M. Kimball), are now being sampled once each month at 50 plots in North Inlet marshes, and blue and stone crabs are being caught (and returned to the water) four times each year in North Inlet and Winyah Bay (Baker got a little too excited about this particular guy).



- **System-Wide Monitoring Program**
- **Salt Marsh Response to Sea Level Rise**
- **NI-WB Reserve Research Program**

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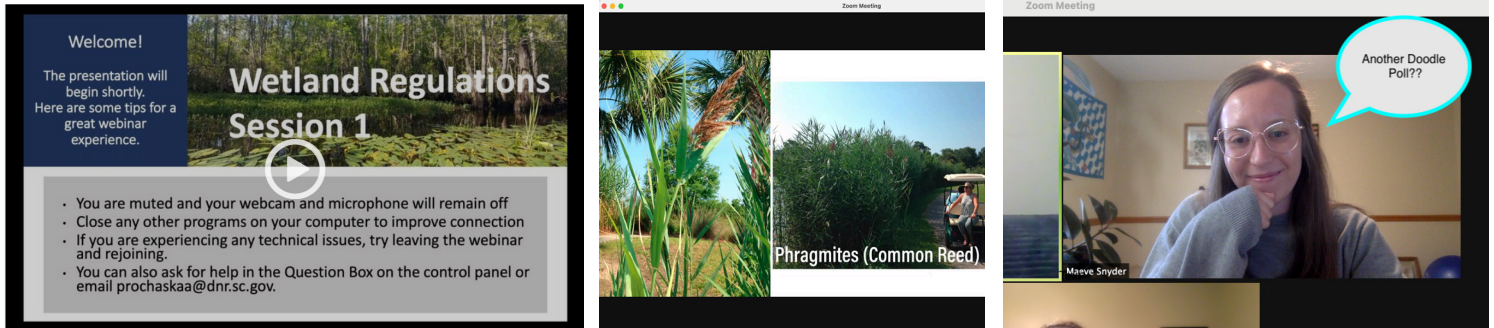
Coastal Training

Program Notes

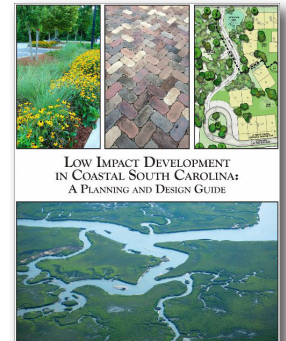
Maeve Snyder
Coastal Training Program
Coordinator



While dress pants are now optional, coastal management decisions carry on. In our new virtual reality, CTP has continued to provide trainings in support of science-based policy, while finding a new niche in virtual facilitation. Shortly after shutdowns hit, CTP provided a training on planning and facilitating engaging virtual meetings to help local decision-makers keep the gears turning. Another training designed to improve virtual work outcomes focused on strategies for communicating science and data.



Strengthened partnerships and broader audiences have been silver linings of the switch to virtual training formats. A two-part training on Wetland Regulations engaged nearly 200 planners, real estate professionals, developers, and other land use professionals in coastal South Carolina. By developing this training as an interactive webinar, a wider audience was able to access this important and complex information. Other CTP training topics have included Low Impact Development practices for engineers and site designers. Real Estate Professionals gained resources on flooding, healthy water, and shoreline management. Coastal managers and researchers gained social science skills in stakeholder engagement and survey design.



New this year, CTP launched the Grand Strand Healthy Pond Series, a community-based discussion series for pond owners to learn and share stormwater pond management solutions. Virtual workshops have provided tips and tools on understanding pond design and managing aquatic plants to nearly 50 local HOA representatives and pond managers. Keep an eye out for this quarterly series – we look forward to hosting these events in-person in the future!

Like our estuary ecosystems, it's important for coastal communities to have resilience and adaptability. The Coastal Training Program will continue to provide technical assistance for virtual meeting facilitation and on-line trainings, but we will also be busy brainstorming field trips and planning coffee break snacks for the future.



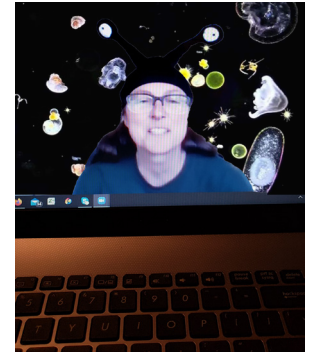
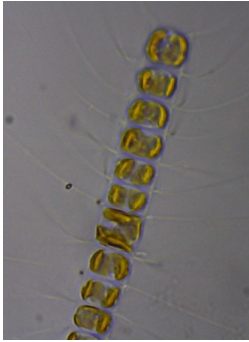
- 🔗 [Virtual Meeting Facilitation Resources](#)
- 🔗 [Wetlands Regulation Seminar Recordings](#)
- 🔗 [NI-WB Reserve Coastal Training Program](#)

Contact

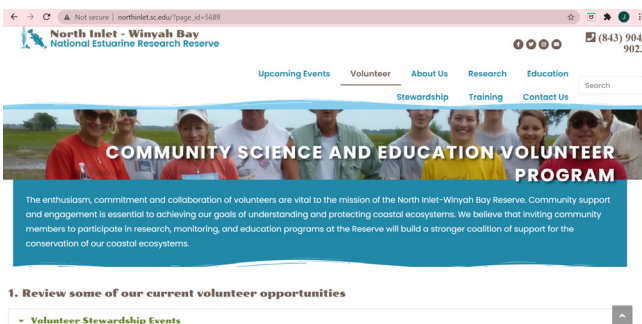
Maeve Snyder
Coastal Training Program Coordinator
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It was a solitary spring without the company of the Winyah Master Naturalists or the volunteers of our new Phytoplankton Monitoring Network (PMN) community science program. However, the hiatus from classes and field work did provide an opportunity to lay the groundwork for building our volunteer and community science program and exploring new opportunities for training.



Phytoplankton samples continued to be collected and assessed at Oyster Landing throughout the summer and fall. No blooms were observed, but some species such as *Chaetoceros* (above left) were featured in our virtual “Scary Estuary” program in October. We also hosted a virtual phytoplankton monitoring refresher, where the CTP and Stewardship program coordinators matched wits in ID skills. This fall we also launched the *Winyah Wildlife* iNaturalist project. We are asking community members to help us understand biodiversity in the Winyah Bay watershed by surveying the plant and animal life in their own yard. Learn more about other new volunteer and community science opportunities as they are launched this coming year by visiting the Reserve volunteer page. Look for announcements in the spring for training events for upcoming projects include phenology monitoring and beach plastics surveys.



Shorebird monitoring continued in the summer and fall (see article below) with great appreciation to Captain Dennis Allen. Monitoring will begin again in March to observe the spring migration. Reserve staff and volunteers also participated in the Audubon annual Christmas Bird Count on December 17. Forty-nine species were observed across the creeks, marshes and beaches of North Inlet. Highlights included sighting two marbled godwits, three marsh sparrow species at Bosun’s Point (saltmarsh sparrow pictured above) and one piping plover.



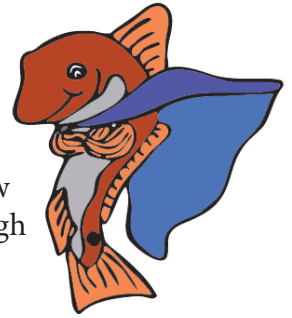
- [Volunteer Program Page](#)
- [Phytoplankton Monitoring Network](#)
- [Winyah Wildlife iNaturalist Project](#)
- [NI-WB Reserve Stewardship Program](#)

Contact

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Our Estuary Heros!

The North Inlet - Winyah Bay NERR celebrated National Estuaries Week in September by honoring some of our local Estuary Heroes. National Estuary Week recognizes that estuaries are amazing, valuable places that provide many benefits to local communities. This year we want to recognize those who give back to their estuaries. Through this award we hope to show our appreciation to members of our community who promote stewardship of estuaries through their work, personal actions, and community engagement.



Duane Draper has been an active champion of estuarine education and conservation since trading New Hampshire snow for South Carolina pluff mud in 2015. An alumnus of the 2016 Winyah Master Naturalist class, Duane has continually lent a hand to the NI-WB Reserve, from picking up trash along the highway and in the marsh, to spending his time at a microscope identifying phytoplankton. He has also volunteered with Friends of Coastal SC, and currently helps with the Hobcaw Ecology Camps, both focused on environmental education of youth. He is a member of Keep it Green, a community activist group concerned about issues of over-development, land use planning and stormwater runoff on the Waccamaw Neck, and also spends time helping out sea turtles with S.C.U.T.E. Recently, Duane has been instrumental in bringing even more friends to our estuaries as the Chair of the newly formed Inlet and Bay Stewards, a non-profit friends group that supports the Reserve by helping to raise community awareness of and participation in Reserve programs.



Ray Funnye is one of our Estuary Heroes for his contributions to healthy coastal ecosystems and for his dedication to his community. Through his role as the Public Services Director of Georgetown County, Ray oversees crucial services, such as stormwater management and environmental services, that protect the health of our local ecosystems and the safety of our communities. Ray was also recently recognized with the American Public Works Association's Presidential Leadership Award. As the Founder and Executive Director of the Village Group, Ray gives back by promoting youth development for children in rural Georgetown County, especially the Plantersville community. Ray shared some thoughts about what estuaries mean to him, "I am truly fortunate that I can walk a few minutes from my office in downtown Georgetown and gaze out over Winyah Bay—this simple pleasure I enjoyed growing up and it continues today. The difference is, as an adult, I realize these "voiceless" estuaries demand our vigilant protection. I want my grandchildren to experience the peaceful, restorative properties of a vista of clean, flowing waters; this thought motivates me in my personal and professional life."



Sandra Bundy has a lifelong estuary connection and is involved in many pursuits where she supports estuary stewardship and her local community. As a member of the Georgetown County Planning Commission, Sandra applies her understanding of land-water connections to make planning decisions. With her background as a real estate agent, Sandra served on the advisory committee for "Calling the Coast Home," a training series on coastal management issues designed for Real Estate Professionals. Sandra also worked on the Murrells Inlet Watershed Plan to support healthy water quality that is necessary to protect shellfish harvesting. Growing up, Sandra spent her summers at the marsh edge of her family marina in Murrells Inlet. Instead of a lemonade stand, Sandra would sell her fiddler crabs to fishermen! She also remembers ringing the old bell to let people know boats were returning from a day of fishing, so people could gather to watch as the catch was unloaded. You might find Sandra watching the salt marsh at low tide, when herons and egrets get to roam the creeks.

Estuary Heros & Friends



Dr. Susan Libes recently retired as a Professor of Marine Science and Chemistry and the Director of the Waccamaw Watershed Academy at Coastal Carolina University. Throughout her scientific career, Susan has researched water quality in blackwater rivers and coastal ecosystems, investigated water quality problems such as hypoxia or microbial contamination, and assessed management practices for improving the health of local waterways. The health of local estuaries depends on upstream impacts. Susan's contributions to understanding water quality in the Waccamaw Watershed have been vital to estuary stewardship. Besides her many academic contributions, Susan has played a key role in community outreach as well. The Volunteer Water Quality Monitoring Program has engaged community members in

monitoring local waterways in Horry and Georgetown Counties. Throughout her career, Susan has created a legacy of inspiring and supporting others. She has positively impacted the lives of students, colleagues, citizen scientists, and members of her community. Susan will still be keeping an eye on our local waterways and plans to continue sampling the volunteer monitoring site located off her dock. She has sampled there every other day since 1998 (data are available at the Volunteer Water Quality Monitoring Program website).



Pawley's Island Bakery owner **Max Goree** is well known for his community involvement and support; he says that is his true purpose-the sweet treats are just for fun! Max was nominated as an Estuary Hero for his efforts towards more environmentally friendly practices in his day-to-day business operations. Open since 2010, the bakery has been recognized by the 'Chirping Bird Society' - a local environmental advocacy group educating coastal communities about plastic pollution - and was one of 300 businesses in Georgetown and Horry Counties participating in the 99 days of 'Strand Strawless Summer' awareness campaign, and also reduced or eliminated Styrofoam and "clamshell" plastic food containers as well as plastic coffee stirrers. Not only does Max help the environment, but also our

communities. A few of Max's recent recognitions include an outstanding employer of the year award from the state for his commitment to special needs students and the vocational rehab program at Waccamaw High School, and he is also involved with many local non-profits serving a variety of causes dear to his heart, including Miss Ruby's Kids and All 4 Paws Animal Rescue. Max has been a great friend to the Reserve, hosting events for our 'Coffee & Climate' public education series, donating treats for teacher events, and promoting Reserve activities.

Join our Friends

The Inlet & Bay Stewards (IBIS) is a volunteer organization that supports the North Inlet-Winyah Bay National Estuarine Research Reserve. IBIS members play an active role in Reserve school programs, helping children discover the wonder of fiddler crabs and snails, while enhancing their science education. The group is also helping the Reserve to educate and energize our community through events like the Carolina Beach and River Clean Up, workshops on conservation topics, and participation in community science projects. Members also enjoy opportunities such as special hikes and activities in the Reserve. Those with an interest in supporting and learning more about our North Inlet and Winyah Bay estuaries and coastal habitats are invited to join IBIS. Please visit the IBIS web site or Facebook page to learn more.



Inlet & Bay Stewards

Supporting the North Inlet-Winyah Bay National Estuarine Research Reserve

📍 [Inlet & Bay Stewards \(inletandbaystewards.org\)](http://inletandbaystewards.org)

📍 [Inlet & Bay Stewards on Facebook](#)

Reserve Spotlight

The Reserve Welcomes its First Margaret A. Davidson Graduate Fellow

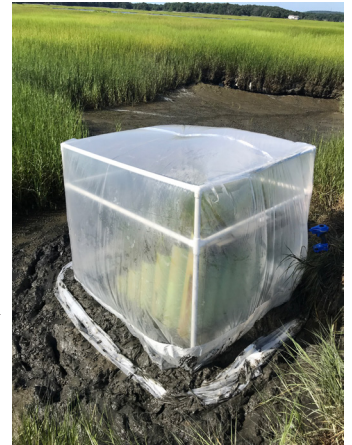
-Robert Dunn



Johanna L'Heureux will be conducting research on the reserve as a Margaret A. Davidson graduate fellow! The goal of Johanna's research is to understand how marsh elevation and nutrients (nitrogen and phosphorus-based fertilizers, in many cases) affect the amount of carbon stored in salt marshes. Marshes face both sea level rise and nutrient additions from wastewater and fertilizer runoff, and as a result, marsh health and the ability of marshes to store carbon is being threatened.

Johanna will be using marsh organs (pictured right) to experimentally examine the effects of elevation and nutrients. As the tide comes in, the pipes of the marsh organ are flooded, and the various levels on the organ can mimic sea

level rise. Johanna nicely describes her research: "In order to learn more about the carbon captured by the marsh grass, *Spartina*, I will create a chamber around the marsh organ and add CO₂ that is labeled with an isotope. The isotope label acts as a marker for carbon and will allow me to trace the carbon from the atmosphere, into the plants, and ultimately into its roots and surrounding sediment. The data I collect from the marsh organs will be used to improve models that predict how marsh carbon storage will change as effects of climate change intensify."



The Margaret A. Davidson Fellowship is a new two-year program that will place one graduate student at each of the 29 National Estuarine Research Reserves. This program will help to support the next generation of leaders in estuarine science and coastal management while helping to address critical reserve management needs through high quality research. Johanna's research will help inform reserve managers and other coastal decision makers how to maintain marsh health and productivity as the climate changes. In addition, Johanna will be working with our Education staff and Coastal Training Program to incorporate her research into their public programs and training events.

Graduate Student Research at the Reserve

University of South Carolina student **Kelly McCabe** completed her reserve-supported research this year and successfully defended her Master's Thesis. Results of Kelly's research, "Particulate and dissolved organic matter in storm-water runoff influences oxygen demand in urbanized headwater catchments," which was conducted along the Waccamaw Neck, was just accepted for publication in the prestigious journal, Environmental Science and Technology.

Graduate student **Curtis Szewczyk** started research that continues on Kelly's work by investigating the role of increasing temperatures and nutrient loading on dissolved oxygen impairment in the Waccamaw River.

Graduate student **Heather Kish** is examining carbon and nutrient storage in the marshes of North Inlet, and how this is affected by tidal flooding and plant community composition, which is critical in quantifying the important role of marshes in buffering climate change.



[Margaret A. Davidson Fellowship](#)

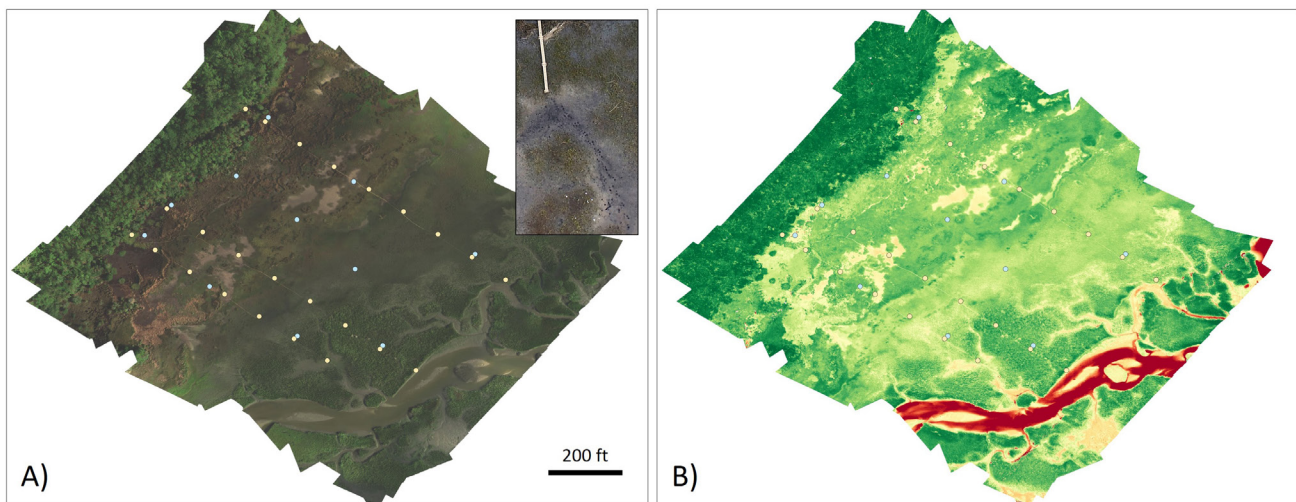
Getting an eagle-eye view of the marsh to measure responses to sea level rise

-Erik Smith

Saltmarshes provide a wealth of benefits to people and places. They protect against flood and storm surge, provide essential fish and shrimp habitat, and help maintain the quality of coastal waters. Not to mention, they are amazing places to recreate and enjoy the beauty of nature. Saltmarshes are also at the front line of sea level rise and other climate change impacts. As sea level rise is predicted to accelerate in the near future, the fate of these marshes, and the benefits they provide, is uncertain.

To better understand and track saltmarsh responses to continued sea level rise, the NI-WB NERR, along with reserves all around the country, have been repeatedly monitoring saltmarsh vegetation communities to assess changes in response to increased tidal inundation. This has been done using standard field-based measurements at fixed points along permanent sampling transects from creek-bank to forest edge. While this approach has been employed by marsh researchers for many decades, and provides critical information at specific points in the marsh, it is logistically limited to relatively few points. To create a bigger picture of spatial patterns in marsh vegetation communities – and how they are changing with increasing tidal inundation – the NERR went high-tech in 2020 and started using Unoccupied Aerial Systems (UAS, commonly known as “drones”) to collect very high resolution 2-dimensional and 3-dimensional images of the marsh over spatial scales that can cover the entire marsh platform, from forest edge to creek.

With a series of grants funded by NOAA, the NI-WB NERR is collaborating with scientists from Duke University, NOAA’s National Centers for Coastal Ocean Science, and other NERRs throughout the Southeast, to test and refine use of UAS-based imagery to estimate common saltmarsh monitoring parameters. The goal of this work is to develop and disseminate step-by-step protocols for incorporation of UAS in wetland monitoring programs, within the NERRS and beyond. Incorporating routine use of UAS in wetland monitoring will greatly increase the temporal and spatial scales over which changes in wetland habitats can be detected and mapped – contributing key information to improve decision making regarding the conservation and management of these critical habitats in the face of continued sea level rise.



A: True color image of one of the NERR’s long-term marsh monitoring sites along Crabhaul Creek in North Inlet. The “photo” is a mosaic of over 900 individual images in each of 5 color bands that are stitched together in 3-dimension by computer software. The inset in upper right shows the high resolution capable from this process – individual footprints left in the mud from researchers stepping off a boardwalk made from 2” x 8” planks. Yellow points are locations of permanent field sampling plots. Blue points are locations of ground control points for the UAS imagery. B: the same area of the marsh depicted as a map of “Normalized Density Vegetation Index” (NDVI), which serves an index of plant biomass and vigor, which can be used to monitor how the marsh community responds to stressors, such as increasing tidal flooding.

Stewardship Spotlight

Finding out where the birds hang out

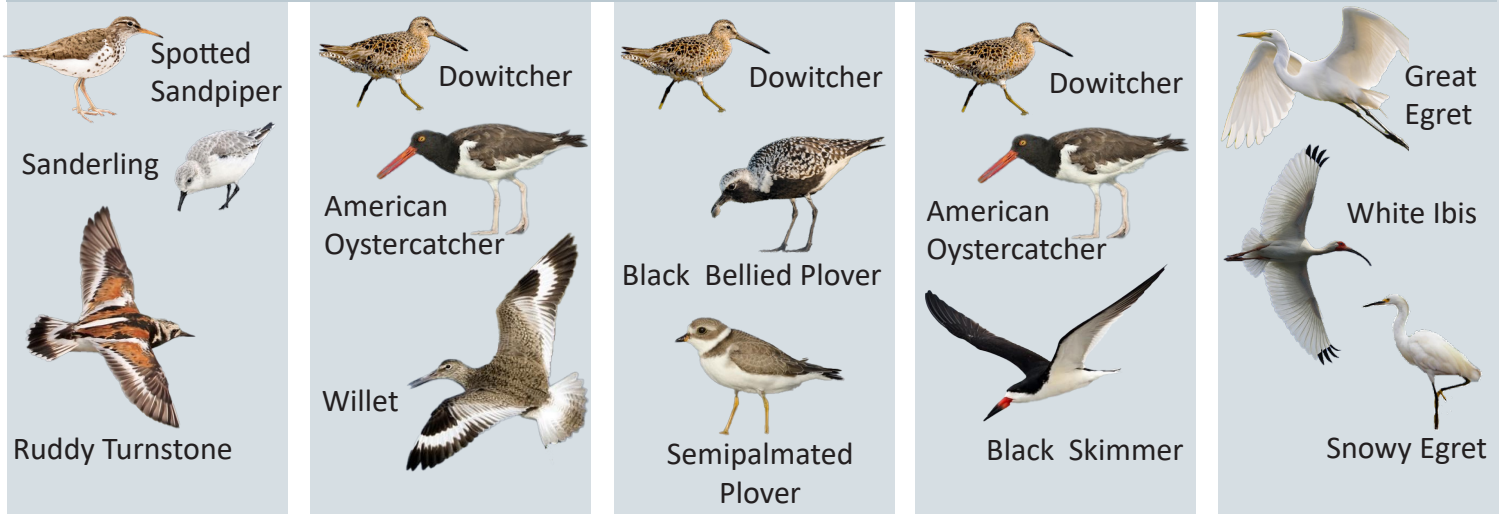
-Jennifer Plunket

The beaches, dunes, marshes, sandbars and mudflats of North Inlet provide feeding, resting and nesting areas for many species of seabirds, shorebirds and wading birds. Bird counts being conducted throughout the estuary will help us to understand how this mosaic of habitats supports bird populations, and how changes in the landscape may affect the ways in which estuarine habitats support bird populations. Data from the surveys is contributed to eBird, one the world's largest biodiversity-related science projects that documents bird distribution, abundance, habitat use, and trends through checklist data contributed by volunteers from around the world. This monitoring program follows the protocol of the International Shorebird Survey, and contributes data that helps to document major shorebird migration staging areas throughout the Western Hemisphere.

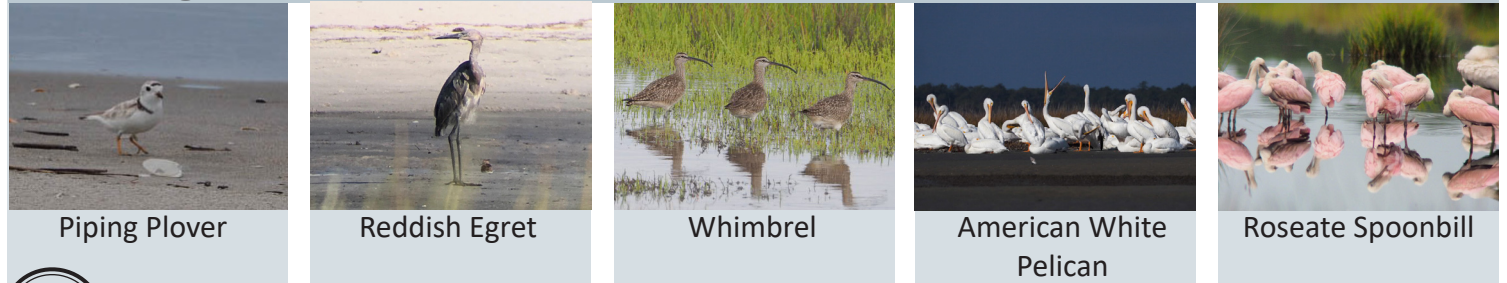


<p>Fall 2020 Count Results 11 species</p>	<p>Fall 2020 Count Results 18 species</p>	<p>Fall 2020 Count Results 27 species</p>	<p>Fall 2020 Count Results 31 species</p>	<p>Fall 2020 Count Results 17 species</p>
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Species Most Commonly Seen



Other Sitings of Note



Find out more

-  eBird
-  International Shorebird Survey

Reserve Programs

January to February, 2021

S'mores by the Shores Friday, January 29th

Join us at Kimbel Pond for a campfire conversation on estuarine topics.

Swamp Stomp Tuesday, February 2nd

Explore the amazing swamps of the Black River Cypress Preserve with Reserve staff.

Bike to the Boardwalk Friday, February 5th

Bike 5 miles (roundtrip) on gravel roads through Hobcaw Barony's pristine forests to the Reserve's beautiful salt marsh boardwalk on North Inlet estuary.

Walk on the Wild Side Friday, February 12th

Take a walk on the wild side this winter! Join us as we discover the unique ecosystems that encompass the Hobcaw Barony property.

Sweet Sweep Sunday, February 14th

Show your estuary love by joining the North Inlet Clean Team to help remove litter.

Creature Feature Friday, February 19th

Come learn about a creature that spends its time in our local estuaries, the American Alligator! This program will take place in our outdoor pond shelter.

Picnic at the Pond Friday, February 26th

Microscopes will be used to discover what life will be found at the pond! Program will take place at our outdoor pond shelter.

Shorebirds at Sunset Friday February 26th

Learn about shorebird conservation while enjoying the setting sun at Oyster Landing.

Programs are Free, but Registration is Required

**Public Programs this spring are limited in number and held in outdoor locations and will follow COVID-19 safety practices.*



All Stewards Virtual Book Club

This spring we will be premiering a new book club to foster conversations on how we all have a vital roll in the stewardship of our coastal communities. Join reserve staff from across the National Estuarine Research Reserves for discussions on backyard conservation, community science and climate change. Details on how to join the conversation and the book list for the spring will be sent out soon.

February 22: *Nature's Best Hope* by Douglas W. Tallamy

This book presents a vision for a grassroots approach to conservation. *Nature's Best Hope* shows how homeowners everywhere can turn their yards into conservation corridors that provide wildlife habitats.

**EXPLORE
THE
WACCAMAW
RIVER
BLUE TRAIL**

Join us for the 2021 Waccamaw Conference as we travel from Lake Waccamaw to Winyah Bay along the Waccamaw River Blue Trail. Explore the rich historical, cultural, and recreational opportunities our river has to offer!

**2021
Waccamaw
Conference**

**CONFLUENCE
THE BLUE TRAIL
CONNECTION**

**PRESENTED BY
WACCAMAW RIVERKEEPER,
WINYAH RIVERS ALLIANCE,
NORTH INLET-WINYAH BAY NATIONAL
ESTUARINE RESEARCH RESERVE,
& AMERICAN RIVERS**

**SAVE
THE
DATE**

Stay tuned for a full calendar of virtual and in-person events!

Begins
**WORLD
WATER
DAY**
3/22/21

Ends
**EARTH
DAY**
4/22/21



northinlet.sc.edu

The North Inlet-Winyah Bay National Estuarine Research Reserve is located in Georgetown, South Carolina. Through research, education, stewardship and training, the Reserve promotes healthy estuaries, watershed preservation, resilient coastal communities, and thriving ecosystems.