

2022-23 ACTIVITY REPORT

Our Mission
is to deliver
science to help
fish, wildlife,
water, land, and
people adapt to a
changing climate.

Our Team

SE CASC STAFF

- **RYAN BOYLES**, USGS Deputy Director
- **ELLEN BROWN**, USGS Data Steward
- **JENNIFER CARTWRIGHT**, Science Coordinator
- **STEPH COURTNEY**, Assistant Tribal Climate Science Liaison
- **MITCHELL EATON**, USGS Research Ecologist
- **KRISTEN FONTANA**, Climate Science Translation and Communications Fellow
- **CARI FURINNESS**, Program Manager, Assistant University Director
- **REBECCA IRWIN**, University Director
- **ALEX LOOMIS**, Rare Plant Climate Impacts Postdoctoral Fellow
- **CATHERINE (KASIA) NIKIEL**, Climate Impacts Postdoctoral Scholar
- **HAILEY SHANOVICH**, Climate Change and Wildlife Action Plan Fellow
- **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

THANK YOU!

We said farewell to several great SE CASC staff in 2022-23:

- **ARANZAZU LASCURAIN**, Assistant University Director [through Oct 22]
- **BRITTANY SALMONS**, Climate Science Translation and Communications Fellow [through May 23]
- **MARIE SCHAEFER**, Tribal Climate Strategies Research Scholar [through Sept 23]



Learn more about us at

<https://secasc.ncsu.edu/home/about/people/staff/>

The Southeast Climate Adaptation Science Center (SE CASC) leads science and partnerships to understand climate impacts and inform adaptation efforts for fish, wildlife, ecosystems, and cultural resources. We place a strong emphasis on co-production of actionable science with Tribal, federal, and state managers. Through workshops, symposia, and working groups, we build communities of practice and share new science and tools with diverse audiences. To foster the next generation of climate professionals, we support a diverse and interdisciplinary cohort of graduate students through our Global Change Fellows program. The 2022 Southeast Climate Adaptation Science Symposium successfully brought all of these SE CASC research efforts together with our management partners.

The SE CASC, including Consortium and USGS scientists, continued to expand and develop new research projects, working group activities, and engagement with managers. This included formation of a working group to develop a Regional Invasive Species Climate Change network for the Southeast and enhancing efforts to assist partners with State Wildlife Action Plan revisions and species status assessments. Our tribal engagement strategy continues to be an important focus. Several significant research products were released, notably a dataset of projected future streamflow for the U.S. and a model of future patterns of urbanization.

University leadership engaged with several institutions to build on accomplishments to date and to envision the next phase of the SE CASC, developing a competitive proposal to continue as the university host for an expanded SE CASC Consortium, which is ramping up at the end of 2023. We invite you to connect with us as we continue our efforts to enable better climate-smart decisions in the changing landscapes of the Southeast.

— *University Director, Rebecca Irwin and USGS Director, Katherine Smith*

Actionable Science

RECENTLY INITIATED SE CASC SCIENCE PROJECTS*



[Characterizing Climate Change Impacts on Species Ecology to Support Species Status Assessments](#)



[Accounting for Ecological Impacts of Climate Change in State Wildlife Action Plans: A Comparison of Model-Based and Index-Based Vulnerability Assessments](#)



[Integrating Sea Level Rise Scenarios into Everglades Restoration Planning](#)



[Climate Impacts on Rare-plant Biodiversity in the Southeastern U.S.](#)



[Developing a Cave Conservation Management Toolbox by Exploring Cave Microclimates and Biodiversity Patterns](#)



[Water, Water Everywhere: Adapting Water Control Operations and Floodplain Conservation Planning to Global Change](#)



[Examining Diverse Management Objectives and Broadening Stakeholder Engagement for Climate Adaptation Planning of Historic Structures Within the National Park System](#)



[Informing Climate-adaptive Forest Management for Breeding Bird Habitat in the Southern Appalachians](#)



[Advancing Climate Change Adaptation Strategies for Sensitive Amphibian Species in the U.S. Caribbean](#)



[Future of Aquatic Flows: Exploring Changes in the Freshwater/Saltwater Interface and Related Impacts to Aquatic Species](#)

PRIORITY 1–EXPOSURE: Improve understanding of what climate and land use change processes and associated biophysical stressors will look like on the land and water they manage.

PRIORITY 2–IMPACTS: Improve understanding of ecosystem, habitat, and species impacts of climate and land use change, as well as the understanding of how these changes affect resources of specific concern to resource managers.

PRIORITY 3–ADAPTATION: Increase understanding of, and access to, practical guidance for framing and making smart climate and land use change adaptation decisions.

*Maps indicate project geography area, color indicates research priority. Learn more at secasc.ncsu.edu/science/.

WORKING GROUPS

CLIMATE CHANGE INTO STATE WILDLIFE ACTION PLANS (PAUL ARMSWORTH)

*Convened regular calls of researchers from universities and USGS with partners from federal and state agencies, Tribal nations, and NGOs on topics including species of cultural concern to Tribes and identifying climate change refugia. *Presented data resources and training to partners on trait-based and niche model methods for estimating species vulnerability to climate change. *Organized a Science Café table at the SE CASC Science Symposium with staff from US FWS and NCASC. *Contributed to a session at 2023 SEAFWA meeting, "[Climate Services and Technical Support for State Fish and Wildlife Agencies](#)."

SOUTHEAST CONSERVATION ADAPTATION STRATEGY (NILS PETERSON)

*Attended monthly SECAS Steering Committee meetings and SE CASC Climate Change into SWAPs meetings, presenting wildlife conservation communication framing strategies and regional collaboration efforts. *Worked with the SECAS steering committee to carry out a survey of state field biologists focused on SWAPs, disease management, and efforts to improve DEI initiatives. *Supported a session at the 2022 SEAFWA Annual Meeting, "[SECAS: Applying the Southeast Conservation Blueprint across scales](#)," and contributed to a 2023 SEAFWA session,

"[Climate Services and Technical Support for State Fish and Wildlife Agencies](#)."

ECOSYSTEM SERVICES AND GLOBAL CHANGE (LYDIA OLANDER)

*[Updated southeast ecosystem accounts](#) with new data to add years 2013, 2016, and 2019. *[Wrote guide for state natural & working lands planning](#) based on recent work with North Carolina. *[Developed two online tools](#) for North Carolina conservation planning and benefits reporting. *Initiated work on a framework for use of nature-based solutions for DOI agencies.

SOUTHEAST REGIONAL INVASIVE SPECIES AND CLIMATE CHANGE MANAGEMENT NETWORK (BRETT SCHEFFERS)

*Developed a session on biological invasions in the SE at the SE CASC Science Symposium and hosted a Science Café table to engage partners in the network. *Organized a workshop to elicit stakeholder feedback for the network. *Hosted informational webinars and implemented a survey of managers and researchers in invasion science. *Contributed to synthesis research of the cross-RISCC network.

52

new publications
in 2022-23

[secasc.ncsu.edu/
publications/journal-
articles-and-reports/](https://secasc.ncsu.edu/publications/journal-articles-and-reports/)

WATER SUPPLY AND DEMAND IN A CHANGING CLIMATE (WENDY GRAHAM)

*Hosted two webinars: [Impacts of Extreme Weather & Climate on Florida Water Agencies](#) (Oct 2022) and [Future Rainfall Projections for Florida Water Resources Planning and Management: Stakeholder Needs Assessment](#) (Mar 2023).

EVALUATION OF ACTIONABLE SCIENCE (PAUL ARMSWORTH, KAREN MCNEAL)

*Facilitated monthly calls of researchers interested in how to evaluate actionable science and contributed to a synthesis paper on lessons learned across the CASC network. *Hosted a session on evaluating actionable science at the SE CASC Science Symposium. *Publications: Courtney et al. 2022. [Development of a survey instrument to assess individual and organizational use of climate adaptation science](#). Hyman et al. 2022. [Distinct pathways to stakeholder use versus scientific impact in climate adaptation research](#).

* Working Groups bring together multi-disciplinary, multi-organizational teams to address regionally-relevant emerging issues and improve co-production. Learn more: secasc.ncsu.edu/science/working-groups/.

Capacity & Partnership Building

PROJECT HIGHLIGHT

Impacts of Sea Level Rise and Associated Salinity Changes on At-risk Native Freshwater Mussels and Their Habitats in Atlantic Coastal Rivers

THE PROBLEM: Increased salinity levels in coastal drainages can negatively affect freshwater dependent species, including imperiled native Tidewater Mucket mussels, which are sensitive to changes in water quality and salinity.

PROJECT RESULTS: Research with partners VA Dept of Wildlife Resources, NC Wildlife Resources Commission, and US FWS showed that larvae were the life stage most sensitive to sea salt, especially in populations that had no previous salinity exposure. This represents a critical reproductive bottleneck; if larvae cannot survive at these concentrations then they don't develop into adults and add to existing populations.

IMPACT: This research provides valuable insight on the growing threat of sea level rise and other sources of salinity to imperiled mussels. These findings inform multiple aspects of work in the US Fish and Wildlife Service, such as threat analysis in Species Status Assessments or listing decisions for mussels, and selecting appropriate sites for activities that support species recovery, such as translocation or reintroduction to sites where animals will be protected from potentially toxic levels of salinity. *Dr. Jennifer Archambault, Deputy Field Supervisor, US FWS*

 **Learn more:** <https://secasc.ncsu.edu/science/slr-freshwater-mussels/>

DEIJ EFFORTS: NCSU/SE CASC staff participate in several working groups and efforts related to justice, equity, diversity, and inclusion, including: CASC Climate and Urban Ecology working group; CASC Inclusive Mentoring Working Group; NOAA-led SE and Caribbean Environmental Justice Community of Practice. We sponsored an award for a student doing research through [Field Inclusive](#), whose mission is "amplifying and supporting marginalized and historically excluded biologists and researchers."

FIELD INTENSIVE: Held in August 2022 in Beaufort, NC, the Field Intensive is an important research support experience for students from NC State and our Consortium. This [place-based learning experience](#) included [presentations, discussions, and field visits](#) with regional partners from USFWS, NC Dept of Environmental Quality, NOAA, NC Sea Grant, NPS, NC Coastal Federation, USFS and NC Natural Heritage Program, deepening these manager relationships. The [2023 Climate Adaptation Science Field Intensive](#) was planned

at the NC Eastern 4-H Center on the Albemarle Peninsula and also included connections with Tribal nations, local storytellers, USFWS Refuge system, and Albemarle Pamlico National Estuary Partnership.

EARLY CAREER OPPORTUNITIES: We supported early career scholars from the Consortium to attend the [CASC Early Career Workshop](#). At the SE CASC Science Symposium a Global Change Fellows Lightning Talks/Early Career Roundtable provided opportunities to highlight their research and career interests to SE CASC partners. Students from the Consortium and from Jackson State University were supported to participate in the Poster and Tools session.

HBCU SCIENCE COMMUNICATIONS INTERN: We again partnered with Science Communicators of North Carolina to host a summer intern from NC A&T University. We are exploring ways to [expand this very successful program](#) that helps cultivate entry of historically underrepresented students into fields related to the SE CASC mission.

GLOBAL CHANGE FELLOWS

In 2022-23, we had an excellent cohort of 12 Global Change Fellows from multidisciplinary academic backgrounds.

- [MURRY BURGESS](#) | [AUSTIN LAMICA](#) | [GREIVIN ULATE](#)
Dept. of Forestry and Environmental Resources
- [ERIN G. EICHENBERGER](#) | [EMILY NASTASE](#) | [BETHANY WAGER](#)
Dept. of Applied Ecology
- [SHANNON MCGOVERN](#)
Dept. of Public Administration
- [SAMANTHA RAE MICHLOWITZ](#) | [LILY RAYE](#)
Dept. of Marine, Earth, and Atmospheric Sciences
- [CHRISTINA PERELLA](#)
Center for Geospatial Analytics
- [JULIANNE REAS](#)
Dept. of Parks, Recreation, and Tourism Management
- [SOPHIA ROSENBERG](#)
Dept. of Civil, Construction, and Environmental Engineering

A [new cohort](#) of 12 students began their term in Fall 2023.

2022-23 Global Change Fellows hosted 4 [public seminars](#):

- [NOAA's New Agenda for a Climate Ready Nation](#)
- [Indigenous Leadership in Conservation from Yellowstone to Yukon](#)
- [Inclusivity in the Outdoors](#)
- [Communicating Risk in a Changing Climate](#)

Global Change Fellows produced 20 publications from their research since our last report, including:

- Awasthi, C, et al. 2022 | [Projecting Flood Frequency Curves Under Near-Term Climate Change](#)
- McQuillan et al. 2022 | [Forest water use is increasingly decoupled from water availability even during severe drought.](#)
- Montefiore, LR, et al 2023 | [Vulnerability of Estuarine Systems in the Contiguous United States to Water Quality Change Under Future Climate and Land-Use](#)

 The Global Change Fellows developed a variety of [media products](#) such as blog posts, videos, story maps, and fact sheets on diverse topics related to their research interests. We created a [short video](#) celebrating ten years of the Global Change Fellows program. go.ncsu.edu/global-change-fellows.

“My favorite part of being a Global Change Fellow is meeting the diversity of people all working toward the same goal. Connecting with professionals in other disciplines is so important for tackling an issue as large as climate change, as well as for challenging me to think outside the box on my own research.”

MURRY BURGESS, 2022-2023 FELLOW

Outreach & Engagement

2022 SOUTHEAST CLIMATE ADAPTATION SCIENCE SYMPOSIUM

The [Symposium](#) took place in Gulf Shores, AL, Sept. 19-21, 2022. This signature event provided a venue for researchers, managers, and others to share information about research products, management needs, and potential areas of collaboration. 164 researchers and managers working in the southeastern U.S. and U.S. Caribbean participated, including decision makers and practitioners from state fish and wildlife agencies, federal organizations, Tribal Nations, and NGOs involved with climate impacts and adaptation for fish, wildlife, habitat, and cultural resources in the Southeast. We developed a comprehensive [Symposium Summary](#) detailing key findings from presentations and discussions. secasc.ncsu.edu/2022-secasc-science-symposium/

SEAFWA ANNUAL CONFERENCE

We partnered with USFWS at the 2022 Southeastern Association of Fish and Wildlife Agencies annual meeting to [present on work](#) to improve collaborative conservation efforts. SE CASC and Consortium staff will participate in the [2023 conference](#), playing a role in organizing and presenting in four sessions.

DEEP SOUTH CENTER FOR ENVIRONMENTAL JUSTICE

We partnered with DSCEJ to involve their staff as plenary presenters at our SE CASC Science Symposium. SE CASC and USGS jointly sponsored the [8th Annual HBCU Climate Change Conference](#) in April 2022; we promoted our science and Fellows program as well as supported travel of CASC Fellows. Our participation led to a new partnership with the University of Virgin Islands. We will participate in the [9th Annual Conference](#) in Oct.

2023; USGS supported several CASC Fellows to present their research, including two SE CASC Global Change Fellows.

NATIONAL ADAPTATION FORUM

SE CASC staff presented in several CASC-organized sessions at [NAF in fall 2022](#), "Approaches to Co-Producing Science for Natural Resource Adaptation" and "Innovative Communications to Improve Natural Resource Adaptation to Climate Change." We also participated in meetings to improve program coordination with other federal-university organizations.

CARIBBEAN COMMUNITY OF PRACTICE

We collaborated with USFWS to organize the first in-person convening of this group of conservation practitioners from state, territorial, federal, and community partners working in the US Caribbean. We'll continue to support this community to strengthen existing and facilitate future collaborations in Puerto Rico and USVI.

TRIBAL PARTNERSHIPS

SE CASC staff participated in the [2022 National Tribal and Indigenous Climate Conference](#), organizing and presenting a session, "Advance science through collaborations that bring Indigenous and Earth sciences into partnership." We were sponsors to the 2023 AISES Conference, an opportunity to share the work and opportunities of SE CASC and to recruit Native students into SE CASC programs. Tribal environmental staff join monthly calls of the Climate Change into SWAPs WG, including representatives from the Native American Fish and Wildlife Society. Tribal managers presented in many [plenary and breakout sessions](#) at our Science Symposium; we also hosted a discussion of Tribal science

priorities with Tribal representatives and SE CASC leadership and implemented a session on ethical Tribal engagement.

SCIENCE SEMINARS

We continue to implement Fellows-led Global Change Seminars via Zoom and in person as well as our staff-led virtual [Science Seminar Series](#). We attract registrants from federal agencies, Tribal nations, state and local agencies, universities, NGOs, and community members, with our monthly newsletter a big driver of participation. We are coordinating with contributors to organize a seminar series on the Fifth National Climate Assessment.

NEW LOGO

SE CASC staff worked with a talented creative team, which included a former Global Change Fellow, to develop a [new logo](#) that is uniquely representative of our southeastern context and complementary to other CASC regional logos.



Looking Forward

NC State University engaged with several institutions to build on these and other accomplishments and to envision the next phase of the SE CASC, developing a competitive proposal to serve as the university host for the SE CASC Consortium for the next 5-year cycle. We enlarged our Consortium to incorporate access to expertise in specific areas of our footprint and to enhance connections with Tribal and other underserved communities. Learn more about the next phase at go.ncsu.edu/secasc-host-award.

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OUR CONSORTIUM PARTNERS

