

# State of the South Atlantic Salt Marsh Virtual Workshop



December 3, 2025

Workshop Report and Summary References



# SOUTH ATLANTIC SALT MARSH INITIATIVE

The South Atlantic Salt Marsh Initiative (SASMI) is a regional partnership focused on protecting and restoring vital salt marsh ecosystems along the southeastern coast of the United States. This initiative, which extends from North Carolina to Florida, aims to safeguard these ecologically significant areas that are under increasing threat from sea level rise, land use changes, and other environmental pressures. The goal of SASMI is to conserve and restore the approximately 1 million acres of salt marshes within the South Atlantic states to ensure their long-term survival and to protect the benefits these wetlands provide for fish, wildlife, and people. SASMI launched in 2021 and has built a coalition of more than 300 partners across the region including leaders from the military, federal, state, and local government, communities and non-governmental organizations and academia.

## SEA GRANT IN THE SOUTHEAST

Sea Grant is a U.S. federal-university partnership program under NOAA that connects science with coastal communities to address challenges in marine, coastal, and Great Lakes environments through research, education, and outreach, promoting healthy ecosystems, sustainable economies, and resilient communities. Established by Congress in 1966, it involves 34 university-based programs across the U.S., working to provide practical solutions for issues like fisheries, aquaculture, coastal resilience, marine debris, and workforce development. Sea Grant programs in North Carolina, South Carolina, Georgia, and Florida connect with and support faculty and students researching salt marsh science and policy through grants, fellowships, internships, and other educational and workforce development opportunities.

## ACKNOWLEDGEMENTS

The project was made possible with support from UGA Marine Extension and Georgia Sea Grant. The planning team included Michelle Covi, Amanda Gobeli, Sarah Spiegler, Landon Knapp, Sydney Williams and Anna Braswell. Workshop logistics support provided by Leslie Ferguson and Anna Schumacher, UGA Marine Extension and Georgia Sea Grant. Breakout group assistance provided by Dana Bauer, Lora Clarke, Ben Carswell, Mike Molnar, Courthey Reich, Julie Binz, Heather Nagy, Ben McGarr, Ashby Worley and Claire Rapp. Design was provided by Trey Cooper.

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## KEY TAKEAWAYS

- The South Atlantic Salt Marsh is healthy but vulnerable, and marsh sustainability across the ecosystem can be highly variable, even within a localized area.
  - Vulnerability depends on metric, scale, and site-specific interactions.
  - Variability in anthropogenic impacts among states need to be considered.
  - It is difficult to use regional scale assessments for policy at the state level.
- Indicators that are only estimating above ground biomass, such as the unvegetated to vegetated ratio (UVVR), might not be appropriate for some areas of the South Atlantic salt marsh and might not be telling the full story of vulnerability. Belowground biomass may be a better early indicator of vulnerability.
- Multiple threats are happening concurrently: these include sea level rise, land use change, species changes, predation, reduced hydrologic connectivity, etc.
- The South Atlantic Bight is composed of subregions that often span across multiple states, with each subregion having specific wave and tidal regimes that impact marsh morphology and processes, perhaps research should be focused at this scale rather than by political boundaries.
- Research Needs and Knowledge Gaps:
  - A central repository for high-resolution local data to be used for regional and/or national assessments data such as low tide imagery all along coast, data for smaller tidal creeks and marsh areas, etc.
  - A rapid marsh condition assessment to allow for more time-efficient, widespread data collection across the states that could be easily used by multiple partners
  - A better understanding of biotic feedbacks, e.g. bivalves are critical for marsh health, but few projects monitor them or incorporate them into modeling
  - More faunal data (birds, nekton, invertebrates), wildlife data are important to understand full ecosystem responses to SLR and functional implications
  - More information about non-*Spartina* marshes
  - Finer scale shoreline change analysis
  - Thin layer sediment placement/marsh enhancement experiments in variable areas--how do these affect belowground biomass?
  - Interventions if belowground biomass is declining
  - More information about sediment transport and storm effects on sediment bedload migration
  - Development/impervious surfaces impacts on salt marsh
  - More monitoring to evaluate how habitats are changing.

## MEETING PURPOSE

Since its launch in 2021, the South Atlantic Salt Marsh Initiative has bridged many diverse sectors and interests under a shared vision to enhance the long-term abundance, health and resilience of the salt marsh for the benefit of people, communities, military, fish, and wildlife that depend upon it. To achieve this goal, SASMI uses a voluntary, collaborative and nonregulatory approach that engages across existing state, federal and non-governmental organization programs for conservation and restoration, uniting these into a larger landscape approach. Working across the four states, the SASMI Partnership Council has formed work groups to coordinate a regional approach to funding, communications, and policy, as well as developed regional metrics to measure success. As SASMI state teams start to implement their plans, a need was identified to reach out to the scientific community that is assessing the salt marsh in the region. SASMI partnered with the Sea Grant programs in the South Atlantic that have supported salt marsh research for decades and whose extension faculty work with the science teams, serving as trusted sources of science-based information for coastal communities. Sea Grant faculty from each of the four programs developed the agenda, organized and facilitated the workshop.

The purpose of the meeting was to bring together salt marsh scientists and local conservation and restoration experts working in the South Atlantic to discuss the latest research related to salt marsh sustainability within the context of sea level rise and other environmental change, and to inform priorities and actions of the South Atlantic Salt Marsh Initiative (SASMI).

### OBJECTIVES:

- Assess the health of the South Atlantic Salt Marsh and identify sources of vulnerability
- Review and discuss the variables that affect marsh sustainability
- Inform priorities for conservation, restoration and policy actions of SASMI partners
- Identify research gaps and opportunities for collaboration across the region

The virtual workshop was held on the Zoom platform, hosted by University of Georgia Marine Extension and Georgia Sea Grant on Wednesday, December 3, 2025. The agenda, speaker and moderator biographies and instructions for using the interactive whiteboard were available to all participants in a [Google folder](#). After the workshop, slide presentations and recordings of the presentations were made available in the same folder.

The workshop was organized by Michelle Covi, UGA Marine Extension and Georgia Sea Grant who served as the overall moderator. Technical assistance was provided by Leslie Ferguson and Anna Schumacher, UGA Marine Extension and Georgia Sea Grant.

## SUMMARY BY TOPIC SESSION

The agenda for the meeting was organized into an introduction and four sessions, each with several presentations. Breakout discussion followed the second session focused on state-wide assessment of salt marsh health, and group discussion followed the third session which focused on field data studies, with a wrap up discussion after the fourth session which focused on threats beyond sea level rise.

### INTRODUCTION

Amanda Gobeli, SASMI coordinator, kicked off the workshop with a brief presentation to introduce the South Atlantic Salt Marsh Initiative ([SASMI](#)) to any workshop participants previously unfamiliar with the organization. SASMI is a voluntary, non-regulatory partnership that began in 2021 as a collaborative effort between the Southeast Regional Partnership for Planning and Sustainability and the Pew Charitable Trusts focused on the South Atlantic region. The goal of the partnership is to enhance the long-term health and resilience of the 1 million acres of salt marsh in this region to ensure no overall loss of the benefits to fish, wildlife and people. The two main strategies outlined in the regional plan launched in 2023 are to protect and restore the health and functions of existing salt marsh and conserve marsh migration corridors and remove barriers to ensure salt marshes can shift as sea levels rise. The organization has a regional Partnership Council that is made up of leaders of federal and state agencies, non-governmental organizations, cultural interests, resources users, and private entities that are organized into state implementation teams and work groups collaborating to implement the regional plan.

### REGIONAL SCALE ASSESSMENTS

The regional scale assessment session was organized by Sarah Spiegler, North Carolina Sea Grant. Dr. Davinia Passeri, USGS, presented the Salt Marsh Evolution in the South Atlantic Bight, an ongoing project in collaboration with NOAA, University of Georgia and University of South Carolina. The object of this project is to produce future projections of salt marsh vulnerability to sea level rise that use regional wetland models and remote sensing, quantify uncertainty, and provide robust predictions with efficient computational costs and actionable research results through collaboration with end users. Using multiple approaches to modeling including Hydro-MEM, which uses both the ADCRIC model, an advanced computer model that creates simulations of water circulation and transport in three dimensions using highly flexible unstructured grids, and the marsh equilibrium model (MEM), which predicts where you can expect marsh biomass based on water depth and elevation. They will use this model to predict future marsh areas for migration and biomass density for three sea level rise predictions. They are also comparing results with other models that use UVVR.

During this session, Dr. Jenny Davis, NOAA, shared information about the North Carolina effort to look at Surface Elevation Tables (SETs) throughout the state to assess trends. SETs have been installed all over the southeast region by a variety of organizations over the last 30 years, usually with a site-specific purpose and placed in different positions relative to the tidal frame. In North Carolina, over 130 SETs were analyzed, with only 10 gaining elevation, most losing elevation, and 5 entirely lost to submergence. Trends vary by habitat type, vegetative species,

restoration strategy and geography. In the last few years there has been a concerted effort to compare data across the SETs. There is a broader regional organizational effort led by the Southeast Coastal Ocean Observing Regional Association, SECOORA, which is part of the NOAA Integrated Ocean Observing System (IOOS) program.

## STATE-WIDE ASSESSMENTS OF SALT MARSH HEALTH

The second session focused on state-wide assessments of salt marsh health and was organized and moderated by Landon Knapp, South Carolina Sea Grant Consortium. Nick Brady, from Natrx, talked about lessons learned from a collaborative project with the North Carolina Coastal Federation. Initial observations show that North Carolina is both gaining and losing marsh in different areas. Natrx is using data science to analyze the coast using National Agriculture Imagery and machine processing to identify restoration priorities.

Dr. Andrew Tweel, marine scientist from South Carolina Department of Natural Resources, discussed the applicability of large-scale vulnerability metrics to salt marshes in South Carolina. UVVR (unvegetated to vegetated ratio) has been used in national studies to assess salt marsh vulnerability with the idea that areas with more vegetation are more resilient. While this has been tested and validated in the mid-Atlantic, the northeast and southern California, it may not be reliable in the South Atlantic due to several factors, including variation within marshes and details of how the imagery is collected due to large tidal range. The research group is continuing to work on comparing imagery data to the SET data. Further research is needed to understand this variability and how it effects potential differences across years.

Mr. Lee Burdick, from the Kiawah Conservancy in South Carolina, shared how they have been incorporating marsh assessments into local marsh front property management plans with municipalities using geospatial information and the UVVR values to guide decision-making. They have worked closely with communities to develop interactive maps that integrate the built environment, policies and natural features such as oyster beds and landcover changes into an analysis. They have calculated lifespans for marsh units under 6 sea level rise scenarios to assist planning efforts. The project uses a digital shoreline analysis system to assess annual shoreline change to identify priorities for restoration.

The final presentation in this session was from Dr. Kyle Runion, University of Georgia, who examined trends in belowground biomass in salt marshes across the Georgia coast. He used the Belowground Ecosystem Resiliency Model (BERM) to assess belowground productivity and calibrated it for Georgia *Spartina alterniflora* marshes through extensive ground truthing data. By applying BERM to monthly estimates over the past decade, he found that the aboveground biomass did not signal losses in belowground biomass and that while 88% of the marsh area increased above, 72% of the marsh decreased below the surface. These declines are driven by changes in hydrology and sea level rise. Belowground declines can later lead to aboveground declines and marsh loss. Using this model, over a quarter of the Georgia marsh is classified as vulnerable, even when the aboveground may not be signaling vulnerability.

## FROM PLOTS TO PLATFORMS: EVALUATING MARSH HEALTH WITH LONG-TERM FIELD DATA

The three presentations in this session examined the results of monitoring programs that use long-term field data to assess salt marshes in South Carolina, Georgia and Florida. This session was organized and moderated by Dr. Sydney Williams, UGA Marine Extension and Georgia Sea Grant.

Dr. Erik Smith of the North Inlet-Winyah Bay National Estuarine Research Reserve (NERR), South Carolina, shared long-term emergent marsh vegetation monitoring data showing that marsh elevations generally are not keeping pace with sea level rise, but there is little evidence of trends in stem density. The research team has measured physical parameters such as species composition, elevation at SETs, elevation of marsh platform using RTK-GPS, and water level since 2008. More recently they have platform-scale monitoring by UAS (aerial drones) mounted LiDAR and reflectance mapping which show seasonal variability. The newer technology allows more routine and reliable ways to monitor changes and the distinct spatial and inter-annual variability in aboveground biomass.

Dr. Meryl Abler discussed the NSF-funded long-term ecological research project (LTER) that has been tracking Georgia coastal ecosystems for about 25 years. Their field monitoring program has tracked aboveground plant biomass, invertebrates, salinity and other measures for 30 years. The remote sensing program used a machine learning method to estimate the fractional cover of different marsh types using Landsat imagery from 1994-2024 to assess change. The researchers have found that fresh and brackish marshes have decreased and are moving upstream with freshwater discharge, with drought playing a significant role. Recently there has been a sharp increase in salt marsh extent at the expense of unvegetated areas, likely attributable to sea level rise.

Lia Sansom, manager at the Guana Tolomato Matanzas NERR, described several of their ongoing projects in northeast Florida to track long-term changes in their coastal wetlands. Their scientists have been monitoring vegetation changes over the last two decades and have seen a significant increase in mangroves across their salt marshes. Long-term data has shown an overall loss of salt marsh, but mangroves are not necessarily replacing it. They use SETs, which demonstrate that vegetation types are changing within the salt marsh in response to sea level rise. The GTM NERR is conducting research to look at the ecosystem impacts of mangrove expansion and how mangroves may impact oyster reefs.

## THE FUTURE OF THE SOUTH ATLANTIC SALT MARSH- THREATS BEYOND SEA LEVEL RISE

The final session was organized and moderated by Dr. Anna Braswell of Florida Sea Grant and examined threats to the salt marsh that are compounding impacts beyond those of sea level rise alone. Dr. Scott Jones, University of North Florida, focused on the impact of tropicalization of the salt marsh including mangrove expansion in northeast Florida and into Georgia. Because of the trends in the southeast of fewer days of freezing weather each year and of warmer days even when freezing, mangroves are less likely to die from cold weather. Field work has demonstrated that even those that seem dead can resprout. Further research is needed to understand where mangroves will grow next and what impact this expansion will have on salt marshes.

Coastal development and land use was the topic of the presentation of Dr. Rachel Gittman, East Carolina University. She has been looking at the shift in land use in North Carolina over several decades and found losses of wetlands in every coastal county in North Carolina, as populations have been growing. Shoreline hardening has increased while marshes have declined. These data and recommendations developed by a state task force on fisheries and fisheries habitat were presented to the state legislature with the goal of halting or reversing patterns of habitat loss in North Carolina.

Climatic stresses in salt marshes are not limited to the impact of sea level rise and warmer temperatures tropicalizing the ecosystem. The interactive effects of drought and periwinkle snail grazing on salt marsh vegetation are the focus of research that was presented by Dr. Carter Smith, University of Washington. Previous studies have shown that drought and snail grazing can have a synergistic effect up to 10 times stronger than additive effects, causing large-scale die off over short time scales when snails are in high densities. More recent studies looking at long-term data sets at the several Georgia LTER sites found that the interactive effects of droughts and snails were not as straightforward: at low snail densities the interactive effects are minimal, and at higher snail densities the effects are additive.

Dr. Samantha Chapman discussed the findings of an experimental warming project conducted in northeast Florida. Using experimental warming chambers in the field, plots were warmed 1.6 degrees C. After three years, salt marsh plants in the experiment were healthy and resilient. The research team found that hydrological position and nutrients had a larger impact than warming. This study also found that interactions with mangroves can alter plant growth forms and types of plants found in the salt marsh.

The topic that rounded out the final session of presentations was the impact of invasive hogs on the salt marsh. Drs. Marc Hensel and Hallie Fischman presented research on the direct and indirect effects of hogs on the marshes in the southeast. Direct effects of hogs on salt marsh include trampling plants, which changes the carbon and nitrogen dynamics, and the consumption of marsh crabs and ribbed mussels. One indirect effect is that when hogs are attracted to areas to forage on mussels, it changes the relationship between mussels and grass from a positive one to a neutral or even negative one. Hogs also affect salt marsh recovery from drought on large spatial scales and exacerbate the impact of sea level rise by decreasing marsh elevation and increasing patchiness. More research is needed to determine coast-specific population estimates and assess how hog management might mitigate their impact.

# DISCUSSION

## BREAKOUTS AND WHITEBOARD

After session 2, participants were invited into breakout session rooms with moderators and volunteer participant facilitators. An interactive Canva [whiteboard](#) was used to capture discussion and allowed moderators, speakers and participants to contribute ideas. Discussion prompts in the breakout centered around assessments of marsh health and indicators at the state and regional levels. Information about what actions will sustain salt marsh health and knowledge gaps was also collected. Several of the groups noted that variability across the region makes regional assessments of marsh health difficult and that the appropriate metric and scale of the assessment depend on how it is being used. Methods such as UVVR can cover a larger spatial extent and may be good for community planning but may not be appropriate in southeast marshes. Belowground biomass seems to be a promising early indicator of marsh health but is field work intensive.

A final discussion followed the last set of presentations. Participants were encouraged to add comments to the whiteboard and discussed a consensus statement about regional marsh health. Most participants agreed the South Atlantic Salt Marsh is healthy, but vulnerable, and further research is needed to determine the best indicators of marsh loss and how variability across the region affects ecosystem functions.

## NEXT STEPS

The workshop, through a collaboration between Sea Grant extension faculty and SASMI, was successful in bringing together salt marsh researchers who work throughout the southeast to engage in discussion about the salt marsh health and the variability in vulnerability across and within the region. Recordings of presentations, slide decks, the agenda and speaker information was made available to all participants through a link to the [Google folder](#).

Among the items suggested through discussion and whiteboard was a list of summary references that are included in this report. Other topics and themes to be considered for future workshops:

- Effectiveness of management strategies
- Translating data to stakeholders
- Adaptive management approaches to saltwater intrusion from sea level rise
- Watersheds changed due to dredging
- Policy and regulation changes
- Inclusion of a legislative or state management perspective
- Social and cultural dimensions of marsh resilience and loss
- Thin-layer placement or beneficial use opportunities and how we can fund them

Participating scientists will be invited to join the SASMI science work group which will be convened in early 2026.

# SUMMARY REFERENCES

## REGIONAL SCALE ASSESSMENTS

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### **What do SETs- Surface Elevation Tables tell us about salt marsh health in the South Atlantic?**

North Carolina SET Community of Practice. (2024). “Surface elevation trends in North Carolina’s coastal wetlands.” <https://iris.fws.gov/APPS/ServCat/DownloadFile/248442>.

## STATEWIDE ASSESSMENTS OF MARSH HEALTH

### **Assessing the applicability of salt marsh vulnerability metrics to South Carolina**

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### **Incorporating geospatial analysis into local marsh management planning**

Ganju, Neil K et al. (2020). “Are Elevation and Open-Water Conversion of Salt Marshes Connected?” <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019GL086703>.

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### **Declining belowground plant biomass provides an early warning of marsh drowning**

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## **FROM PLOTS TO PLATFORMS: EVALUATING MARSH HEALTH WITH LONG-TERM FIELD DATA**

### **Long-term marsh monitoring efforts in the North Inlet – Winyah Bay NERR**

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## **THE FUTURE OF THE SASM- THREATS BEYOND SEA LEVEL RISE**

### **Mangrove expansion and tropicalization**

Bates et al. (2015). “A Time-Series View of Changing Ocean Chemistry Due to Ocean Uptake of Anthropogenic CO<sub>2</sub> and Ocean Acidification.” <https://tos.org/oceanography/article/a-time-series-view-of-changing-ocean-chemistry-due-to-ocean-uptake-ofanthro>.

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<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019GL083315>.

### **Understanding the interactive effects of drought and grazing on salt marsh vegetation**

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### **Salt marsh vegetation is resilient to experimental warming**

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### **Direct and indirect impacts of invasive hogs**

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# EVALUATION

Twenty-four individuals responded to the request for evaluation at the end of the workshop and through a follow-up email. Responses were collected via Google forms.

Likert-scale and free response questions were asked:

## Logistics

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The meeting time and format (virtual) worked for me.			1	11	11
The technology used in the meeting was user-friendly and helpful.			2	9	12
There was sufficient opportunity for discussion		2	5	9	7
The pacing of this meeting was reasonable.			1	13	9

## Content

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The meeting effectively addressed the purpose.			1	5	17
Regional scale assessments were adequately discussed.		1	2	8	11
Assessing marsh health at the state level was adequately discussed.	1		1	8	12
Evaluating marsh health with long-term field data was adequately addressed		1		9	13
Threats beyond sea level rise were adequately discussed.			3	10	10

## Participation

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Speakers were given adequate attention and time to make their point.				8	14
Everyone was able to respectfully express their opinions.				7	15
The Canva whiteboard was effective and user-friendly.		1	5	8	7

## Overall Opinions

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
This meeting was a good use of my time.		1		8	14
The meeting advanced SASMI goals and priorities.				9	14

Some workshop participants found an all-day virtual meeting difficult to attend in its entirety, some would prefer an in-person workshop or a virtual meeting broken up over multiple days. Some participants wanted more time for discussion and while many liked the breakout room format for discussion, others did not and would have liked the Canva whiteboard to be used more by other participants. Some would have liked to choose breakout rooms based on topics.

While most thought the mix of topics was good, some wanted a summary at the end of each session, like the consensus statement discussion at the end of the meeting. Some proposed adding topics with more social and cultural dimensions. One participant remarked that small study areas may misrepresent the reality of the state of the salt marsh and wanted presentations that were more integrative with several studies to represent the whole area.

Overall, most respondents felt the meeting was a good use of time and advanced the SASMI goals and priorities. One person suggested quarterly updates on research and projects. Suggestions for themes and content for further workshops were collected and will be considered as next steps.