

State of the Sound Symposium



**Proceedings of the Symposium:
January 23 2023
Port Royal Sound Foundation
Sharon & Dick Stewart Maritime Center
Okatie, South Carolina**

Port Royal Sound Foundation,
with support from:

Dominion Energy

South Carolina Department of Natural Resources

University of South Carolina Beaufort



About the Port Royal Sound Foundation Research Symposium

The Port Royal Sound Foundation's mission is to preserve the Port Royal Sound for the environmental, cultural, and economic well-being of our area. We strive to be the leading authority and advocate for the Port Royal Sound, providing and supporting education, research, and conservation initiatives to preserve it.

Research is vital to understand what we know about the Port Royal Sound, what questions are left to be answered, and how to prioritize future research. Many estuaries that have been extensively studied are already damaged or polluted. Research on the Port Royal Sound has historically lacked long-term, consistent data on a variety of topics. In order to avoid the fate of other damaged estuaries, it is critical to be proactive and invest in understanding and protecting the Sound.

The Port Royal Sound Foundation's research symposium provides a platform for researchers to share their work with other scientists, local leaders, and community members. Convening researchers in this way facilitates conversations between people with similar areas of interest and encourages collaboration between scientific entities doing work on the Port Royal Sound. It also engages the public to understand what work is being done in their backyard and why it matters.

The 2nd annual Port Royal Sound Foundation research symposium was held on January 23, 2023. This event marked the launch of the Port Royal Sound Environmental Quality Assessment, the first publication in the State of the Sound Series. This publication examines historic water quality data on the Port Royal Sound watershed, providing critical baseline data for future research in the area and highlighting sites that may benefit from more focused study. Four speakers, moderated by Dr. Chris Marsh, presented on various topics related to the health of the Sound and explored how they connect to the Port Royal Sound Environmental Quality Assessment. These speakers included Dr. Denise Sanger, Dr. Andrew Tweel, and Dr. Joseph Ballenger (SCDNR Marine Resources Research Institute) and Dr. Eric Montie (University of South Carolina Beaufort). The Port Royal Sound Environmental Quality Assessment is available online at the Port Royal Sound Foundation website.



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January 2023

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ACKNOWLEDGEMENTS

We would like to thank Dr. Chris Marsh for his guidance and support in organizing this symposium. Thanks to a grant from Dominion Energy Charitable Foundation for providing funding for this research initiative. Special thanks to the presenters from SCDNR and USCB for their many hours of hard work to share their research with the public and collaborate with other scientists. Thank you to the Port Royal Sound Foundation staff who assisted with set-up and logistics for the event.

REPORT AVAILABILITY

Electronic copies of this report may be downloaded from the Port Royal Sound Foundation's website at: <https://portroyalsoundfoundation.org/> .

Hard copies may be available from the following address:

Port Royal Sound Foundation
310 Okatie Highway
Okatie, SC 29909

Videos of select presentations can be found at:

<https://www.youtube.com/@portroyalsoundfoundation696>.

COVER

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SUGGESTED CITATION

Armstrong, K.L. and Kim B. Ritchie, eds. 2023. State of the Sound Symposium. Port Royal Sound Foundation 2nd Annual Research Symposium. Port Royal Sound Foundation, Okatie, SC. 8 pp.

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Port Royal Sound Watershed and Land Use

Dr. Andrew Tweel

Environmental Scientist at Marine Resources Division of SCDNR

The Port Royal Sound Watershed reaches 70 miles inland and covers parts of 5 counties. The upper watershed is primarily characterized by agriculture and forestry, while the lower watershed has higher levels of urbanization and extensive wetlands, and these distinct watershed zones are approximately delineated by I-95. The Port Royal Sound is characterized by low freshwater input and high salinity relative to other South Carolina estuaries and approximately sixty percent of the lower watershed is made up of open water or coastal marshes. Rapid and ongoing development of the Beaufort, Port Royal, Bluffton, and Hilton Head areas has the potential to impact these wetlands and other coastal ecosystems by increasing impervious cover in the lower watershed, which reduces groundwater recharge and increases the volume and rate of stormwater runoff. Stormwater ponds are a best management practice intended to slow runoff and limit pollutants entering the estuary. As of 2015 there were 1,900 ponds in the lower watershed that make up 5 square miles of new surface water. As stormwater enters the estuary, small tidal creeks are often the primary interface between upland and coastal ecosystems, and the first to receive runoff from the land. As development continues, it is important to understand the potential impact of land use changes on the watershed and monitor areas where these changes may first be observed.

Port Royal Sound Environmental Quality

Dr. Denise Sanger

ACE Basin National Estuarine Research Reserve Research Coordinator and

Ecosystems Scientist at Marine Resources Division of SCDNR

The South Carolina Estuarine and Coastal Assessment Program (SCECAP) is a long-term monitoring effort that began in 1999, sampling at least 30 sites a year along the coast. In the lower Port Royal Sound watershed, SCECAP has sampled 156 open water sites (>100 m wide) and 123 large tidal creek sites (10-100 m wide). Environmental quality assessments from these sites include water quality (dissolved oxygen, pH, fecal coliforms, and eutrophication [nutrients such as nitrogen and phosphorus and chlorophyll a]), sediment quality (chemical contaminants, total organic carbon, and toxicity), and biological quality (macrobenthic organisms). All these metrics—given a rating of poor, fair, or good—are combined to determine an overall habitat assessment. Habitat quality has remained good at most open water sites throughout the entire sampling period. While large tidal creek sites are primarily characterized by good habitat quality, they see more fair and poor ratings than open water sites, particularly in the second half of the sampling period. Water quality assessments at these sites have more fair and poor ratings than sediment and biological quality. Additional targeted sampling has been conducted at 48 small tidal creek sites, which have a closer connection to the land and may be the first sites to indicate habitat quality changes due to runoff. While the Port Royal Sound has not reached the tipping point of broader impairment, it is essential to continue monitoring the health of these habitats, particularly as development continues to grow in the area.

Fish Resources of the Port Royal Sound

Dr. Joseph Ballenger

Estuarine Finfish and Sharks Scientist at Marine Resources Division of SCDNR

The Inshore Fisheries Research Section of SCDNR conducts several long-term monitoring programs along the coast with the goal of monitoring the population demographics and relative abundance of estuarine finfish and coastal shark species through time. In the Port Royal Sound, longline, trammel net, and estuarine trawl surveys are used to collect information on recreational fish population trends in order to make science-based management decisions. Longline surveys in the area began in 2007 and take place at the entrances of estuaries and nearshore waters, targeting adult red drum and coastal sharks. Trammel net surveys target lower estuary, salt-marsh edge, and oyster reef habitats. In the Port Royal Sound, over 70 species have been encountered since 2010. The estuarine trawl survey typically targets small size species or juveniles of large-bodied species with over 120 species recorded since monitoring began in 2011, including ones not typically recorded in other surveys, like weakfish. The long-term data from these surveys can be used to understand synchrony and abundance trends of fish populations along the coast, and relate these trends to environmental conditions and fishing pressure. Generally, fish population trends in the Port Royal Sound reflect trends along the rest of the coast, but the unique hydrology of the area makes it difficult to compare to other sites. A tagging study of red drum shows a high recapture rate in the Port Royal Sound, which may indicate high fishing pressure or declining population size. The combination of all these surveys provides an important snapshot of finfish and coastal sharks and a long-term data series to detect ecological change in the Port Royal Sound.

Estuarine Soundscapes and the Lowcountry Dolphin Monitoring Project

Dr. Eric Montie

Associate Professor of Biology and Director of Marine Sensory & Neurobiology Lab at USCB

Soundscapes are a new approach to understanding marine life by observing biological, geophysical, and anthropogenic noise. The Estuarine Soundscape Observatory Network in the Southeast (ESONS) strives to measure the health of estuaries by recording the diversity and abundance of marine life at a high temporal resolution—healthy estuaries are loud with biological noise. Passive acoustic recorders have been monitoring soundscapes throughout the state since 2013, with two recorders in the Port Royal Sound. Soundscape data can be paired with other fishery data and ongoing monitoring studies to examine relationships between environmental factors and the health of the estuary. One study on courtship sounds and spawning potential of fish reveals a correlation between fish calling and juvenile appearance and abundance.

The Lowcountry Dolphin Monitoring Program offers another opportunity to integrate soundscape data with long-term monitoring projects. Visual surveys of year-round resident, seasonal resident, and non-resident (migratory) dolphins provide information on dolphin abundance, movement, and behaviors. This is important because dolphins are apex predators and serve as indicator species for the health of the estuary. There is much more to learn from acoustics, including the link between prey and dolphin abundance, determining core use areas, and analyzing the impacts of anthropogenic noise.