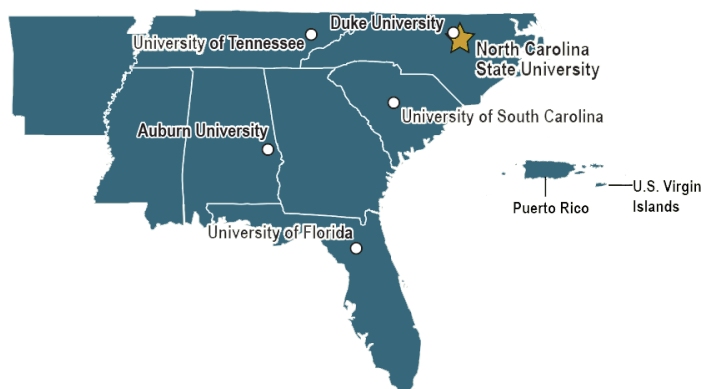


## OUR MISSION

We work with natural and cultural resource managers to gather the scientific information and build the tools needed to help fish, wildlife, and ecosystems adapt to the impacts of changing climate and land use.



## OUR TEAM → <https://secasc.ncsu.edu/home/about/people>

### SE CASC STAFF

- [DEREK ADAY](#) / University Director
- [RYAN BOYLES](#) / USGS Deputy Director
- [MITCHELL EATON](#) / USGS Research Ecologist
- [CARI FURNESS](#) / Program Manager
- [MIKAYLA KERRON](#) / BIA Pathways Intern
- [ARANZAZU LASCURAIN](#) / Assistant University Director
- [CAROL MOREL](#) / USGS Data Steward
- [ASHLYN SHORE](#) / Science Communications Specialist
- [KATHERINE SMITH](#) / USGS Director
- [ADAM TERANDO](#) / USGS Research Ecologist
- [CASEY THORNBRUGH](#) / Southeast & Northeast Tribal Climate Science Liaison



### UNIVERSITY PRINCIPAL INVESTIGATORS

- [PAUL ARMSWORTH](#) / University of Tennessee
- [WENDY GRAHAM](#) / University of Florida
- [JOHN KUPFER](#) / University of South Carolina
- [KAREN MCNEAL](#) / Auburn University
- [LYDIA OLANDER](#) / Duke University
- [SANKAR ARUMUGAMAN](#) / NC State University
- [ROB DUNN](#) / NC State University
- [RYAN EMANUEL](#) / NC State University
- [STEVE FRANK](#) / NC State University
- [KRISHNA PACIFICI](#) / NC State University
- [NILS PETERSON](#) / NC State University
- [ASTRID SCHNETZER](#) / NC State University
- [ERIN SEEKAMP](#) / NC State University

## FROM UNIVERSITY DIRECTOR, DEREK ADAY



As for so many others, 2020 was a time of change and challenge for the Southeast Climate Adaptation Science Center (SE CASC). Since March we have modified nearly every aspect of our working lives in

response to an unpredictable pandemic, variable state and federal guidelines, and unique personal circumstances of our students, staff, and partners. Though the nation's focus rightly turned to the immediate threats of a relentless virus, the SE CASC has remained committed to understanding and adapting to a longer-term — but no less dangerous — global threat.

The University Consortium recruited outstanding Global Change Fellows for the 2019-20 academic year who effectively navigated the transition to remote technology for their Global Change Seminars and training modules. Plans for travel and outreach changed, but USGS-funded science initiatives continue, connecting climate concerns to species status assessments, evaluating best practices for designing projects to address management needs, and better understanding and mitigating the effects of sea level rise. Consortium scientists continue efforts to assess ecosystem services throughout the region, to better manage water supply and demand in a changing environment, and to improve coastal resilience in the face of climate change. And, importantly, we partnered with the other seven regional Climate Adaptation Science Centers to request and receive substantial additional federal funding through bipartisan and bicameral support from the U.S. Congress.

These are challenging times indeed, but the SE CASC remains committed to working with our scientists, students, partners, and stakeholders to address the most formidable climate threats facing our states, region, and nation. We invite you to join us in our efforts and look forward to connecting with you in the upcoming year.

# Actionable Science

## SE CASC SCIENCE PROJECTS 2019-20 \*Maps indicate project geography area



Facilitating Accurate and Effective Application of Coastal Marsh Models <https://secasc.ncsu.edu/science/marsh-model-application/>



Strategic Habitat Conservation and Adaptive Strategies for the Conservation of Coqui Frogs in Puerto Rico <https://secasc.ncsu.edu/science/coqui-conservation/>



Best Practices for Project Design: Effectively Addressing Natural Resource Management Needs <https://secasc.ncsu.edu/science/project-evaluation/>



Impacts of Sea Level Rise and Associated Salinity Changes on At-risk Native Freshwater Mussels and Their Habitats in Atlantic Coastal Rivers <https://secasc.ncsu.edu/science/slr-freshwater-mussels/>



Analysis and Visualization of Climate Information to Support USFWS Species Status Assessments <https://secasc.ncsu.edu/science/ssa-climate/>

→ Learn more: <https://secasc.ncsu.edu/science/>

### Project Highlight: Cape Romain NWR Research Engages Diverse Stakeholders in Climate Adaptation

**The problem:** Coastal protected areas play an important role in sustaining valued resources and helping social-ecological systems respond and adapt to global change. The Lowcountry coastal region of South Carolina near Cape Romain NWR is rich in historical and



PHOTO BY FRED JOHNSON

→ For more info: [http://go.ncsu.edu/secasc\\_fs\\_2020-3](http://go.ncsu.edu/secasc_fs_2020-3)

cultural heritage and includes a diverse group of agencies and organizations with active conservation interests. Increases in sea level and urban growth threaten the ability of the refuge to expand as an adaptation measure.

**Project results:** The project brought conservation interests together to: (a) identify those being affected by or concerned with global-change issues in the Lowcountry, (b) address both conservation and non-conservation concerns, values, and desired services associated with the region's future, (c) work together to identify sources of conflict and reveal collaborative opportunities, and (d) use the best available science to understand and guide decisions to achieve goals for the future of the region. They concluded that adaptive capacity of a region ultimately depends on a region's ability to act collectively, and the presence of strong social networks, coordination among a diverse group of stakeholders, and social learning are key elements needed to build that adaptive capacity.

**Impact:** "Integrating science into the strategic growth of the refuge system in the face of climate change through the process described holds promise that we can come up with defensible, marketable and implementable strategies for acquiring interest in lands (and maybe waters) to advance conservation of natural resources." — Mike Bryant, Coastal North Carolina NWR Complex (former)

### WORKING GROUPS

**Ecosystem Services and Global Change - Lydia Olander (Duke):** Developed [map data products](#) and [methods briefs](#) on open space recreation access, wild pollinator habitat, and recreational birding. Created [ecosystem services maps](#) and [data products](#) on forest and coastal habitats for NC natural and working lands assessment.

**Water Supply and Demand in a Changing Climate - Wendy Graham (U of FL):** Engaged Florida Water and Climate Alliance stakeholder-scientist network to develop a learning network to effectively co-develop user-relevant climate data, tools and information.

**Southeast Conservation Adaptation Strategy - Nils Peterson (NCU), John Kupfer (U of SC):** Coordinated a session at the SEAFWA Annual Conference; presented [a list of regional species of greatest conservation need](#) developed with SEAFWA Wildlife Diversity Committee. Conducted interviews with wildlife agency directors to determine how climate uncertainty influences management and policy decisions.

**Evaluation of Actionable Science - Paul Armsworth (UT), Karen McNeal (Auburn):** Collated preliminary data to measure scientific impact of SE CASC projects. Held focus groups of science producers and users at SE CASC Regional Science Symposium. Developing survey instrument to gather qualitative data from SE CASC science users.

**Coastal Resiliency to Global Change - Karen McNeal (Auburn), Lydia Olander (Duke), Wendy Graham (U of FL), Erin Seekamp (NCU):** Hosted stakeholder discussions at SE CASC Regional Science Symposium on using social science research to inform coastal resilience challenges and decision making. Leveraging existing efforts and stakeholder connections to understand needs/gaps and opportunities for coastal resilience in the region.

→ **40** new publications in 2019-20  
[go.ncsu.edu/secasc-publications](http://go.ncsu.edu/secasc-publications)



# Capacity & Partnership Building

## TRIBAL PARTNERSHIP UPDATE

SE CASC staff led by Casey Thornbrugh participated in the Tribal Climate Resilience Summit sponsored by The United South and Eastern Tribes and hosted on the Oneida Indian Nation. Representatives and partners convened for discussions about climate change impacts on Tribal Nations, tribal climate adaptation plans, and opportunities and resources for building resilience within Tribal Nations and communities in the USET region. Tribal youth, undergraduate, and graduate students gave presentations on climate change research and climate change resilience projects in their Tribal Nations and communities.

This year marked a more active engagement with Tribal Nations in the Southeast due to relationship building over the years and active collaboration of Tribal Climate Liaison, Casey Thornbrugh. We participated in a site visit with the Seminole Tribe of Florida and have provided planning resources and grant support via the BIA's Tribal Resilience Program for development of their Climate Adaptation Plan. We have a productive partnership with the Eastern Band of Cherokee Indians through collaboration at the Field Intensive. University staff participated again this year in reviewing BIA Tribal Resilience Program grant applications.



## PROJECT UPDATE

### Communicating Future Sea-Level Rise Scenarios for Gulf Coast National Wildlife Refuge and National Park Lands

**The Problem:** Low-lying public lands along the northern Gulf of Mexico coast are vulnerable to sea-level rise. Coastal planners and resource managers in the region requested customized information that can be used to concisely communicate local sea-level rise scenarios and identify potential impacts to the missions of management agencies.

**Project results:** Project investigators produced customized fact sheets that describe local sea level rise scenarios and potential impacts on the mission of each of the 54 federally managed lands in the northern Gulf of Mexico. These “two-pagers” provide detailed information about how sea level rise will affect a specific park or refuge, how to access SLR scenarios for each location, and how to incorporate that information into planning decisions.

**Impact:** *“This product will provide two primary benefits to the intended audience of decision-makers and stewards for federally managed lands. The first, is that it will enhance the capacity to access, understand, and act on locally-relevant sea-level rise information. . . . The second benefit is that it will increase the capacity of the staff at these parks, reserves, and preserves to communicate to visitors and other stakeholders the potential risks and changes associated with rising seas. In some cases, this will be the only materials they have to share about sea-level rise, in other locations this will enhance existing programming. By developing these materials in collaboration with the targeted end-users we have been able to ensure that these materials will meet their needs.”*

— Renee Collini, Northern Gulf of Mexico Sentinel Site Cooperative

→ See <https://secasc.ncsu.edu/science/ngom-sealevelrise/>

## GLOBAL CHANGE FELLOWS

In 2019-2020, we had an excellent cohort of 11 Global Change Fellows, from multidisciplinary academic departments (see <https://go.ncsu.edu/global-change-fellows>).

- [SAM FLAKE](#) | Plant Biology
- [FAITH JOHNSON](#) | Civil Engineering
- [KATE JONES](#) | Forestry and Environmental Resources
- [HAOFAN LI](#) | Civil, Construction, and Environmental Engineering
- [KATIE MCQUILLAN](#) | Forestry and Environmental Resources
- [ANA MARIA MEZA SALAZAR](#) | Applied Ecology
- [LISE MONTEFIORE](#) | Biological and Agricultural Engineering
- [MARIO SIMON PINILLA-GALLEGO](#) | Applied Ecology
- [EMILY REED](#) | Applied Ecology
- [RACHEL SUSSMAN](#) | Marine, Earth, and Atmospheric Sciences
- [ERIN VOIGT](#) | Marine, Earth, and Atmospheric Sciences

2019-20 Global Change Fellows hosted 6 public seminars (see <https://go.ncsu.edu/gcf-seminars>):

- Adaptation to Global Change in Urban Environments
- Faith and Reasoning in Climate Change Views
- Fire: Connecting Science, Management, and Policy
- Global Change and Adaptation in Agriculture
- Mapping Biodiversity in a Changing World
- Hurricanes: Extreme Weather in a Changing Climate

Global Change Fellows produced 17 publications from their research. Highlights:

- Sanchez, GM, A Terando, JW Smith, AM García, CR Wagner, RK Meente-meyer [Forecasting water demand across a rapidly urbanizing region](#)
- Rossi, RE, SK Archer, C Giri, CA Layman [The role of multiple stressors in a dwarf red mangrove \(\*Rhizophora mangle\*\) dieback](#)
- Krabbenhoft, TJ, BJE Myers, JP Wong, C Chu, RW Tingley III, JA Falke, TJ Kwak, CP Paukert, AJ Lynch [FiCli, the Fish and Climate Change Database, informs climate adaptation and management for freshwater fishes](#)

*“The Global Change Fellows Program has had a huge influence on the way I think about my research and potential future career paths. I have a more interdisciplinary view of my work and consider much more carefully the involvement of stakeholders in my research. I also have cultivated an appreciation for decision science and have integrated elements of social science and climate models into my dissertation.”* – EMILY REED

# Education & Outreach

## SE CASC REGIONAL SCIENCE SYMPOSIUM → <https://go.ncsu.edu/secasc-science-symposium>

The goals of the SE CASC Regional Science Symposium held in New Orleans, LA on Nov. 13-15, 2019 were to:

- support climate adaptation efforts by sharing science resources and tools, lessons learned, and best practices
- discuss and identify gaps and needs for actionable science that meets the requirements of managers for on-the-ground application
- facilitate collaboration among researchers, managers, and other resource people.

More than 160 scientists and natural and cultural resource managers from universities, federal and state agencies, Tribal nations, and NGOs working in the southeastern U.S., including the U.S. Caribbean, registered.

Combined sessions provided broad science and management perspectives on regional climate impacts and adaptation. Breakout sessions, tasked with identifying ideas and science needs that SE CASC might help address, were organized across themes: Landscapes, Aquatic Habitat, Coastal, and Human Dimensions, and encouraged small group discussions that were more disciplinary in nature. A Poster Session and World Cafe Session fostered interdisciplinary sharing and learning about complementary programs and initiatives and facilitated networking.

Conclusions from the symposium:

- There is a wide range of capacity for resource managers to access and use existing and emerging science. Deep, long-term partnerships between scientists and managers are needed in order to develop actionable science. The

development and maintenance of such partnerships requires time, funding, and commitment beyond a single project.

- Resource managers working to adapt to a changing climate often face multi-disciplinary challenges. Teams of social, physical, and biological scientists are often needed to work closely with managers to tackle these challenges.

At least one journal article derived from symposium sessions and science needs identified by participants will be considered by our Stakeholder Advisory Committee.

### NCA4 Webinar Series and S6 series

We hosted a variety of webinars this year through two different series. The [NCA4 Webinar Series](#) was held in early 2020, with the intention of helping users understand the findings in the large report, and to find and download report figures, climate data sets, projections, and planning data for their own adaptation purposes. Additionally, this year we partnered with the USFWS South Atlantic Blueprint team to plan and implement the [SE CASC South Atlantic Spring/Summer Science Series](#). This webinar series highlighted SE CASC funded science relevant to conservation in the Southeast and South Atlantic region while enhancing connections among our combined partner organizations and enabling science outreach to managers.

### Climate Adaptation and Resilience Immersion

After a successful [Climate Adaptation Science Field Intensive](#) in August 2019 in the Great Smoky Mountains, we did extensive

planning for an on-site training in coastal Alabama for our Global Change Fellows in August 2020. COVID-19 safety precautions dictated that the experience be implemented virtually, resulting in a dynamic and interactive [Climate Adaptation and Resilience Immersion](#) with participation from university faculty and staff; federal, state, and Tribal scientists and managers; consortium members; and GCF alumni. We partnered with Auburn University's NSF National Research Trainee program and included additional consortium students in the week-long immersion event.

### All-CASC Meeting

SE CASC hosted the CASC Annual Meeting on October 13-15, 2020, planned to be held in Asheville, NC. Due to COVID-19 travel restrictions the planning committee developed a successful and engaging virtual meeting of the CASC regional network.

### We welcomed Katherine Smith,

who began serving as the USGS Director of the SE and NE CASC in October 2020. Katherine joins us from the USFS where she worked with stakeholders and scientists to develop national research programs and agendas. **Mikayla Kerron** also joined our team as a BIA Pathways Intern. Mikayla is a senior at Haskell Indian Nations University studying Tribal environmental justice & protection among Indigenous communities.



## Looking Forward

### FALL AND SPRING SCIENCE SEMINAR SERIES

Learn about SE CASC funded projects that support resource management actions across the Southeast in our upcoming SE CASC Science Seminar Series, planned for Fall/Winter 2020 and Spring 2021. Stay tuned for more information about these outreach opportunities.

### REGIONAL SCIENCE SYMPOSIUM

The SE CASC plans to host our second Regional Science Symposium in early Spring 2022. Because an objective of this event is to facilitate networking and collaboration, we plan to develop a rich in-person experience, but are committed to enabling robust participation for remote attendees. Planning for this event will take place in 2020-21.



OUR CONSORTIUM PARTNERS

