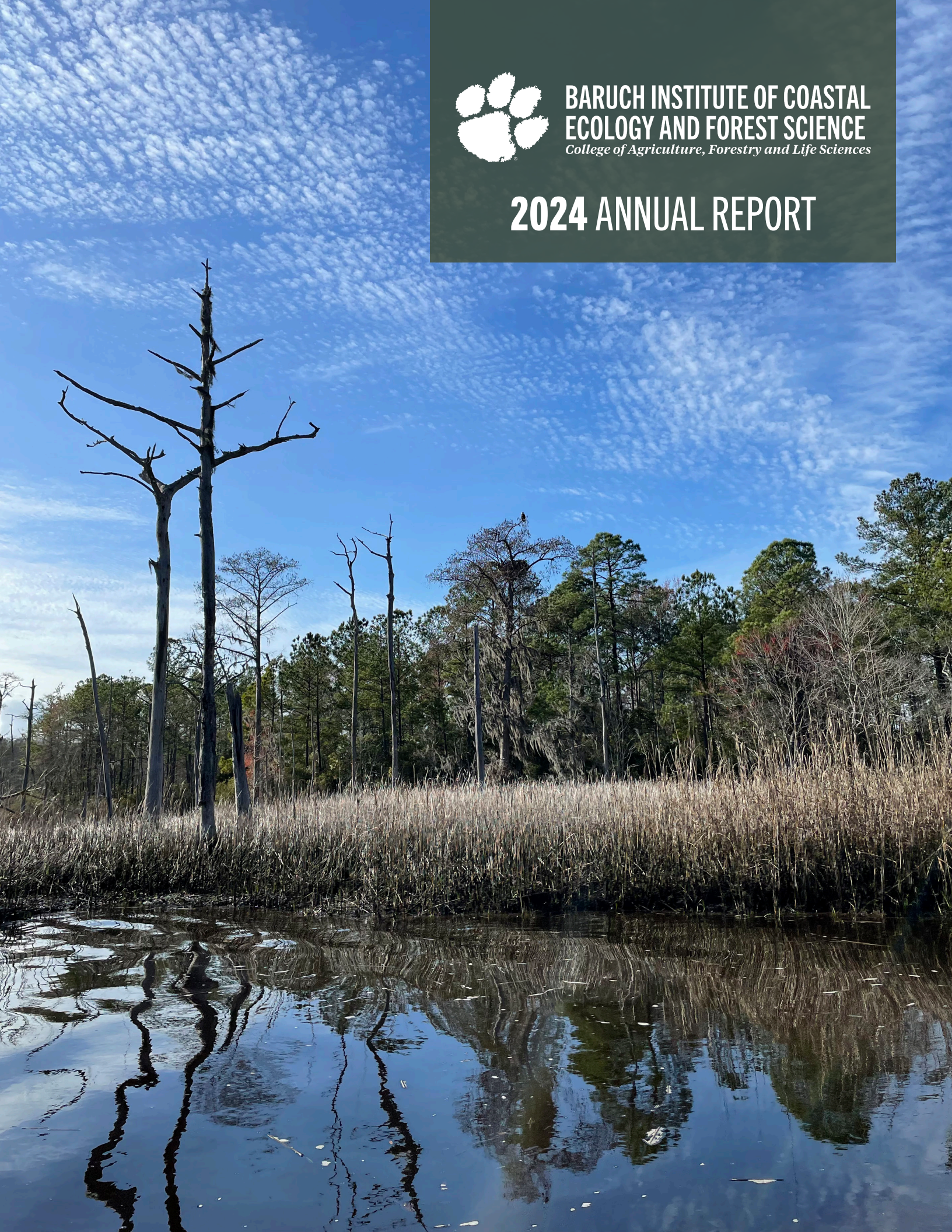




**BARUCH INSTITUTE OF COASTAL
ECOLOGY AND FOREST SCIENCE**
College of Agriculture, Forestry and Life Sciences

2024 ANNUAL REPORT







Contents

MESSAGE FROM THE DIRECTOR	4
RESEARCH HIGHLIGHTS	6
NEW HIRES	12
EVENTS & PROGRAMS	20
AWARD WINNERS	26
SUMMER INTERNS	29
GRADUATE STUDENT BIOS	34
REMEMBRANCE OF MAŽEIKA	42
PUBLICATIONS	46
RESEARCH GRANTS & CONTRACTS	51
CROSSWORD PUZZLE	54



*Living
Coasts*



*Watersheds, Wetlands,
& Wildlife*



*Tomorrow's
Forests*

Message from

THE DIRECTOR

Hello! Welcome to the 2024 edition of the annual report for the Clemson University Baruch Institute of Coastal Ecology and Forest Science (BICEFS). Our Institute is housed at the scenic 16,000-acre Hobcaw Barony, owned by the Belle W. Baruch Foundation in Georgetown, SC.

Our faculty, research scientists, staff, and students conduct innovative and cutting-edge research addressing many of the pressing issues we face in South Carolina and the region. Our outreach and research focus on the three BICEFS Themes: 1) Living Coasts, 2) Watersheds, Wetlands & Wildlife, and 3) Tomorrow's Forests. These themes serve as a guide for our mission, which is to promote forward-looking conservation supported by interdisciplinary training and translational research by strategically partnering with a diverse array of stakeholders and experts in ecological science that generate solutions to environmental challenges.

This past year proved to be challenging for the employees of BICEFS. In May 2024, we lost our leader, Dr. Mažeika Patricio Sulliván, following a brief illness. Dr. Sulliván came to BICEFS in the fall of 2022 as Director and quickly made his mark on BICEFS via his policy initiatives to improve workplace efficiency. He was a charismatic colleague and capable scientist who left us way too early. You can read more about his life later in this report.

I became the Interim Director of BICEFS in July 2024 following the passing of Dr. Sulliván. The interim tag was removed in December 2024. In addition to being the Director of BICEFS, I also serve as the Director of the James C. Kennedy Waterfowl and Wetlands Conservation Center, which is housed at BICEFS. I became the Director of the Kennedy Center in August 2021. Prior to Clemson, I was a faculty member at West Virginia University for 22 years. I earned a B.S. in Wildlife (University of Wisconsin-Stevens Point), an M.S. in Range and Wildlife Management (Caesar Kleberg Wildlife Research Institute at Texas A&M University-Kingsville), and a Ph.D. in Wildlife Science (Texas Tech University).



My research centers on the ecology of wetland and riparian systems and wetland-dependent wildlife. In my free time, I enjoy hunting, gardening, playing with my yellow Labrador retriever, Gideon, (*Editor's note: everyone loves Gideon*) and hiking with my wife, Heather.

Coastal South Carolina is a special place. The people are friendly, the sunrises are amazing, and the wildlife is diverse. However, myriad issues, including rising sea levels, wetland and forest losses, and increasing development, lead to numerous negative societal and ecological interactions that impact our quality of life. Our team at BICEFS works diligently to conduct original research and disseminate findings through our outreach and extension activities to help improve the quality of life in the Grand Strand and the Lowcountry.

I hope you enjoy reading the articles highlighting a few of our many research and demonstration projects and endeavors that our students, faculty, and staff are undertaking. I am proud of the work and accomplishments achieved by our dedicated and skilled scientists. I look forward to another productive year in 2025.

I am proud to serve as the Director of BICEFS. I look forward to meeting and working with you on the issues that affect our coastal communities and ecosystems. However, we do need your help. We are short on space (lab, office, and storage) and student housing. We also need to update our water quality and other research equipment. Please consider supporting our efforts with your tax-deductible gift through the Clemson University Foundation. Type in "BICEFS" under "Fund keywords" to ensure the funds are directed towards us. Please don't hesitate to get in touch with me at jta6@clemson.edu or (843) 546-1013 to discuss support or arrange a visit.

Take care, and thank you for your interest,



James T. (Jim) Anderson, Ph.D.

Director, Bruch Institute of Coastal Ecology and Forest Science





Research

HIGHLIGHTS

47 years of American Alligator Research in Coastal South Carolina: A Summary

Basic natural history data on reproductive ecology and behavior are a prerequisite for designing and implementing effective conservation strategies for wildlife species and populations of concern. Phil Wilkinson (Biologist, South Carolina Department of Natural Resources [SCDNR]) conducted the first and seminal study of American alligator (*Alligator mississippiensis*) nesting ecology in SC from 1978 to 1983, a time when this large reptile was listed as an Endangered Species. His research revealed when and where alligators nest in SC, how often and how many eggs a female typically lays (average clutch size), how long eggs incubate in the nest before hatching, and how long a maternal alligator protects her hatchlings, among other vital aspects of the animal's reproductive ecology.

Considered one of the greatest conservation success stories in U.S. history, the alligator was removed from the Endangered Species list in 1987, and populations have continued to recover over the last four decades. However, much of the alligator's natural history, and by extension, its ecological role and importance, remain poorly understood. From 2010 to the present, our team at BICEFS has worked with Phil Wilkinson and other collaborators to further examine additional aspects of alligator reproductive ecology in SC, particularly at the Tom Yawkey Wildlife Center (Georgetown County), including size- and age-related fertility, nesting frequency, nest site fidelity,

and the influence of temperature on development, sex, size, growth and survival of hatchling alligators. We have also conducted studies to assess alligator growth, diet, ecotoxicology, immunology, role in food web dynamics, movement and space use, and the effectiveness of capture as aversive conditioning to reduce negative human-alligator interactions. Most recently, our work has focused on the environmental and site factors that influence nest attendance behavior of maternal alligators and the impact of human presence at nests (during research activities) on nest predation rates (do we attract predators to nests and thereby reduce nest success?).

Alligators are considered “ecosystem engineers” because their modification of habitats (e.g., construction of nest mounds) provides opportunities for vital life activities (e.g., feeding, drinking, breeding, sheltering) to other animals. As such, we are also cataloguing what other wildlife species utilize alligator nests and how they use them. This information, combined with data from our other studies, will help us quantify the contribution (“ecological services”) of alligators to the overall structure and function of wetlands throughout the southeastern U.S.



Finally, our long-term (47 years) alligator research at the Tom Yawkey Wildlife Center represents the longest continual study of a crocodylian population in the world – and provides a unique opportunity to examine the influence of age and senescence on various life history traits. Building on research started by Tom Murphy (Biologist, SCDNR) in 2009, we have another long-term (17 years) alligator study ongoing at Spring Island, SC (Beaufort County), allowing us to compare research results from different locations in the SC coastal plain.

Collectively, our collaborative and multidisciplinary research on alligators in SC strives to inform the conservation and management of this iconic species, unlock the mysteries of its biology, and better define its role in shaping and maintaining southeastern U.S. wetlands.

Editor's note: The alligator research also supports students at various stages of their education and careers, as you will see from the bios here in the annual report.





James C. Kennedy Waterfowl and Wetlands Conservation Center

Established in 2014 through a generous endowment from Mr. James C. Kennedy, the James C. Kennedy Waterfowl and Wetlands Conservation Center at Clemson University stands as a premier program dedicated to wetlands, waterfowl, and wetland-dependent wildlife conservation. Mr. Kennedy's steadfast commitment to these vital ecosystems has had a profound and lasting impact on conservation efforts, and we are deeply grateful for his visionary support. Situated within the Belle W. Baruch Institute of Coastal Ecology and Forest Science on the 16,000-acre Hobcaw Barony in Georgetown, South Carolina, the Kennedy Center serves as a hub for cutting-edge research, education, and conservation leadership.

At its core, the Kennedy Center is dedicated to:

Advancing science and education to sustain waterfowl and wetland ecosystems of the South Atlantic Coastal Plain and beyond while training the next generation of waterfowl and wetland ecologists and managers.

While wetland and waterfowl conservation remain our primary focus, the Kennedy Center also explores the complex interactions between wetland, terrestrial, and aquatic ecosystems throughout the southeastern United States. Effective wetland conservation requires a holistic approach—understanding not just waterfowl, but the broader ecological networks that sustain them.

Through innovative research, hands-on training, and collaborative partnerships, the Kennedy Center continues to shape the future of wetland and wildlife conservation.



Research and Academic Growth

Under the leadership of Dr. Jim Anderson, the Kennedy Center has expanded significantly. The team now includes two full-time wildlife biologists and a postdoctoral researcher, with graduate student enrollment growing from three in 2021 to nine in 2024.

Graduate students at the Kennedy Center conduct research on a wide range of topics, including:

- Habitat use of secretive marsh birds and waterfowl habitat relationships in historic rice fields using drones and autonomous recording units.
- Mercury accumulation in wetland-dependent birds.
- Oyster-based habitat restoration on South Carolina's coastal beaches and islands.
- Wood duck cavity selection, seasonal activity, diet, and methods for evaluating nest cavity suitability.
- Pollinator education and conservation, including community gardens in underserved rural communities, wetland pollinator abundance and diversity assessments, and pollinator plant range shifts in response to climate change.
- Social surveys to enhance rice field restoration efforts.
- Waterbird habitat selection and spring migration patterns.
- Mallard genetics and behavioral adaptations in the Atlantic Flyway.
- Development of decision-support tools integrating social and ecological data for the management of historic rice fields in coastal South Carolina.
- Relationships between environmental variables and wetland restoration success on Little Edisto Island.
- Indices of biotic integrity for isolated Carolina Bays, incorporating anuran, avian, macroinvertebrate, and vegetative indicators.

Support Our Research

The Kennedy Center conducts a broad range of research both in South Carolina and globally, made possible in part by generous contributions from private donors.

If you would like to support our research and conservation efforts, please visit:

<https://www.clemson.edu/cafls/kennedy-center/giving.html>





Tomorrow's Forests: Pioneering Longleaf Pine Research at Clemson University

At BICEFS, Dr. Tom O'Halloran's lab is advancing our understanding of future forests through research and conservation initiatives focused on the iconic longleaf pine ecosystem. Once sprawling across the southeastern United States, longleaf pine forests are uniquely resilient, naturally adapted to withstand fires, drought, and windstorms - qualities essential in a rapidly changing climate.

In 2024, Dr. O'Halloran's lab advanced ecosystem science by operating state-of-the-art eddy covariance flux towers at Hobcaw Barony, providing rare direct measurements of carbon sequestration and water usage in both mature and newly restored longleaf stands. Their findings revealed compelling insights: while restored longleaf forests initially release carbon following establishment, they transition into significant carbon sinks within just a few years, contributing positively to climate mitigation. These observations not only provide vital data but enhance predictive models, guiding strategic forest management decisions region-wide.

Data from the Hobcaw towers contributed to several influential global synthesis publications in recent years, elevating the lab's international scientific impact. These include studies on the global warming potential following forest disturbances, ecosystem evapotranspiration dynamics, and extensive carbon and water flux products developed through

collaborative global frameworks. Publications from these studies are listed in the Annual Report's publications section.

Under Dr. O'Halloran's leadership, the lab also co-authored essential conservation resources, including the influential *Managing Longleaf Pine Forests for Our Future: A Climate-Smart Guide* and the updated *Range-wide Conservation Plan for Longleaf Pine 2025-2040*. These publications serve as cornerstone references, equipping landowners and policymakers to sustainably manage forests while maximizing ecological and economic benefits.

Central to the lab's success is Dr. O'Halloran's commitment to student training and mentorship. Lucas Clay, a graduate student, recently completed his dissertation research on the ecosystem services provided by managed longleaf pine forests, producing findings now prepared for submission to prominent scientific journals. Clay's work exemplifies the integration of rigorous science and practical management solutions, helping prepare future land managers to tackle ecological challenges.

Moreover, the lab annually engages undergraduate interns through Clemson's University Professional Internship and Co-op (UPIC) program, training two students per year to conduct crucial forest productivity and biodiversity assessments. This hands-on opportunity equips students with field experience while contributing valuable long-term data critical for conservation and management.

Essential to these achievements have been robust partnerships and generous support from key organizations. The Nature Conservancy, National Fish and Wildlife Foundation, The Longleaf Alliance, the Belle W. Baruch Foundation, and the Forest

Futures Initiative have provided critical funding, collaboration, and guidance, greatly enhancing the lab's impact and reach. Dr. O'Halloran's team sincerely thanks these partners for their ongoing support and commitment.

Through applied research, strategic leadership in conservation planning, and dedication to student mentorship, Dr. O'Halloran's lab supports the restoration of the longleaf pine ecosystem while helping train the next generation of scientists, ensuring the future of our forests is vibrant, resilient, and climate-smart.



New
FACULTY HIRES



Dr. Sarah Waickowski, PE is an Assistant Professor and Water Resources Extension Specialist. Prior to joining Clemson, she earned her B.S. in Civil Engineering from the University of Florida in 2012 and her M.S. and Ph.D. in Biological and Agricultural Engineering from North Carolina State University in 2015 and 2023, respectively. Sarah is also a licensed water resources engineer in Florida, North Carolina, and South Carolina. Her research focuses on stormwater management with emphasis on using green stormwater infrastructure (e.g., rain gardens) to improve water quality and reduce localized flooding. She also studies how to retrofit more traditional practices (e.g., stormwater ponds) to improve their performance. In addition to research, Sarah is a co-instructor for Clemson’s Certified Stormwater Plan Reviewer (CSPR), Master Pond Manager, Master Rain Gardener, and Post-Construction BMP Inspector programs. In her spare time, she enjoys rowing, baking, and watching college sports.



Dr. Reed Goodman, a geoarchaeologist and historical ecologist, joined BICEFS as an Assistant Professor of Environmental Social Science last September. His research explores the cultural ecology of coastal societies through archaeological science. At BICEFS, Dr. Goodman investigates past human interactions with intertidal environments, with a particular focus on historic rice impoundments. His work examines how these landscapes—some actively managed, others long abandoned—serve as repositories of cultural heritage and wetland subsistence knowledge developed over centuries. His current research places Lowcountry impoundment legacies within a broader historical and geographic framework, drawing both direct and indirect connections to tidal agriculture across trans-Saharan Africa, the Middle East, and South Asia. Dr. Goodman is actively recruiting graduate students for his Researching Impoundments for Conservation Ecology (RICE) project, an interdisciplinary initiative that treats coastal impoundments as model systems for studying human-environment dynamics. By integrating archaeological, ecological, and historical data, RICE examines the long-term evolution of coastal land use, providing critical baselines for understanding environmental change and informing contemporary management strategies. Before joining BICEFS, Dr. Goodman was a postdoctoral fellow at New York University’s Institute for the Study of the Ancient World (ISAW), where he investigated the role of the Tigris-Euphrates delta in the emergence of early cities.



New
POST-DOC HIRES



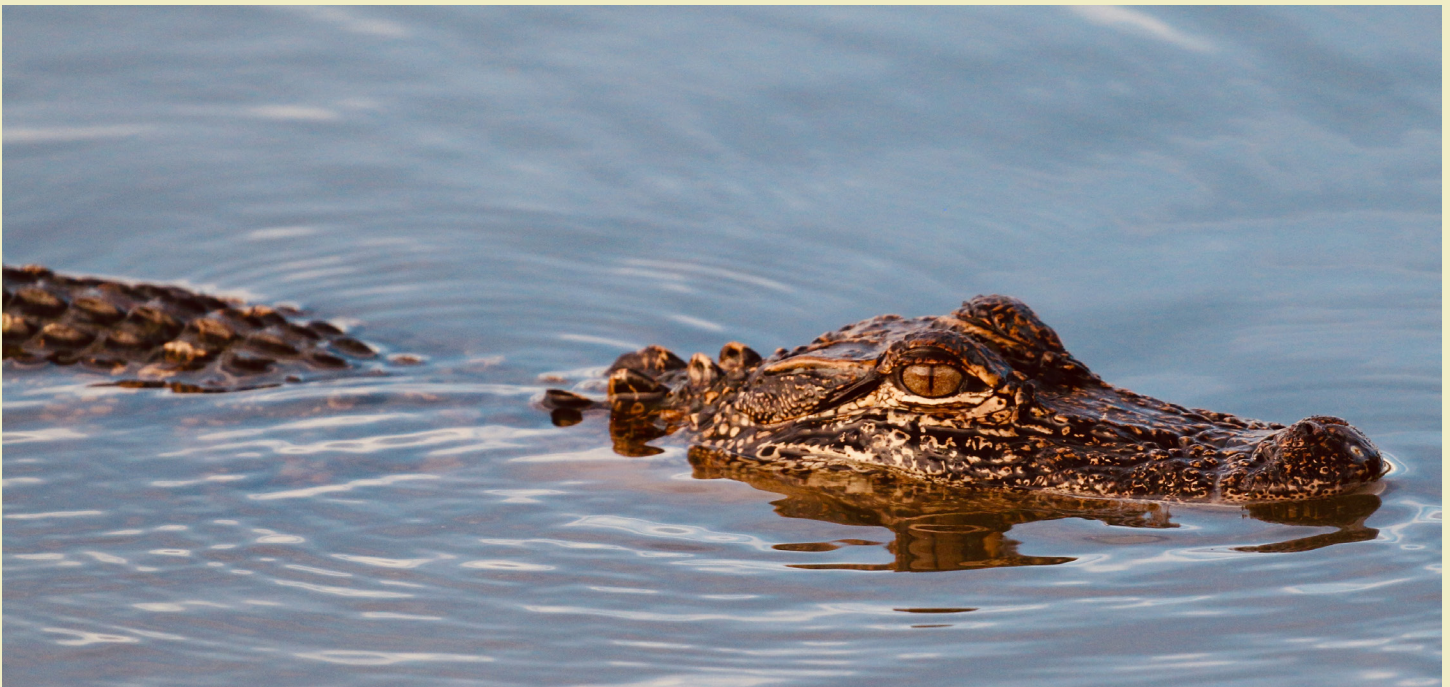
Andrew Hopkins is a postdoctoral fellow at the James C. Kennedy Waterfowl and Wetland Center working with Dr. Jim Anderson. He previously completed a postdoctoral position at Purdue University, where he researched antimicrobial resistance in amoeba and canines, as well as worked on a USDA project examining the role of backyard poultry owner attitudes and perceptions in biosafety and security. He completed his Ph.D. at Purdue University in 2023, where he researched the effects of agricultural fungicides on aquatic communities. He earned his M.S. from Western Michigan University in 2019 and his B.S. from Eckerd College in 2013. At the Kennedy Center, Andrew assists with existing projects as well as the teaching and mentoring of students. He is developing new research that will predict the spread of avian influenza using environmental DNA and will examine the impacts and health of herpetofauna using temporary ponds and stormwater catchments in South Carolina. In his free time, Andrew enjoys baking and reading, as well as exploring new areas to find local amphibians and reptiles.



Rafael (Rafa) Feijo de Lima is a biologist specializing in freshwater ecosystem dynamics and restoration across temperate and tropical regions. He earned his Ph.D. in Brazil, where his research examined how land use and deforestation impact structural and functional parameters of Atlantic Rainforest streams. His postdoctoral work has spanned multiple projects, including research with MT-CREWS investigating anthropogenic impacts on Montana's riverine systems, where he studied the relationships between benthic algae, ecosystem metabolism, heavy metal contamination, and nutrient cycling in the Upper Clark Fork River. While at BICEFS, Dr. Feijo de Lima contributed to the CASS EVOLVED program, which worked to integrate initiatives to help support underserved students and scientists across ten major aquatic science societies. He also conducted research on alligator food webs in coastal South Carolina, furthering our understanding of these complex ecosystems. Rafa's time at BICEFS was shortened by the cancellation of the grant that supported the CASS EVOLVED project.

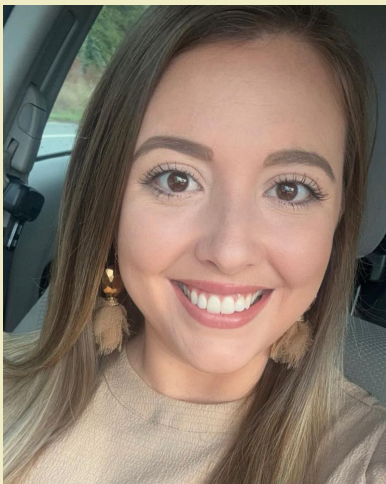


Miren Atristain is an early-career aquatic ecosystem ecologist with a focus on understanding the impacts of human-induced stressors on stream and river ecosystems. Her academic journey began in 2017 at the University of the Basque Country, where she focused on restoration efforts in stream ecosystems. Her research demonstrated the potential of dam removal to restore stream structure and integrity, while also highlighting the importance of site-specific conditions in determining the success of such interventions, focusing on the Enobieta Dam in northern Spain. She also collaborated on research investigating the effects of hydroelectric dams and wastewater treatment plant effluents on invertebrate communities, nutrient dynamics, and greenhouse gas emissions of stream ecosystems. In 2024, she joined the Streams, Rivers, and Estuaries (STRIVE) lab at BICEFS under the supervision of the late Dr. Mažeika Patricio Sulliván. She is currently leading several research projects that address different anthropogenic stressors and their effects on freshwater ecosystems. One project investigates the food web dynamics of the American Alligator (*Alligator mississippiensis*) in coastal South Carolina, exploring their role as apex predators and the ecological interactions within their local environment. A second project investigates how environmental and geomorphological factors contribute to nutrient loading in streams and lakes, which may drive harmful algal bloom occurrences. Finally, she is exploring environmental drivers of antibiotic resistance gene (ARG) transport through food webs in stream ecosystems. Her research aims to improve management and restoration approaches that help maintain or restore the integrity of stream and river ecosystems.





New
STAFF HIRES



Alexis Brandon
Administrative Assistant

Alexis (Lexi) joined BICEFS as Administrative Assistant in spring 2024. She provides administrative support to the faculty and staff. With an eye for detail and her organizational skills, Lexi ensures the smooth operation of daily activities, including handling correspondence, maintaining records, preparing reports, managing financial tasks, and assisting with event planning. Her smiling face is often a visitor’s welcome to the Institute. Lexi is a native Georgetownian.



Clemence Bonenfant
Climate Smart Soils Lab Technician – The O’Halloran Lab

Clem joined the team in May 2023 as the Soil lab technician on the Climate-Smart project. She has a background in geology engineering and graduated from a French engineering school in 2018. She specializes in hydrogeology and environment and worked previously as a field engineer on soil and groundwater remediation projects. While working on the Climate-Smart project, Clem has contributed to expanding our knowledge of complex climate change mechanisms. Clem is also a frequent contributor to BICEFS outreach activities.



Crystal Anderson

Wildlife Biologist III – The James C. Kennedy Waterfowl and Wetlands Conservation Center

Crystal, a South Carolina native, holds a B.S. degree in Wildlife and Fisheries Biology and a M.S. degree in Forest Resource Management from Clemson. As a biologist with the James C. Kennedy Waterfowl and Wetlands Conservation Center, Crystal plays a vital role in grant writing, lab management, financial planning, student mentorship, and research on wetlands, wildlife, and human dimensions. She is concurrently pursuing a Ph.D. under the mentorship of Dr. Jim Anderson where she is investigating the role of wetlands and surrounding landscapes in supporting at-risk pollinator species, including the monarch butterfly (*Danaus plexippus*), southern plains pine bumble bee (*Bombus fraternus*), and rusty patch bumble bee (*Bombus affinis*). Crystal uses pollinator surveys to evaluate the diversity and abundance of wetland pollinators, with a focus on detecting rare and endangered species to map shifts in the distribution of pollinator host plants. Crystal co-wrote the Winter Tree Identification for the Southern Appalachians and Piedmont – A Photographic Guide alongside Dr. Donald Hagan and Hailey Malone. Her photography skills captured the detailed images in this visually stunning field guide. She lives in Myrtle Beach with her husband, Will, and their two teenage children. Their home is shared with two goldendoodles, Nova and Comet, and a lively kitten named Lola.



Daniel Schermaier

Eddy Covariance Tower Technician – The O’Halloran Lab

Daniel is a M.S. student and eddy covariance flux tower technician advised by Dr. Tom O’Halloran. Broadly, he is interested in biosphere-atmosphere interactions and the complex feedbacks that drive ecosystem function, particularly biogeochemical cycling. In his role, he maintains, builds, and processes data from flux towers that measure mass and energy exchange between the environment and the atmosphere. His research investigates how biotic factors (such as vegetation, microbes, and marsh fauna) and abiotic drivers (such as temperature, water depth, and salinity) influence carbon cycling in salt marsh ecosystems. Daniel earned his B.S. degree in Chemical Engineering with a minor in Bioengineering from the University of Dayton. Prior to joining BICEFS, he helped develop lab-based platforms to study how cells function and behave across different environments. This work sparked a strong interest in microbiomes and microbial complexity- initially within human systems, and now in the context of natural ecosystems. His current work continues to explore these microscale interactions through ecosystem-scale measurements, with the goal of deepening our understanding of how local ecological processes shape global environmental patterns.



Haoyu Li

Environmental Sensor Manager - The O'Halloran Lab

Haoyu joined BICEFS in March 2024 as a tower technician maintaining eddy flux towers and related environmental surveys and sampling on Hobcaw Barony and commissioning towers for new projects. He moved from China to the US in 2016 to pursue a master's degree at the University of Central Florida. In 2019 he started working at the Archbold Biological Station in South Florida as an Environmental Specialist managing the North Everglades Payment for Environmental Services project funded by South Florida Water Management District. That project focused on controlling surface water and nutrient flow with local ranchers. His undergraduate experience involved mostly working in mangroves in subtropical and tropical South China. Haoyu is generally interested in incorporating field experiments, instrument technology, and long-term monitoring to facilitate sustainable conservation management. During leisure time he enjoys photography and long road trips across the western U.S. to camp in national parks.



Keegan Foster

Wildlife Biologist I – The James C. Kennedy Waterfowl and Wetlands Conservation Center

Keegan comes to BICEFS as a wildlife biologist with the Kennedy Waterfowl and Wetland Center. He joins us from Rhode Island. Having spent 20 years in a state that takes only an hour to drive across, he felt ready to branch out and explore new regions. Keegan earned his bachelor's in wildlife and conservation biology at the University of Rhode Island in 2023. Keegan's first experience conducting field and lab research occurred during the summer of 2022 at North Dakota State University with research on the agriculturally beneficial alfalfa leaf-cutting bee (*Megachile rotundata*). Since then, Keegan has held multiple seasonal technician positions with an emphasis on field ornithology, including monitoring nesting shorebirds on Martha's Vineyard, capturing and banding wild turkeys, and banding and tracking American woodcock. Having these experiences under his belt, Keegan's love of fieldwork only continues to grow. In his free time, Keegan loves being physically active outdoors, finding the combination of exercise and nature to be particularly helpful in reducing stress. He loves camping, hiking, kayaking, and birdwatching.



Samantha Hamilton

Research Technician – The Duberstein Lab

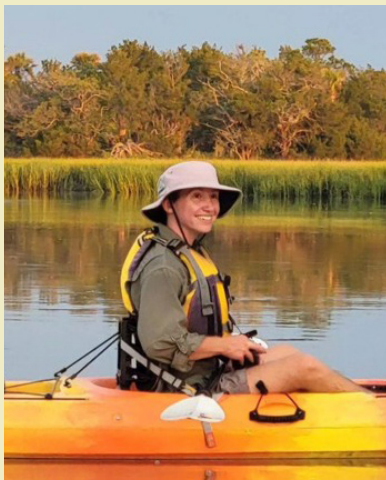
Sam Hamilton is a research technician for Jamie Duberstein’s Lab where she is evaluating the plant communities of the Savannah National Wildlife Refuge marshes as part of the environmental impact statement for the Savannah Harbor Expansion Project. She holds a B.S. in Environmental Science and Technology with a focus in restoration ecology from Colorado Mesa University. Sam is originally from Colorado, most recently lived in Montana, and in December 2024 she left the Rocky Mountains for the SC coast. Before joining BICEFS, Sam worked as a watershed technician for Glacier Two Medicine Alliance developing wildlife connectivity projects and for the U.S. Forest Service as a wildlife and archeology technician. Throughout her degree she worked in watershed research and enjoyed riparian fieldwork immensely. In her free time, Sam enjoys paddleboarding, swimming, backpacking and traveling.



Sarah Griffith

Climate Smart Soil Flux Technician – The O’Halloran Lab

Sarah joined our team in May of 2023 as a Field Technician on the Climate-Smart project. This USDA-funded research project is focused on reducing greenhouse gas emissions with the implementation of selected agriculture and forestry land-use practices. Sarah manages the team’s mobile greenhouse gas lab, custom-designed to monitor soil efflux of greenhouse gases on farms in coastal and central South Carolina. Her work on the project measures year-round soil flux to evaluate the impact that our land management choices have on our regional and global climate. Driven by a passion for sustainable food production, Sarah graduated from Prescott College in Arizona with a degree in Agroecology. She is increasingly interested in how our relationships with the land impact ecosystem health and well-being. In her free time Sarah enjoys playing with her nephew and niece, hiking, swimming, kayaking, and crafting a variety of fermented foods and beverages.



Stevie League

Research Technician, Duberstein Lab

Stevie League is a research technician and data manager for Jamie Duberstein's Lab and a South Carolina native. Stevie earned a B.S. in Environment and Natural Resources with a concentration in Conservation Biology and a minor in Geology from Clemson University. Before joining BICEFS, Stevie was a Naturalist at Kiawah Island. They also worked on research projects with Furman University studying riparian ecology and use of camera traps in mountain lion research and projects with Clemson studying mesopredator and alligator behavior. Stevie is currently looking at changes in salinities and plant communities in the marshes of the Savannah National Wildlife Refuge to inform the environmental impact statement for the Savannah Harbor Expansion Project. Stevie also maintains long-term tree growth and salinity data sets in tidally-influenced forested wetlands in the Savannah National Wildlife Refuge and Winyah Bay area. In their free time, Stevie enjoys kayaking, birdwatching, photography, and learning about traditional uses of native plants.



Josh Rayfield

Maintenance Technician

Josh joined BICEFS as a maintenance technician in May 2024. He plays a crucial role in the upkeep of our buildings, vehicles, and surrounding landscape. He has years of experience in various trades. In his spare time, he enjoys tinkering and taking care of his chickens. *(Editor's note: In this photo, Josh puts on a protective suit as he prepares to install insulating foam inside our maintenance building. He doesn't always dress like this!)*

Events & PROGRAMS

A Little Birdie Told Me About Girl Scouts

Wadesboro, NC

May 18, 2024

The Girl Scouts Hornets' Nest Council in conjunction with the U.S. Fish & Wildlife Service hosted an educational, recruiting event called "A Little Birdie Told Me About Girl Scouts" at the Pee Dee Wildlife Refuge.

At the event, Girl Scouts and their families explored most of the wildlife refuge by visiting various stations, including one focused on the importance of wetlands. At this station, Annika Kuleba (Graduate Student) and Daniel Schermaier (Field Technician) represented BICEFS and the James C. Kennedy Waterfowl and Wetlands Conservation Center. They spoke with attendees about the critical role wetlands play in providing habitat for numerous species, as well as their valuable ecosystem services, such as water purification and carbon storage.

Girl Scouts had the chance to earn up to four patches at the event, including bird watching, hiking, trash pick-up, and the recruiter patch!

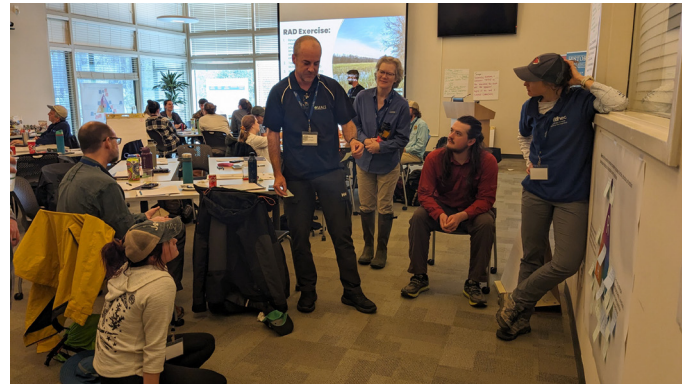


Forested Wetlands of the Upper Estuary

Charleston and Georgetown, SC

March 5-7, 2024

This specialized conference had split venues with two days at the College of Charleston in Charleston, SC, followed by a third day at BICEFS in Georgetown. On that third day, interested parties were able to take part on a morning boat tour of the Waccamaw River and Winyah Bay, ending at the Hobcaw House on Hobcaw Barony. Through the interactive forum, roughly 120 attendees discussed the state of science regarding tidally-influenced forested wetlands, cultural identities bound to the ecosystem, and management strategies for involving the input of all stakeholders to best maximize ecosystem function. Top scientists in this field from the southeastern US, Gulf of Mexico, Pacific Northwest, and Australia came together to share knowledge and learn of the cultural bonds that the Gullah folk of the southeastern U.S. have with this ecosystem. A workshop utilizing the Resist-Accept-Direct framework was conducted to identify key issues related to these resources and develop alternate ways of managing the issues. After the meeting, attendees (and others) were invited to contribute manuscripts to be published in a special issue of the journal *Estuarine, Coastal and Shelf Science* that focuses on this ecosystem. Financial support of the symposium was also provided primarily by the National Sea Grant Office as well as a consortium including Clemson University, College of Charleston, U.S. Geological Survey, and U.S. Forest Service. To learn more, please visit: <https://www.scseagrant.org/forested-wetlands-conference/>





Organization of Biological Field Stations (OBFS) Annual Meeting

Georgetown, SC

November 11-15, 2024

OBFS, as the name indicates, represents the thousands of field stations across the U.S. and worldwide. OBFS membership currently includes stations on all six inhabited continents. Over the years, OBFS has published research that demonstrates the impact that field research and education experiences have on student development, and the importance of field stations in supporting research overall. Many long-term studies, like our alligator and cypress projects, exist because of ongoing support of field stations. OBFS efforts have made support of field stations by the National Science Foundation a Congressional mandate through the CHiPS Act, rather than simply an agency preference. Field stations serve as platforms to support multiple types of research. BICEFS is an excellent example as you can see in this annual report. Both BICEFS and OBFS were founded in 1968 (see www.obfs.org).

BICEFS and the USC Baruch Marine Field Lab co-hosted the event, with additional support from the Belle W. Baruch Foundation. Skip J. Van Bloem (BICEFS) and Bill Strosnider (USC BMFL) served as hosts. There were 138 attendees with an additional 15 following along online. Both Clemson and USC housing was at capacity. Attendees were educators,

managers, students, scientists, and administrators – the folks that make field station programs work. This group works hard and has fun. The main rules are to collaborate well and not take yourself too seriously. Plenary talks were presented by: Zenobia Harper, local artist and director of the Gullah Geechee Improvement Society, who spoke about the Gullah Geechee culture in the area; Amy Armstrong, director of the South Carolina Environmental Law Project (SCELP) about protecting critical environmental areas in South Carolina; Thomas Rainwater and Miriam Boucher, who discussed long-term and new research on American Alligators; and Reed Beamon, the NSF Field Stations and Marine Labs Infrastructure program lead, about the latest at NSF and particularly with infrastructure. Field trips to North Inlet, Sandy Island, the Black River Cypress Preserve, the Tom Yawkey Wildlife Center, Historic Georgetown, and across Hobcaw helped participants sample some of the local history and ecology.



We had five workshops and ten concurrent sessions this year covering a broad range of topics including field safety, The Virtual Field (an online program for educators to introduce students to locations too far away to visit), best practices for outreach and education, creation of new programs, resource management software, mentoring, addressing field station history – even the ugly parts, disaster response, developing partnerships, and integrating the arts. This programming was provided by OBFS attendees who shared their expertise with the rest of the community. As a volunteer organization, presenters put these programs together without compensation. The social event of the year is the auction, which raises money for a restricted fund that is used to fund special projects. Many great items were donated by members! The OBFS auction follows this maxim: Price has No Relationship to Value.

OBFS awarded their annual Advancing Equity award to Toolik Lake in recognition for how intentionally and thoroughly they had integrated respect for all their field station staff and users' experiences into their station operations, strategic planning, etc. A second award was given to the USC Baruch Marine Field Lab for their work with the local Gullah Geechee community. Traditionally the Advancing Equity award has recognized efforts that support programs within a station's program, but the USC application highlighted community work that hadn't been considered before, and as a result, the OBFS Board approved a recommendation from the committee to add a second category for Advancing Equity awards. The Local Hero award was presented to Amy Armstrong of SCELPA, who was nominated jointly by both the Clemson and USC stations. Amy has led a non-profit environmental law practice to protect the Wild Side of South Carolina. They litigate if needed, but they also work with local groups and municipalities to develop regulation and other legal strategies to further conservation so that litigation isn't needed (see more of what they do here: <https://www.scelp.org/>). Amy is also an alumna of the University of Michigan Biological Station. OBFS bestowed their Distinguished Service Award to

Philippe Cohen, former director of the Jasper Ridge Biological Station near San Francisco, CA. He has been a valued member of OBFS for decades, serving in many capacities including a long stretch as Treasurer. He and his wife, Cindy Stead, established the OBFS endowment fund last year, setting the example and standard for others to help support the long-term future of OBFS. Finally, Philippe is also well-known for photography, some of which he donates for OBFS fundraising.

This year was nicknamed the “Experimental OBFS Meeting” because we tried many new things logistically. First, the meeting was in November to avoid hurricane season. That proved prescient since Hurricane Helene disrupted travel in Atlanta and Charlotte in mid-September when the meeting is normally held. Experimenting with a southern location also provided nice November weather in South Carolina. We were last in the South in 2012 at Archbold Field Station in South Florida. Thanks to a new website, OBFS was able to manage registration instead of relying on the university hosts. Meeting evaluations showed all our experiments were well received.

Next year's meeting will be at Rocky Mountain Biological Lab near Crested Butte, Colorado. After RMBL in 2025, Schoodic (Maine) will host in 2026, and Gault (Quebec) in 2027. Big meetings like this don't happen without substantial support by host-site staff, and the OBFS leadership extends their deep gratitude to the folks from BICEFS, BMFL, and Hobcaw for their amazing efforts.





Southeastern Wildlife Exposition (SEWE)

Charleston, SC

February 16-18, 2024

Drawing tens of thousands of outdoor enthusiasts from around the country, SEWE is one of Charleston's signature annual events. It is a showcase of wildlife art and the conservation work of several regional organizations. These include SC DNR, the South Carolina Aquarium, Ducks Unlimited, The Avian Conservation Center, Turtle Survival Alliance, the Amphibian and Reptile Conservancy, and of course Clemson University. Students, staff, and faculty came together to talk to visitors about the important research taking place at BICEFS and the Kennedy Center. Sometimes, this took the form of a thoughtful discussion with adults, answering their questions about the environment in their own backyards. At other times, it required engaging with a child excited to dig through sand, examine algae under a microscope, or look at a crayfish. Speaking of those tiny crustaceans, a couple of our staff actually found an extremely rare specimen while collecting samples for SEWE. It was a blue crayfish, which is a 1 in 10,000 genetic anomaly. Needless to say, this little critter was a big hit with the kids. Overall, this event was a huge success and we look forward to what we can discover and showcase next year.



35th Annual Wooden Boat Show

Georgetown, SC

October 19-20, 2024

For the first time, BICEFS had the honor of taking part in Georgetown's Annual Wooden Boat Show. At this event, both locals and visitors from states away came to display their wooden vessels, with sizes ranging from canoes to yachts. Each has the opportunity to become an award winner, or at the very least, be a part of the celebration of Georgetown's nautical heritage. In addition to the food, music, and wooden boat race, the event gives local organizations like BICEFS a chance to share their knowledge of the coastal landscape with visitors. Thanks to the people of the South Carolina Maritime Museum who held the event, our students and staff were able to connect with the community closest to home. Some attendees were familiar with Hobcaw Barony, while others were surprised to learn that Clemson had a research station just down the road. Like at SEWE, visitors were excited to swing by our tent and get a hands-on environmental science experience learning about our research on climate change, microplastics, water quality, and wildlife conservation.

And throughout each day, both adults and children had the chance to fulfill their dreams (or confront their fears) by holding a juvenile alligator named "Chompy," who also made an appearance at SEWE. These encounters always ended in a well-behaved alligator, a chorus of relieved laughter, and a deeper appreciation for wildlife and our natural world. Those moments, where you feel that you may have sparked a child's love for nature or helped someone see animals in a different light, were truly special. They reminded us that, while sharing our research findings is important, so too is the act of spreading awareness about the needs of wildlife and, wherever possible, replacing fear with understanding. Just like SEWE, the Wooden Boat Show has become a staple event for BICEFS outreach, and we are excited to attend in years to come.





Award

WINNERS



Morgan Chaudry, a second year Ph.D. student advised by Dr. Stefanie Whitmire, received the Wade Stackhouse Graduate Fellowship from the College of Agriculture, Forestry, and Life Sciences at Clemson University for the 2024-2025 academic year for her research on the impacts and fate of anthropogenic pollutants in stormwater ponds across coastal South Carolina. In addition, Morgan won first place for her entry of a microscope image of microplastics in Clemson's 2024 Science as Art Showcase.



Siddhartha Regmi, first year Ph.D. Student advised by Dr. Bo Song, has also been awarded the Wade Stackhouse Fellowship for the 2024-2025 academic year for his Ph.D. research on forest disturbance and restoration ecology. In addition, Siddhartha was awarded the Society of American Foresters (SAF) Diversity Scholarship 2024, which enabled him to attend the 2024 SAF Annual Conference in Loveland, Colorado.



Kenneth R. De León Colón is a third year Ph.D. student who is co-advised by Drs. Miren Atristain and Troy Farmer (FEC). At the inaugural Society for Freshwater Science Southeast USA Chapter Meeting in Columbus, GA, he received the Best Poster Presentation Award for a presentation titled *Investigating the Role of Environmental Factors in the Dissemination of Antimicrobial Resistance in Surface Water*. Additionally, at the Society for Freshwater Science Annual Meeting in Philadelphia, PA in June 2024, he received the Best Poster Presentation Award in the Applied Science Category for his presentation titled Participatory Mapping with Community Leaders: Water, Food, and Energy Insecurity Physical and Social Resources in Disaster Context.



Nayeli Sanchez, a research technician in the Streams, Rivers, and Estuaries Laboratory, was selected as a representative of the Society for Freshwater Science in the inaugural cohort of the NSF EVOLVED SP²ARK Fellowship (2024-2025). This six-month program trains early-career aquatic scientists in science communication and policy engagement, enhancing skills in narrative development, advocacy, and media outreach for broader impact.



Annika Kuleba, a M.S. student advised by Dr. Thomas O'Halloran, received the Clemson University Interdisciplinary Research Fellowship in Spring 2024. Additionally, Annika was awarded the South Carolina Mitigation Association Scholarship in Summer 2024.



Robert (Bobby) Greco, second year Ph.D. student advised by Dr. Jim Anderson in the James C. Kennedy Waterfowl & Wetland Conservation Center, received an International Union for Conservation of Nature- Species Survival Commission, Crocodile Specialist Group, Student Research Assistance Scheme grant. *(Say that three times fast!)*



Aruã Yaim de Castro Ferreira is a second year M.Sc. student in the James C. Kennedy Waterfowl & Wetland Conservation Center advised by Dr. Jim Anderson. Aruã received the James C. Kennedy Fellowship for the 2024-25 academic year, and a research scholarship from The Wildlife Society - Wetlands Working Group. Additionally, he was awarded the Clemson Graduate Travel Grant.



Miriam Boucher, a 3rd year Ph.D. student at the James C. Kennedy Waterfowl and Wetlands Conservation Center advised by Dr. Jim Anderson, received a Slocum-Lunz Foundation Student Research Grant and a student research grant from The Wildlife Society - Wetland Working Group to support her dissertation work investigating alligator diet and exposure to contaminants of emerging concern in coastal South Carolina. Miriam also received an award through the IUCN Crocodile Specialist Group Student Research Assistance Scheme, and a David L. Stephan Grant in Herpetology from the North Carolina Herpetological Society. She was awarded Best Student Poster at the 2023 Southeastern Association of Fish and Wildlife Agencies (SEAFWA) Meeting in Corpus Christie, TX for her poster titled *Conquering the Crush: A Novel Crocodilian Jaw Prop*. In 2024, she received the Clemson University Marion Bailey Fellowship from the Department of Forestry and Environmental Conservation, and an Interdisciplinary Fellowship from CAFLS. Also, Miriam was awarded a student research grant from the Society of Wetland Scientists, South Atlantic Chapter. Miriam was also chosen as a Conservation Access, Relevancy, and Engagement Fellow at the 2024 SEAFWA meeting in Augusta, GA.



Akshit Suthar is a third-year Ph.D. student at the James C. Kennedy Waterfowl and Wetlands Conservation Center, advised by Dr. Jim Anderson. He was awarded The Wildlife Society's (TWS) Wetland Working Group Research Grant to support his research on the acoustic survey for secretive marsh birds in the Antebellum rice field impoundments. Akshit was also awarded a student research grant from the Society of Wetland Scientists, South Atlantic Chapter and the James C. Kennedy Graduate Research Fellowship. He received a travel grant from TWS Human Dimension Working Group and Biodiversity Working Group to present his research at the 30th TWS Annual Conference in Louisville, KY, and the TWS Drone Working Group's Conference Registration Support Grant to present his drone-based waterfowl survey research at the 31st TWS Annual Conference in Baltimore, MD. Additionally, he received three Clemson Graduate Travel Grants to attend various workshops and conferences. He was elected and currently serves as the Co-Chair of the American Ornithological Society's Student Affairs Committee.



Summer
INTERNS



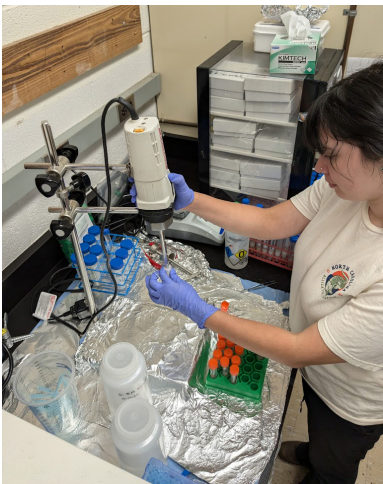
Colin Baker, a junior at Clemson University, is pursuing a B.S. in Wildlife and Fisheries Biology with a minor in Political Science, expected to graduate in May 2026. Over the summer, he worked with Ph.D. student Miriam Boucher through Clemson's Creative Inquiry program, researching microplastics and PFAS contamination in the diets of American alligators across the Southeastern U.S. His work primarily involved dissecting alligator stomachs in the lab and collecting samples for microplastic and PFAS analysis. In the field, he assisted with alligator captures, performing gastric lavages to obtain diet samples and collecting body measurements, blood, and muscle samples. Colin plans to pursue a career in environmental law, focusing on sustainability and pollution reduction.



Jeyda Bolukbasi is a third-year student, pursuing a B.S. in Environmental and Natural Resources with a concentration in Conservation Biology, expected to graduate in May 2027. During the summer, she worked on research examining the impact of Banana Water Lily (*Nymphaea mexicana*) on wintering and migrating waterfowl in coastal South Carolina wetlands. This involved field plots, exclosures, and assessments of plant productivity, waterfowl, invertebrates, and nutrient content. She also assisted in research on alligator diet as an indicator of microplastic contamination. Her role included trapping, handling, measuring, tagging, and processing alligators, as well as sorting and identifying stomach contents. The internship provided valuable insights into natural resource conservation and research, reinforcing her aspirations to pursue an M.S. in environmental conservation and a Ph.D. in a specialized field, possibly ornithology.



Sabrina Drescher is a senior at Clemson University, set to graduate in Fall 2024 with a B.S. in Wildlife & Fisheries Biology. Under the mentorship of Miriam Boucher, she conducted research on American alligator diets and mercury concentrations. Her work focused on analyzing alligators from Texas, North Carolina, and Mississippi to examine contamination levels in relation to diet, mercury concentration, size, and habitat. Throughout the summer, she developed laboratory skills in stomach dissections, necropsies, and blood processing using a mercury analyzer. In the field, she gained experience in alligator capture, blood draws, stomach flushing, muscle biopsies, and morphometric data collection. This internship expanded her expertise in alligator research and field techniques, reinforcing her goal of attending veterinary school to become a wildlife veterinarian specializing in birds of prey.



Sophia Corey, a senior in Clemson University's Wildlife Biology program, has been involved in Miriam Boucher's Creative Inquiry since Fall 2023. This past summer, she continued research as a UPIC intern, further expanding her experience in both lab and fieldwork. In the lab, she analyzed alligator stomach contents by weighing and categorizing larger diet items and filtering smaller material for microplastic analysis. She also traveled to the University of Florida's PFAS lab to study PFAS concentrations in alligators using muscle biopsy samples. Fieldwork involved capturing and measuring live alligators; taking blood draws, muscle biopsies and scute clips; and conducting stomach lavages. Additionally, she conducted an independent mini project on oral leeches in alligators, with plans to compile her findings into a research paper. This internship deepened Sabrina's expertise in alligator research and independent study, reinforcing her aspiration to continue studying herpetology.



Hannah Dozier is a junior at Wofford College pursuing dual degrees in Chinese Language and Environmental Studies. She is deeply passionate about the intersection of language and environmental stewardship. Hannah's interests in sustainability in coastal areas stems from having grown up on the Tom Yawkey Wildlife Center in Georgetown, SC. Hannah will return to BICEFS in the summer of 2025 to continue her work with the Whitmire lab.



Louisa Mai worked in the Whitmire lab during the summer of 2023 to complete the research portion of her senior thesis for her B.S. degree at the University of South Carolina. Her project focused on quantifying the degradation of geotextiles commonly used for coastal protection into microplastics in order to understand their environmental impacts. Louisa graduated from USC in spring 2025.



Alyssa Wentzel is a NOAA Hollings Scholar whose project focused on assessing microplastic occurrence and distribution in Murrells Inlet and North Inlet, supported by the Whitmire lab and the USC Marine Lab. Their research interests include environmental pollution, climate change, and environmental justice. Alyssa completed her Bachelor's degree in the spring of 2025 at the University of Delaware, studying marine science and public policy.



Colleen Sweeting is majoring in Environmental and Natural Resources at Clemson University and joined the Streams, Rivers, and Estuaries (STRIVE) Lab research team at the Coeur d'Alene Reservation in Idaho to learn about wetland ecology and restorative processes. She worked with local tribal members and gained valuable insight on the traditional ecological knowledge of the land. She calculated bankfull and sampled and identified vegetation while gaining a deeper understanding of the cultural importance of wetlands and the impact they have on the Coeur d'Alene Tribe.

SUMMER INTERNS



Beth Walker is a Biosystems Engineering major at Clemson University who worked as a wetland ecology and restoration intern in the Streams, Rivers, and Estuaries (STRIVE) Lab. She spent the summer in Northern Idaho assisting with research and fieldwork in various streams across the Coeur d'Alene Reservation. She gathered stream sensor data in unrestored and restored stream sites, helped compile and analyze data comparing these areas, and was able to immerse herself in a new culture to incorporate traditional indigenous ecological knowledge into future restoration efforts. Her research helped provide valuable insight on how healthy streams influence the environment by establishing diverse and essential habitats for native species, including native plants and fish with cultural and historical significance to the Tribe.



Abigail Lacy was an undergraduate UPIC intern in the O'Halloran Lab working with M.S. student Annika Kuleba during the summer of 2024. She assisted with ongoing field efforts on the Conservation Reserve Program project in the Midwest and helped to reestablish the greenhouse gas flux measurement system. At Clemson, she studies biosystems engineering with an ecological engineering emphasis.



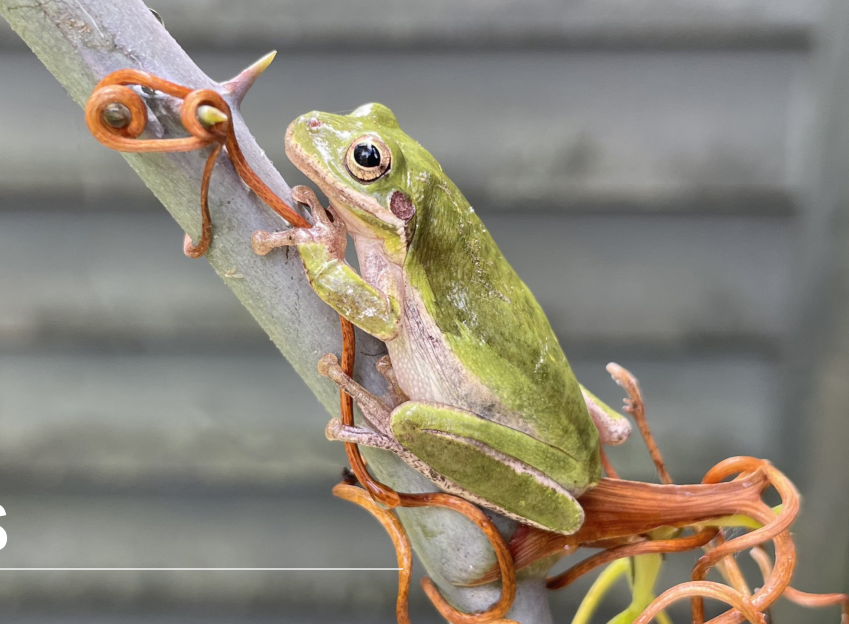
Logan Porter is a senior at Clemson University majoring in Biological Sciences. During the summer of 2024, Logan worked with the Tom O'Halloran lab as a UPIC intern performing vegetation surveys in the longleaf forest surrounding the tall eddy covariance flux tower. He also worked in long-term plots affected by Hurricane Hugo with Dr. Bo Song investigating saltwater intrusion. He graduated in the spring of 2025.



Tim Ziegler is a senior undergraduate student at Clemson majoring in Environmental Engineering. During the summer of 2024, he was a UPIC intern with the Tom O'Halloran lab, working on vegetation surveys in the Longleaf and Loblolly pine forests surrounding the tall eddy covariance flux tower. In addition, Tim worked with Dr. Bo Song on a long-term regeneration study of plots impacted by Hurricane Hugo. He will be graduating from Clemson in the spring of 2027.



Graduate
STUDENT BIOS



Annika Kuleba is a master's student in the Department of Forestry and Environmental Conservation under Dr. Tom O'Halloran. Her research explores the climate mitigation potential of restored wetlands in the Conservation Reserve Program (CRP) by quantifying greenhouse gas emissions and soil organic carbon accumulation. Her findings will aid the Farm Service Agency (FSA) to more precisely direct CRP initiatives, refining current models, and enhancing tools for conservation planning. Annika hopes to continue to contribute in the field of ecological restoration, empowering landowners with the knowledge and tools necessary to ensure a thriving environment for generations to come. Prior to Clemson University, Annika earned a B.S in Environmental Science and a B.A. in Economics from Sweet Briar College in Virginia. Outside of research, Annika enjoys volunteering with the SC United Sea Turtle Enthusiasts (SCUTE), which assists the DNR in protecting and monitoring sea turtle nests, as well as hiking, spending time on the water, and playing golf. *(Editors note: Annika successfully defended her MS in March, 2025 and continues in the O'Halloran lab as lab coordinator.)*



Brynne Sumner is a master's student in the Forestry and Environmental Conservation Department, working with Dr. Amy Scaroni and Dr. Stefanie Whitmire. Her project's focus is identifying the sources of bacteria and turbidity pollution in the sub-watersheds encompassing Edisto Island. She is excited about water quality research and community engagement. Brynne graduated from Clemson with an undergraduate degree in Biological Sciences and minored in sustainability. She spent her senior year summer as a BICEFS UPIC student intern doing wetland restoration research with the Stream, River, and Estuaries (STRIVE) Lab alongside the Coeur d'Alene Tribe in Idaho. Outside of research, Brynne runs for the Clemson track and field team and enjoys rock climbing.



Dorothy Aldridge is an M.S. student co-advised by Dr. Stefanie Whitmire and Dr. Thomas Rainwater, researching climate-driven distribution of PFAS and microplastics in coastal wetlands. She integrates contaminant data with climate variables like sea level rise and flood risk to identify vulnerable wetland systems. She earned a B.S. in Ecology and Evolutionary Biology and a B.A. in Environmental Studies from UC Santa Cruz, where she studied frogs and toads in toxicology assessments and climate extinction risks for salamanders. Before Clemson, she worked in environmental consulting, leading tidal salt marsh restoration and invasive species surveys in the San Francisco Bay Estuary. Dorothy recently relocated to South Carolina with her elderly rabbit, Ziggy, and enjoys herpetology, backpacking, trail running, ecological poetry, and mint chip ice cream.



Hallie Cowan, a Latina from New Jersey, is a master's student working with Dr. Jim Anderson. Her research in Suriname examines the impact of small-scale gold mining on caimans by analyzing mercury accumulation in their tissue and blood across diet and age classes. She aims to establish caimans as bioindicators of waterway health in Latin America. Before Clemson, Hallie worked in the Peruvian Amazon with Fauna Forever, contributing to long-term caiman monitoring and mercury studies. She also studies caiman growth rates using seven years of data. An award-winning conservation photographer, Hallie writes for Photography Life and is a Girls Who Click ambassador, using photography to communicate research. She looks forward to exploring wetlands and collaborating at Clemson.



Aruã Yaym de Castro Ferreira developed a deep connection to the region while assisting at his godfather's lodge and cattle ranch near Brazil's Pantanal. Inspired by its landscapes and traditions, he aspired to become a wetland ecologist supporting conservation and sustainable development. At 18, he met U.S. ecologists who encouraged him to pursue his dream. He earned a B.S. in Forestry with a focus on ecosystem restoration from the University of Wisconsin–Stevens Point in 2022, gaining research experience in soil science and plant taxonomy. Following graduation, he worked as a field technician in South Carolina, studying food availability in historic rice field impoundments for dabbling ducks. In 2024, Aruã joined the James C. Kennedy Waterfowl and Wetlands Conservation Center as an M.S. student. His thesis examines mercury accumulation in wetland-dependent birds within the Bento Gomes River Watershed, tracing its sources, trophic positioning, and environmental correlations. Beyond research, he enjoys fishing, kayaking, hunting, birdwatching, hiking, reading, RPG video games, Dungeons & Dragons, and TV series.



Rene Brown is a Graduate Research Assistant at the James C. Kennedy Waterfowl and Wetlands Conservation Center. Growing up in Jamaica on her grandfather's livestock farm, her early exposure to animal behavior sparked a lifelong interest in wildlife and environmental science. Rene studied biology at Allen University, in Columbia, SC, where she researched microRNA biogenesis in corn. She volunteered at Hope Zoo in Jamaica and interned with the Caribbean Coastal Area Management. Currently, Rene is researching salt marsh restoration at the Little Edisto S-161 site in Charleston, SC. Her focus is on improving bird habitats, water quality, and oyster bed ecosystem services. She conducts water quality tests, bird habitat studies, and experiments on leaf litter decomposition to assess the effectiveness of restoration efforts. Outside of research, Rene enjoys soccer, podcasts, audiobooks, and nature walks.



Akshith Suthar is a Ph.D. student advised by Dr. Jim Anderson with the Kennedy Waterfowl and Wetlands Conservation Center. His research focuses on waterbird habitat use in antebellum rice fields using drones and autonomous recording units in coastal South Carolina. His ecological journey began with studies on House Sparrow nest box ecology, Human-Sloth Bear conflicts, and Mugger Crocodile assessments. He holds a B.Sc. in Chemistry from Gujarat University (in Western India) and an M.Sc. in Environmental Science from Krantiguru Shyamji Krishna Verma Kachchh University. From 2014, Akshith led environmental education and biodiversity conservation efforts in Gujarat's Kachchh region. Later, at the Gujarat Ecological Society, he contributed to ecological profiling, human-wildlife conflict mitigation, and rediscovered Smooth-coated Otters in Gujarat, earning the "Otter Oscar-2019" from the International Otter Survival Fund. He also played a key role in securing RAMSAR recognition for Wadhvana Wetland. Beyond research, Akshith enjoys photography.



Siddhartha Regmi is a Ph.D. student in Department of Forestry and Environmental Conservation. Siddhartha's research focuses on the impacts of sea level rise and hurricanes on coastal forest ecosystems. He is also interested in science communication and outreach programs. He has a M.S. degree in Forest Resources from Clemson and a B.S. degree in Forestry from Tribhuvan University in Nepal. Outside of research, Siddhartha is passionate about hiking, watching movies, and cooking. Siddhartha is co-advised by Dr. O'Halloran and Dr. Bo Song.



Bobby Greco, a Rocky Hill, CT native, is a second-year Ph.D. student advised by Dr. Jim Anderson. His dissertation focuses on head-start methods and the life history of American crocodiles in Lago Enriquillo, Dominican Republic, to aid conservation efforts. He earned a B.Sc. in Ecology and Evolutionary Biology from the University of Connecticut, gaining hands-on experience with herpetofauna research. He earned his M.Sc. degree from the University of North Florida, where he conducted the first nationwide population survey of American crocodiles in the Dominican Republic since the 1980s and contributed to a diet study on urban versus natural alligator populations. In between degrees, Bobby has worked with Morelet's and American crocodiles in Belize, alligator husbandry and behavior studies on dunes sagebrush lizards in Texas, water quality studies using common snapping turtles, spotted turtles surveys, bog turtle habitat management, and rare herpetofauna monitoring across Connecticut; as well as coral, seagrass, herpetofauna, and bird surveys for government agencies and monitoring manatee and gopher tortoise populations on construction projects. In his free time, he enjoys herping, hiking, wildlife photography, music, motorcycling, and travel.



Christopher Pettengill is a Ph.D. student in Wildlife and Fisheries Science with the James C. Kennedy Waterfowl and Wetlands Conservation Center, advised by Dr. Jim Anderson. His research explores community ecology, wetland ecosystem functions, and how disturbances impact these systems. As an undergraduate at SUNY Brockport, he assisted with plant community research and conducted an independent study on aquatic invertebrate diversity. During his M.S. at the University of Alabama, he studied the effects of beaver dam removal on freshwater insects. Christopher's Ph.D. research evaluates the economic value of oyster-provided ecosystem services at a salt marsh restoration site on Little Edisto Island, SC. He monitors abiotic conditions, fish and invertebrate communities, vegetation, and bird activity to assess restoration success. His work is supported by Southeastern Mitigation LLC and local landowners. In his free time, he enjoys nature walks, fishing, kayaking, and gardening.



Gafar Agunbiade is a Ph.D. student co-advised by Dr. Lydia Ries O'Halloran and Dr. Debabrata Sahoo (Agricultural Sciences). He has a background in water quality and environmental management. His experience has led him to explore the environmental effects of silvopasture, a sustainable agroforestry system that integrates trees, forage, and livestock. Through environmental sensors, field sampling and computer modeling, his research examines how silvopasture systems impact water quality.



Hannah Malcomson is a Ph.D. student co-advised by Dr. Lydia Ries O'Halloran and Dr. Liliane Silva. Her research interests center around a passion for animal agriculture and the future of sustainable food production. Major areas of interest include regenerative grazing practices, diversified production systems, effective land utilization for production goals, and the future carbon credit market. Her dissertation research focuses on how silvopasture in South Carolina can benefit landowners while simultaneously enhancing ecosystem services.



Justin Robbins is a Ph.D. student advised by Dr. Lydia Ries O'Halloran. After completing a string of internships in the mangroves of southwest Florida, Justin Robbins went back to school to study their interaction with climate change. Examining nitrogen in mangroves led him to Dr. O'Halloran's lab, where he is studying the role of nutrients and disturbance on grassland ecology. His research explores how both human and natural systems function and interact. When he isn't conducting research, his interests include games, high fantasy, and puns.



Maiya Duncan, a Long Beach, CA native, earned her B.S. in Animal, Poultry, and Veterinary Sciences in 2021 and M.S. in Environmental Science in 2024 from Tuskegee University, where she studied coyote responses to feral hogs. She joined Clemson University's Kennedy Waterfowl and Wetlands Conservation Center in fall 2024 to pursue a Ph.D. under Dr. Jim Anderson. Her research examines genetic and behavioral divergence in farm-raised, hybrid and wild mallards across the Atlantic Flyway. Passionate about wildlife conservation and predator-prey dynamics, Maiya has led conservation education efforts as president of Tuskegee's Natural Resource Conservation Club and Red Tails Ducks Unlimited. Before Clemson, she interned with AmeriCorps/ACE and the National Park Service, mentoring high school students in conservation careers.



Miriam Boucher, a Canadian native with a passion for reptiles, is a Ph.D. student co-advised by Dr. Stefanie Whitmire and Dr. Jim Anderson. Her current research at Clemson focuses on the diet of American alligators in the southeastern U.S., examining microplastic ingestion and the presence of "forever chemicals" (PFAS) in their tissues to determine if alligators can be used as indicators of emerging contaminants. After earning her B.S. in Environmental Biology from Wingate University, she worked in Brazil with Iracambi and later conducted her M.S. research at West Virginia University on American crocodile behavior and bioacoustics in Belize. Miriam's professional experience includes working with the Crocodile Research Coalition in Belize, conducting population surveys, leading outreach programs, and overseeing projects in Nicaragua. She also worked as an environmental scientist in Canada, managing wildlife mitigation for construction projects.



Morgan Chaudry is a Ph.D. student in the Plant and Environmental Sciences department at Clemson. Her current projects focus on evaluating the abundance and impact of microplastics and herbicides in stormwater ponds throughout coastal South Carolina. Before joining the Whitmire Lab, Morgan received her B.S. and M.S. from Eastern Michigan University and researched the sources, transport, and impacts of microplastics in a Michigan watershed for her M.S. thesis. During her time at EMU, Morgan taught an introductory biology course-based research experience focused on isolating bacteria from soil samples for its use in antibiotic drug development. Outside of research, Morgan is an avid runner, fantasy reader, and crocheter.



Olaniyi Oluwatobi is a Ph.D. student developing a decision support tool to sustain rice fields on South Carolina's Atlantic coast, co-advised by Dr. Jim Anderson and Dr. Troy Farmer (FEC-Campus). His research integrates geospatial technology, machine learning, deep learning, and optimization to balance historical and modern farming practices with coastal habitat and waterfowl conservation. He earned his M.S. in wildlife management from the Federal University of Technology in Nigeria, along with postgraduate certifications in remote sensing and GIS. Olaniyi has contributed to wildlife conservation across Africa, Asia, and Europe, leading projects on wetland assessments, bird populations, and climate impact studies. He has also worked as a research fellow in Malaysia, applying geospatial technologies for avian conservation. Olaniyi is actively involved in international organizations such as the American Society of Primatologists and the Society for Conservation Biology.



Scott Binger is a Ph.D. student researching biodiversity in Carolina Bay wetlands with the James. C. Kennedy Waterfowl and Wetlands Center, advised by Jim Anderson. His work examines how human disturbances affect these unique habitats by sampling macroinvertebrates, frogs, birds, and vegetation. He is developing a wetland disturbance gradient and creating indices of biotic integrity to guide wildlife management strategies. A Chicago-area native, Scott earned his Bachelor's and Master's degrees at Southern Illinois University, where he studied fish, amphibians, invertebrates, and parasites. His master's research focused on phosphorus enrichment effects on parasite populations and bioenergetic modeling of parasite growth. Outside of academia, he enjoys hiking, biking, fishing, playing and recording music, attending concerts, and cheering for the Clemson Tigers.



Charlie Kloppenburg is a Ph.D. student in the Streams, Rivers, and Estuaries (STRIVE) Lab. He earned a B.A. in Ethnoecology and an M.S. in Environmental Science and Conservation Biology from Prescott College, Arizona. He later joined the faculty at Prescott College while also managing projects for the Red Willow Farm at Taos Pueblo, New Mexico, where he cultivated a deep interest in Indigenous perspectives within ecological sciences. In 2023, Kloppenburg began his Ph.D. in Wildlife & Fisheries Biology with STRIVE Lab, where his research focuses on the ecological impacts of restored hydrologic connectivity in floodplain wetlands. His work extends to the Coeur d'Alene Reservation in Idaho, where he studies cultural-ecosystem services.



Kenneth Rolando De León Colón is a Ph.D. student in the Forestry and Environmental Conservation Department in the Wildlife and Fisheries Biology Program. His research focuses on Carbapenem-Resistant Enterobacteriaceae (CRE) in urban rivers and the environmental factors that drive their spread. Before joining Clemson, Kenneth completed a post-baccalaureate program at the University of New Hampshire, where he studied methane oxidation in Arctic lakes at Stordalen Mire, Sweden. He earned his bachelor's degree in Industrial Microbiology from the University of Puerto Rico at Mayagüez. Outside of research, Kenneth enjoys playing indoor volleyball and visiting his hometown, Guayama, Puerto Rico.



Jeremy Forsythe is a Ph.D. candidate who uses eddy covariance and satellite remote sensing to investigate changing patterns of Southern pine forest productivity, including diffuse radiation enhancement, phenology, timber management, and succession. Additionally, he is developing new uses of light use efficiency models in an ecological forecasting framework to make near real-time predictions of future forest carbon sequestration. In his spare time, he enjoys alternative music, creative cooking, running, and learning new programming skills.



Lucas Clay completed his Ph.D. research on greenhouse gas exchange dynamics in coastal wetlands, focusing on impounded wetlands and natural salt marshes using eddy covariance flux towers. His work explored ecosystem service valuation in these wetlands, with implications for carbon markets and coastal conservation amid climate change and sea level rise. Lucas's research has been used to help SC landowners identify high-value areas for conservation and carbon sequestration. He earned an M.S. in Forest Resources from Clemson University and a B.S. in Environmental Management from Ball State University in Muncie, IN. In his free time, he enjoys backpacking, running, and playing music. He currently works as a research ecologist with the Clemson University Experimental Forest.





Remembrance of

DR. S. MAŽEIKA P. SULLIVAN

Dr. Sean-Mažeika Patricio Sulliván was Director of BICEFS and Professor in the Department of Forestry and Environmental Conservation from August 2022 until his passing in May 2024. He was the head of the Streams, Rivers, and Estuaries (STRIVE) Lab, which specializes in the ecology and conservation of stream, river, and wetland ecosystems, with research centered on ecosystem-scale dynamics, connectivity, and ecological networks. Before joining Clemson University, he was a Professor in the School of Environment and Natural Resources (SENR) at The Ohio State University from 2008 to 2022 and served as Director of the Schiermeier Olentangy Wetland Research Park from 2014 to 2022. Mažeika earned his B.A. in Anthropology and Native American Studies from Dartmouth College, followed by an M.Sc. in Biology and a Ph.D. in Natural Resources from the University of Vermont.

Mažeika's dedication to wetlands, headwaters, estuaries, and connectivity between aquatic and terrestrial systems was evident in both his science and his service. His sponsored projects included grants funded by the Ohio Department of Transportation, which examined the effects of artificial light at night on aquatic ecosystems; the U.S. Department of Agriculture, that assesses the risk of antibiotic-resistant bacteria entering the food chain through contaminated surface water discharges; and the U.S. EPA which studied the relationship between land-use and harmful algal blooms.

In addition to his grant-funded projects, he used his expertise to influence policy in one of the seminal environmental issues of our time: shaping the Clean Water Act's definition of Waters of the U.S. (WOTUS). The extent of the Clean Water Act's jurisdiction over streams and wetlands has become increasingly uncertain, raising concerns about the potential impacts on water quality and ecosystem health. Mažeika was a long-time advocate for this critical issue, publishing numerous articles examining the relationship between evolving water protection policies and established scientific principles.



His work has been vital in supporting advocacy for scientifically sound water protection policies. Thus, numerous scientific societies, such as the Society for Freshwater Science and the American Fisheries Society, have cited his work in response to recent WOTUS rulemaking. Mažeika, along with these organizations, collectively wrote to lawmakers to highlight the detrimental impacts of proposed WOTUS rulemaking changes. His dedication to this cause led him to testify before the Senate Environmental Committee in October 2023, emphasizing the importance of robust and comprehensive protection for the nation's waters. During his work on these issues, Mažeika also hosted informational webinars for the public, and simplified complex legal jargon into accessible content. He provided clear guidance on how to submit comment letters during open public review periods, ensuring that the public could engage with the process effectively. Mažeika's work will leave a lasting legacy, demonstrating how members of both the public and scientific community can directly shape water protection policy by bridging the gap between rigorous research and actionable advocacy.

Mažeika was also committed to enhancing diversity within the discipline of environmental science. He worked extensively on a federal water rights case with the U.S. Department of Justice and Bureau of Indian Affairs on issues relative to the Coeur d'Alene (Schitsu'umsh) Native American Tribe's water rights. Through his expertise, he demonstrated how the natural provisions on the Coeur d'Alene Reservation depend on its aquatic systems. Mažeika was the chair of the Society for Freshwater Science (SFS) Justice, Equity, Diversity, and Inclusion (JEDI) task force, where he promoted involvement of underrepresented groups. Additionally, while at Ohio State, he served as the Chief Diversity Officer for the School of Environmental and Natural Resources. Mažeika was a native speaker of Spanish and Lithuanian and proficient in French, passionate about crossing language barriers to connect with a wider audience.





Today, Mažeika's STRIVE Lab members and collaborators continue to uphold his research legacy by carrying on his research projects in his honor.



*Dr. Sean-Mažeika Patricio Sulliván
December 30, 1972 – May 31, 2024*

The Dr. Sean-Mažeika P. Sulliván Memorial Graduate Fellowship Endowment has been established in memory of Mažeika. Gifts will support graduate students pursuing a degree in Forestry and Environmental Conservation.

Please consider donating by scanning the QR code or visiting this link:
<https://iamatiger.clemson.edu/giving/sullivan-memorial>





2024

PUBLICATIONS

As you peruse the list of the 49 publications we produced in 2024, check out a few things we are proud of:

1. Our students publish with us, as noted with *.
2. Our publication list reflects the variety of topics we research, and collaborations with BICEFS, across Clemson (underlined authors), and with other USA and international partners. **BICEFS personnel are noted in bold text.** Links to online versions provided when available.

Abesh, B. F., **J. T. Anderson**, and J. A. Hubbart. 2024. Using MODFLOW to model riparian wetland shallow groundwater and nutrient dynamics in an Appalachian Watershed. *Water* 16:1772.
<https://doi.org/10.3390/w16131772>

Abesh, B.F., **J. T. Anderson**, and J. A. Hubbart. 2024. Surface water (SW) and shallow groundwater (SGW) nutrient concentrations in riparian wetlands of a mixed land-use catchment. *Land* 13:409.
<https://doi.org/10.3390/land13040409>

Aguilos, M., Sun, G., Liu, N., Zhang, Y., Starr, G., Oishi, A.C., **O'Halloran, T.L., Forsythe, J.D.***, Wang, J., Zhu, M. and Amatya, D. 2024. Energy availability and leaf area dominate control of ecosystem evapotranspiration in the southeastern US. *Agricultural and Forest Meteorology* 349:109960.
<https://doi.org/10.1016/j.agrformet.2024.109960>

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Atristain, M., L. Solagaistua, A. Larrañaga, D. von Schiller, and A. Elosegi. 2024. Slow drawdown, fast recovery: Stream macroinvertebrate communities improve quickly after large dam decommissioning. *Journal of Applied Ecology* 61(6):1481–1491.

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Bohenek, J. R., **S. M. P. Sulliván**, and S. M. Gray. 2024. Habitat and nutrients, but not artificial lighting at night, drive fish assemblage composition in urban streams. *Urban Ecosystems* 27(2):439–452.

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- Escamilla, C.***, **A. E. Scaroni**, G. Wallover, and **S. A. White**. 2024. Understanding resident design preferences and priorities for floating wetlands in coastal stormwater ponds. *Urban Ecosystems* 28:1. <https://doi.org/10.1007/s11252-024-01668-1>
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- Suthar, A. R.***, and **J. T. Anderson**. 2024. Landscape legacy: Waterbird conservation and historic rice fields of Coastal South Carolina, USA. *Jalaplavit* 14(1&2):15–30.
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Research

GRANTS & CONTRACTS

2024 was a successful year for the Institute in terms of grant and program support!

Overall, our faculty and students received over **\$2.9 million** in funding!

\$1,016,432 from federal sources, **\$949,533** from state or local agencies,

\$368,325 from internal competitive programs through Clemson, and

\$569,449 from private sources.

Federal Sources

Anderson, J. T. 2024. Implement community outreach and education initiatives, through community educational events aimed at promoting pollinator and agricultural awareness among marginalized Gullah Geechee descendants. US Dept of Agriculture - NRCS \$138,334.

Anderson, J. T., and C. M. Anderson. 2024. Reviving biodiversity: Restoring wetland pollinators and empowering underserved communities surrounding Hampton Plantation through pollinator education. Natural Resources Conservation Service. \$152,167.

Anderson, J. T., and C. M. Anderson. 2024. Developing anuran, avian, macroinvertebrate, and vegetative indices of biotic integrity for isolated Carolina Bays (SC). U.S. Environmental Protection Agency. \$322,080.

Duberstein, J. A. 2024. Identifying and Evaluating Impacts to Wetlands from the Savannah River Estuary. US Army Corps of Engineers. \$232,164.

Agudelo, P., M. Motallebi, T.L. O'Halloran et al. Submitted 2024 (Awarded 2025-2027). Building Partnerships for Climate-Smart Commodities in South Carolina (Supplement #2). USDA Natural Resource Conservation Service. \$171,687.

State / Local Agency Sources

- Anderson, J. T., M. Boucher, S. Whitmire, and T. Rainwater. 2024. Elucidating patterns of microplastic and PFAS contamination using alligators to explore exposure and fate of contaminants of emerging concern in wetlands. South Carolina Sea Grant \$75,000.
- Anderson, J. T., R. Baldwin, B. Bauer, A. Bridges, J. T. Petty, T. Farmer, T. Folk, D. Hanks, M. Hemingway, T. O'Halloran, C. Strickland, M.P. Sulliván, and S. Rodriguez. 2024. Envisioning the Future of South Carolina's Antebellum Rice Fields: Development of a Decision Support Tool. South Carolina Sea Grant \$159,767.
- Anderson, J. T. 2024. Physical, Ecological, and Social Dynamics of South Carolina Tidal Trunks (Rice Trunks). SC Dept. of Natural Resources. \$114,376.
- Callahan TJ, Wallover CG, Scaroni AE, Deepe J (2024—2026) SOS (Solutions on Septic): Identifying Resilient Solutions for Septic Management in Coastal South Carolina. South Carolina Sea Grant Consortium Biennial RFP. Amount: \$157,572.
- Greco, B. and J.T. Anderson. 2024. Dominican Republic Lago Enriqueillo American crocodile head-start. Croctoberfest-University of North Florida Foundation \$10,101.
- Scaroni AE, Whitmire S, Pettay T (2024—2026) Determining bacteria and turbidity sources to inform management and outreach across the Edisto Island Watershed. South Carolina Sea Grant Consortium Biennial RFP. Amount: \$157,476.
- Jeong D, Motallebi MM, Scaroni AE (2024—2025) Estimating Economic Value of Alternative Residential Wastewater Management in South Carolina. South Carolina Water Resources Center Statewide Research Competition. Amount: \$34,970.
- Silva, L, O'Halloran, LR, Wang, H. 2024. Expanding Plant Research Capability and Improving Data Accuracy for Agricultural-Based Systems Research at Clemson University. Clemson Major Research Instrumentation Initiative. \$61,820.
- White, D. L., J. T. Anderson, and C. Anderson. 20024. Geospatial analysis to identify ephemeral wetlands in South Carolina. South Carolina Water Resources Center/USGS. \$84,398.
- Whitmire, S. L. 2024. CHIRRP: Exploring a Gullah-Geechee Community-Driven Effort to Mitigate Risks and Impacts of Coastal Flooding. National Science Foundation Collaborative award with the University of South Carolina Baruch Marine Field Laboratory \$94,053.

Internal Competitive Programs

- Goodman, R., Barnes, J., O'Halloran T.L., Anderson, J., Shen, Z., Dozier, J., Duberstein, J., Hanebuth, T., Whitmire, S., Williams, T., Sasser, C., Baldwin, R., Chastain, G. Submitted 2024 (Awarded August 2025-August 2028). Resilient Impoundments for Coastal Ecosystems (RICE): A Geoarchaeological Approach to Conservation Science and Social Justice in the Grand Strand. Myrtle Beach Endowment Program, Clemson University. \$81,525.
- Scaroni AE, Waickowski S, Calhoun B, Porzelt S, Watts C (2024—2025) Optimizing the Hydrologic Performance of Rainwater Harvesting Systems Using Innovative Technologies. Clemson Extension Innovation Award. Amount: \$22,249.
- O'Halloran, LR. 2024. Clemson University STEM and Industry Graduate Research Assistantship. \$24,000.
- O'Halloran T.L., Metcalf, A. Submitted 2024 (Awarded January 2025-2026). CU-SRNL ELI: Mobile Facility to Enable Environmental Monitoring for Non-Proliferation and Risk Reduction. Clemson University-Savannah River National Laboratory Equipment/Lab Infrastructure. \$240,551.

Private Sources

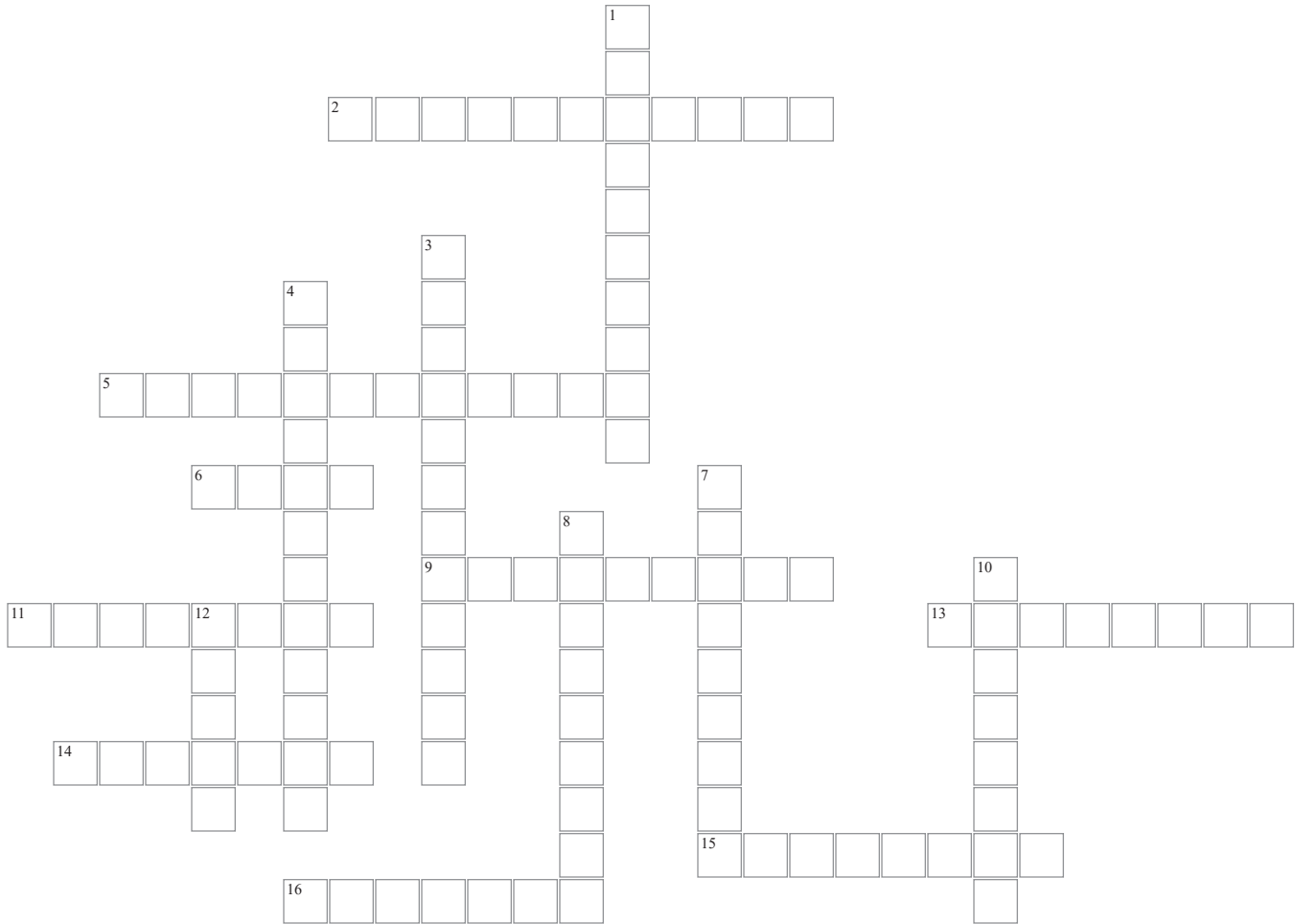
- Anderson, J. T., A. R. Suthar, and C. M. Anderson. 2024. Conserving South Carolina's historic coastal rice fields: Assessing waterfowl dynamics and restoration potential using a decision support framework. Ducks Unlimited. \$233,549.
- Scaroni, A. E., 2024. Identifying plants suitable for use in floating wetlands in brackish coastal ponds. Slocum-Lunz Foundation \$1,200.

Donations in support of research

- Anderson, J. T., and C. M. Anderson. 2024. Waterfowl relations with solar infrastructure. CI V Sunrise Renewables. \$30,000.
- Anderson, J. T., T. L. O'Halloran, M. Motallebi, A. E. Scaroni, and J. Whetstone. 2024. Integrating oysters into salt marsh mitigation banking. Edisto Shellfish and Southeast Mitigation. \$100,000.
- Anderson, J. T. 2024. Graduate student support for Pantanal wetland ecology. Edisto Shellfish and Southeast Mitigation. \$27,150.
- Anderson, J. T. 2024. Support for the James C. Kennedy Waterfowl and Wetlands Conservation Center. Private Donor. \$100,000.
- Anderson, J. T. 2024. Mallard genetics in South Carolina. Private Donors. \$1,550.
- Anderson, J. T. 2024. Truck purchase to support the Kennedy Center. Cox Foundation. \$30,000.
- Boucher, M., and J. T. Anderson. 2024. Nemour's Ph.D. Fellowship: Year 1. Nemour's Wildlife Foundation. \$30,000.
- Boucher, M., and J. T. Anderson. 2024. Kennedy Center support for alligator research. Alligator Crocodile Conservation Institute, Inc. \$5,000.
- Boucher, M. 2024. Exploring Alligator Diet and Microplastic Ingestion in North Carolina and Beyond. North Carolina Herpetological Society, Stephen L. Grants in Herpetology \$1,000.
- Rainwater TR. 2024. Biology of the American alligator on Spring Island, South Carolina. Spring Island Trust. \$10,000.



CROSSWORD PUZZLE



ACROSS

2. The study of human history and prehistory through excavation and the analysis of artifacts
5. A practice of integrating trees, forage, and domesticated animals
6. The loose mineral or organic material that occurs across much of Earth's land surface
9. A large crocodylian found in South Carolina
11. The science or practice of planting, managing, and caring for forests
13. The fauna of a region
14. The long-term pattern of weather conditions for a particular location
15. The pine species *Pinus palustris*
16. The natural home or environment of an organism

DOWN

1. Rainwater that runs off streets, lawns, and other sites
3. The careful maintenance and upkeep of a natural resource
4. The variety of life in the world or in a particular habitat or ecosystem
7. A category of birds with aquatic habitats
8. A scientist who studies the natural processes of living things
10. Relating to or situated on the banks of a river
12. A forested wetland



1. stormwater; 2. archaeology; 3. conservation; 4. biodiversity; 5. silvopasture; 6. soil; 7. watershed; 8. biologist; 9. alligator; 10. riparian; 11. forestry; 12. swamp; 13. wildlife; 14. climate; 15. longleaf; 16. habitat



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