

- Draft Program -
Okefenokee Science Symposium
College of Coastal Georgia, Brunswick
Friday, October 16, 2026

8:00	Coffee & Posters
9:00	Opening: Conference Organizers Michael Lusk & James Deemy
9:15	The human side of the Okefenokee <i>Dwight Kirkland (South Georgia Archaeological Research Team)</i>
9:30	Recovering Company 1433: Reconstructing the history of an all-Black Civilian Conservation Corps camp in the Okefenokee <i>Jessica C. Neal & Jennifer Berglund (Company 1433 Project)</i>
9:45	Translating BF-1: An architectural investigation of a CCC Camp in the Okefenokee National Wildlife Refuge <i>Keif Schleifer & Marietta Monaghan, PhD (Kennesaw State University)</i>
10:00	WELCOME: Johnny Evans President, College of Coastal Georgia
10:15	Coffee & Posters
10:30	KEYNOTE: Johnny Sabo State Forester & Director, Georgia Forestry Commission
11:00	Management of Black Bears in South Georgia <i>Benjamin Carr (GA DNR)</i>
11:15	Sex and seasonal variation of black bear multi-scale space use in South Georgia <i>Haley Jones (UGA Warnell School of Forestry and Natural Resources)</i>
11:30	American black bear density and population genomics in the Okefenokee ecosystem <i>Eden Nitza (University of Georgia)</i>
11:45	Utilizing LiDAR for monitoring fuels and habitat in the Southeast <i>Emily Link (US Wildland Fire Service)</i>

Noon	LUNCH
1:10	KEYNOTE: Reed Noss The Okefenokee Swamp: Jewel of the North American Coastal Plain
1:40	Okefenokee Swamp peat volume recalculated and associated carbon storage <i>Sara Aicher (Okefenokee NWR) and Rena Ann Peck (Georgia Rivers)</i>
1:55	The history of the UGA-Okefenokee alligator project <i>Kimberly M. Andrews (UGA Marine Extension and Georgia Sea Grant)</i>
2:10	Genetic and epigenetic mechanisms drive phenotypic plasticity, adaptive responses, and population structure, offering critical insights for species conservation in dynamic wetland ecosystems. <i>Mark E. Hoog (UGA Marine Extension and Georgia Sea Grant, Georgia Southern University)</i>
2:25	Applying passive acoustic monitoring in avian conservation <i>Ben Stalheim (Virginia Tech)</i>
2:40	Coffee & Posters
2:55	KEYNOTE: Ania Truszczyński (Deputy Director, GA EPD) Planning for Georgia's Water Future, Georgia EPD
3:25	Groundwater studies and data to help evaluate effects of water management practices in coastal Georgia <i>Gregory Cherry (USGS, South Atlantic Water Science Center)</i>
3:40	Improving our understanding of Okefenokee and regional hydrology <i>C. Rhett Jackson (UGA Warnell School of Forestry and Natural Resources)</i>
3:55	Numerical simulation of regional groundwater flow in Southeast Georgia <i>Leslie Okine (UGA Engineering)</i>

Poster Presentations

P1	Using environmental DNA (eDNA) to track the Atlantic Sturgeon population within the St. Marys River <i>Victorya Adams (St. Marys Riverkeeper)</i>
P2	Morphological variation of the lingual glands in wild American alligator populations <i>Benjamin Angalet (Kennesaw State University)</i>
P3	Satilla River Black Willow Island survey: A biodiversity survey of Salix-nigra dominated sandbar islands in Brantley County, GA <i>James Flanders (College of Coastal Georgia, Environmental Sciences)</i>
P4	DBH Survey of Southeastern Georgia's forested wetlands <i>Jackson Chaney (College of Coastal Georgia, Environmental Sciences)</i>
P5	Future threats to the globally significant Okefenokee Swamp and its peat deposits <i>Rena Ann Peck (Georgia Rivers) and Sara Aicher (Okefenokee NWR)</i>
P6	Ecosystem water use efficiency of geographically isolated wetlands <i>Carlie Blackburn (Auburn University, The Jones Center at Ichauway)</i>
P7	Insect mediated pollen movement in geographically isolated wetlands in the longleaf pine ecosystem <i>Lindsey Grimes (Georgia Southern University, The Jones Center at Ichauway)</i>
P8	Investigating the role of vegetation, water level and iron on photo-mineralization of DOC in a boreal fen <i>Jae Clery (College of Coastal Georgia, Georgia Institute of Technology)</i>
P9	Building a watershed resilience plan for the St. Marys River and its community <i>Alec Jarboe (St Marys Riverkeeper)</i>
P10	Hydraulic evidence for surface-groundwater interactions between the Okefenokee and the underlying Floridan Aquifer <i>Todd C Rasmussen (UGA Hydrology & Water Resources)</i>

P11	Following the water: Is the Okefenokee Swamp connected to the Upper Floridan Aquifer? <i>Audra Werley (UGA Warnell School)</i>
P12	Modeling mine dewatering impact on local hydrology: Insight from a calibrated steady state groundwater flow model <i>Franklin Ijigade (UGA Geology)</i>
P13	Controls on carbon dioxide and methane emissions from a boreal peatland under flooding <i>Claire Riggs (Georgia Tech)</i>
P14	Noyes Cut Restoration Project <i>Jaxson Grotz (College of Coastal Georgia, Environmental Sciences)</i>

Title: The Okefenokee Swamp: Jewel of the North American Coastal Plain

Presenter: Reed Noss <reedfnoss@gmail.com> (University of Florida - Center for Landscape Conservation Planning)

Type: Keynote.

Abstract: Two fundamentally important things for conservation are biodiversity and wildness. The Okefenokee National Wildlife Refuge (ONWR) possesses both. The Okefenokee is the wildest and most intact area in the North American Coastal Plain (NACP) Biodiversity Hotspot. The ONWR contains 856+ vascular plant, 48 mammal, 238 bird, 58 reptile, 32 amphibian, and 39 fish species. This represents 14% of the plant and 59% of the vertebrate species within the NACP Biodiversity Hotspot. The herpetofauna of the ONWR is of particular interest as it includes 41% of the endemic reptiles and 41% of the endemic amphibians of the NACP Biodiversity Hotspot, which in turn is recognized as one of the two major centers of turtle biodiversity globally. Moreover, the size and intactness of the ONWR assure that most species are present as viable populations. The ONWR supports one of the largest populations globally of the American Alligator – ca. 15,000. Reintroduction of the Florida Panther into the Okefenokee-Pinhook Swamp-Osceola complex was found to be biologically feasible and this landscape is one of the three highest priority sites being considered for reintroduction. The Okefenokee Swamp is naturally surrounded by longleaf pine savannas. Some 85% of the plant species endemic to the NACP are associated with pine savannas and embedded communities such as depression wetlands. Commercial timberland, when managed sustainably, behaves much like a natural pine savanna ecologically and provides a suitable buffer zone around the ONWR. The vegetation mosaic of Okefenokee is complex and highly dynamic, responding to variability in hydrologic and fire regimes.

Title: Planning for Georgia's Water Future, Georgia Environmental Protection Division

Presenter: Anna Truszczynski <anna.truszczynski@dnr.ga.gov> (Georgia Environmental Protection Division)

Type: Keynote.

Abstract: Georgia uses Regional Water Planning to develop information about water quantity, water quality, and future needs. The Georgia Environmental Protection Division, supported by contractors, uses this information to identify resource challenges, or areas in which water quality or water quantity may not fully meet anticipated future needs. Regional Water Councils, whose membership includes local water and community leaders, review the data, identify priorities, and select best management practices to address those challenges. Regional Water Planning follows an iterative process, with new information and updated plans being generated every five years. This presentation will discuss how Regional Water Planning informed significant water management decisions in coastal Georgia and southwest Georgia. These case studies will highlight the role of data, models, stakeholder involvement, and the public in tackling these complex water resource challenges.

Title: The human side of the Okefenokee

Presenter: Dwight Kirkland <sdkirk4558@gmail.com> (South Georgia Archaeological Research Team)

Type: Cultural History & Archaeology. Oral.

Abstract: This presentation outlines the history of human presence in and around the Okefenokee Swamp from 5,000 years ago until the establishment of the Okefenokee National Wildlife Refuge in 1937. Radiocarbon dates derived from basal peat indicates that the modern Okefenokee began forming around 7, 000 years ago and it was a dry basin before that time. Archaeological sites within a 100 kilometer radius of the Swamp show that humans were in the region as early as 13,500 years ago. However, there is no evidence people used the Swamp significantly until about 5,000 years ago. Perhaps the previous dry basin offered little subsistence resources. There are likely earlier sites buried under the peat adjacent to streams or springs that flowed on the previously dry basin. The current archaeological model for the Okefenokee Swamp will be presented and compared to that of the surrounding region. Prehistoric human modifications in or close to the Swamp will be highlighted and finally, an assessment of the risks faced by these non-renewable cultural resources will be evaluated.

Title: Recovering Company 1433: Reconstructing the history of an all-Black Civilian Conservation Corps camp in the Okefenokee

Presenter: Jessica Neal <jessica.neal@okeswamp.org> (Company 1433 Project)

Coauthor: Jennifer Berglund (Project Manager, Company 1433 Project)

Type: Cultural History & Archaeology. Oral.

Abstract: Nearly a century after its establishment, Company 1433—an all-Black Civilian Conservation Corps (CCC) company stationed in the Okefenokee during the 1930s and early 1940s—remained largely absent from the documented history of the refuge. Yet the men of Company 1433 helped construct roads, firebreaks, communication networks, recreational facilities, and other infrastructure that shaped both public access and long-term management of the Okefenokee landscape. This presentation describes an ongoing effort to recover the history of Company 1433 through archival research, oral histories, genealogical records, historic photographs, federal personnel files, maps, and community partnerships. By integrating these sources into a community digital archive and online exhibition, the project reconnects individual stories with the landscapes where these men lived and worked while creating new resources for researchers, educators, descendants, and refuge visitors. Beyond documenting an overlooked chapter of Civilian Conservation Corps history, the project demonstrates how archival studies, Black Studies, environmental history, historical geography, and oral history can be brought together to reveal how conservation landscapes are also landscapes of labor, segregation, and community memory. The presentation will discuss archival research methods, challenges encountered in closing the gaps in incomplete historical records, and how digital interpretation—including immersive media, mapping, and educational resources—can expand public understanding of the cultural history embedded within protected natural areas such as the Okefenokee.

Title: Translating BF-1: An Architectural Investigation of a CCC Camp in the Okefenokee National Wildlife Refuge

Presenter: Keif Schleifer <kschlei1@kennesaw.edu> & Marietta Monaghan <mmonagh3@kennesaw.edu> (Kennesaw State University)

Type: Cultural History & Archaeology. Oral.

Abstract: Concrete sub-structures, a protected spring, buried pipes, and scattered rubble lie on the site of Civilian Conservation Corps Camp BF-1 at the east entrance of the Okefenokee National Wildlife Refuge. From 1937 to 1941 the camp housed CCC Company 1433 whose members were there to build the first federal infrastructure of the newly minted refuge including cabins, facilities, truck trails, bridges, telephone lines, and numerous service structures. Other evidence of BF-1 can be found in contemporaneous architectural drawings, surviving works across the refuge, institutional knowledge of refuge staff past and present, reports, scholarship, and comparable CCC camps elsewhere in Georgia. Custodianship of these sources of information, however, is spread among disparate agencies, families, fraternal groups, businesses, private collections, and local memory—little of it having been directly connected to specific locations within the camp site. Our research incorporates architectural investigation as a systematic reading of both physical fabric and documentary evidence to make those connections and to reconstruct the conditions under which Company 1433 lived and worked. Spatial arrangement carries much of that evidence. The siting of a water source, the distance between quarters and sanitation, the separation of quarters from administration, and the camp's proximity to the nearest town are measurable decisions that impact daily life. Evidence of this kind may not recover experience, but it does establish what these men were working with and allows their own recollections to be better understood alongside the ground they walked. Ongoing investigations at BF-1 are expected to reveal more than is presently visible. Our findings stand as a baseline identifying probable intentions during the creation of public amenities for education and enjoyment of a wildlife refuge for generations of visitors.

Title: Utilizing LiDAR for monitoring fuels and habitat in the Southeast

Presenter: Emily Link <emily_link@fws.gov> (US Wildland Fire Service)

Coauthor: Leta Douglas (US Wildland Fire Service)

Type: Ecology. Oral.

Abstract: The U.S. Wildland Fire Service in the Southeast Region has been exploring the applications of remote sensing data to monitor hazardous fuels and habitat. These tools include terrestrial laser scanning (TLS) and airborne laser scanning (ALS) from a fixed-wing airplane. These provide efficient and repeatable methods for quantifying vegetation and habitat structure and assessing change. Consistent, long-term monitoring remains a challenge due to limited personnel, time, and resources. There is a lack of documentation and evaluation of the effects of land management treatments. Decision-makers often lack access to data on current habitat conditions and treatment outcomes, limiting their ability to assess impacts on wildland fuels and ecosystems. Remote sensing techniques address these gaps by rapidly documenting changes in vegetation and habitat conditions over time. These methods enable data-driven decisions, demonstrate treatment effectiveness, and support risk reduction efforts. The Southeast Region is developing a monitoring strategy that integrates these technologies to increase efficiency, improve data management, and streamline analysis. In the summer of 2024, the program began using TLS monitoring at Okefenokee National Wildlife Refuge (NWR). During the Spring of 2026 ALS data was collected for the refuge. Post-treatment data was then collected at TLS plots in summer of 2026 to assess change from land management. Our approach supports adaptive management by providing empirical evidence of treatment outcomes. It enhances accountability for wildland fuels reduction and habitat restoration, while promoting science-based decision-making in fire-prone landscapes.

Title: Applying passive acoustic monitoring in avian conservation

Presenter: Ben Stalheim <benstalheim@vt.edu> (Virginia Tech)

Coauthors: Daniel H. Watson and Elizabeth A. Hunter (Virginia Tech)

Type: Ecology. Oral.

Abstract: Passive acoustic monitoring (PAM) provides a non invasive way to collect ecological data by recording environmental soundscapes and extracting biological information from those recordings. Advances in automated species recognizers such as BirdNET have expanded the accessibility of PAM and created new opportunities for large scale bird monitoring. From 2024–2026, we deployed eight autonomous recording units in mature longleaf pine stands at the Okefenokee National Wildlife Refuge to monitor upland breeding landbirds and processed recordings with BirdNET to identify species. We also conducted vegetation surveys in 2024 and made known distance recordings of Bachman’s Sparrows in 2025 and 2026. Our data show that mature longleaf stands experience lower community turnover than other disturbance mediated ecosystems, support a broad range of avian taxa, and maintain avian diversity comparable to younger longleaf stands. Using novel acoustic methods, we also found that mature longleaf in the refuge supports higher densities of Bachman’s Sparrows and elevated relative abundance for several disturbance dependent species. Collectively, our results show that PAM can generate robust ecological information that supports conservation and management in longleaf pine ecosystems. As PAM continues to grow in popularity, integrating acoustic data into long term monitoring programs will provide managers with efficient, repeatable tools for tracking community change, evaluating habitat restoration, exploring new questions, and helping inform future decisions.

Title: Sex and seasonal variation of black bear multi-scale space use in South Georgia

Presenter: Haley Jones¹ <haleymarie.jones@uga.edu> (UGA Warnell School of Forestry and Natural Resources)

Coauthors: Eden Nitza¹, Alex Coombs¹, Michel Chamberlain¹, Richard Chandler¹, Helen Bothwell¹, Michel Kohl¹, Tina Johannesburg², Adam Hammond² 1 = University of Georgia, 2 = GA DNR

Type: Ecology. Oral.

Abstract: Wildlife distribute themselves to balance resource acquisition against energetic cost and mortality risk, and these tradeoffs vary with sex and seasonal resource availability. In the Okefenokee ecosystem of South Georgia, American black bears (*Ursus americanus*) experience substantial interannual variation in mast production from key species such as black gum (*Nyssa sylvatica*) and saw palmetto (*Serenoa repens*), with female home-range size expanding more than fivefold in poor mast years. However, how sex- and season-specific patterns of space use are influenced by the availability of upland hardwoods, intensively managed pine plantations, and supplemental anthropogenic resources within home ranges remains poorly understood. In this study, I quantified how sex and season jointly shape home-range size and habitat selection in South Georgia black bears and identify the natural and anthropogenic resources associated with observed variation. Using GPS-collar data, I estimated seasonal and annual home ranges via autocorrelated kernel density estimation and characterized second- and third-order habitat selection with scale-integrated resource selection functions at both landscape and within-home-range scales. I hypothesize that females will exhibit stronger selection for hardwood cover and reduced use of pine plantations relative to males, with both sexes showing elevated selection for areas proximate to supplemental anthropogenic resources during late-summer hyperphagia. Results will provide updated spatial distribution estimates for South Georgia black bears, supporting conservation and game-management planning by the Georgia Department of Natural Resources and regional partners.

Title: American black bear density and population genomics in the Okefenokee ecosystem

Presenter: Eden Nitza <eden.nitza@uga.edu> (University of Georgia)

Coauthors: Alex Coombs, Haley Jones, Richard Chandler, John Robinson, Michael Chamberlain, Helen Bothwell, Michel Kohl (University of Georgia); Tina Johannsen, Adam Hammond, Georgia DNR.

Type: Ecology. Oral.

Abstract: Large predators are known to have critical effects on the regulation of their ecosystems. However, large predators are also facing immense population declines due to habitat loss, climate change, and conflict with humans. In the southeastern US, black bears were once widely distributed throughout forested habitats; however, their current distribution is much reduced and fragmented compared to historical levels. As such, the capacity of this species to exert ecosystem regulation as a large predator has been diminished. A population of black bears persists within the Okefenokee ecosystem in southern Georgia, which consists of the Okefenokee National Wildlife Refuge (ONWR) and surrounding private lands. To promote the persistence of this population, a contemporary density estimate and a population genomics assessment are needed. To address this, we deployed over 150 hair snares across the Okefenokee ecosystem during the summers of 2024 and 2025. Approximately 900 hair samples were sequenced using a targeted 12K probe-based sequencing method (Capture-Seq) to generate a single nucleotide polymorphism (SNP) dataset. We utilized this dataset to fit spatial capture-recapture (SCR) models to estimate abundance and density with respect to the mosaic of habitat types and land management schemes across the Okefenokee ecosystem. We further assessed genetic diversity, effective population size, inbreeding coefficients, and potentially adaptive variation within major histocompatibility complex genes (MHC) linked to immune system response. Our results support conservation and management of this population and highlight how changing land management patterns are affecting the population dynamics of a large predator.

Title: The history of the UGA-Okefenokee alligator project

Presenter: Kimberly M., Andrews <kma77@uga.edu> (University of Georgia - Marine Extension and Georgia Sea Grant)

Coauthors: Mark E. Hoog (University of Georgia - Marine Extension and Georgia Sea Grant)

Type: Oral. Ecology.

Abstract: The Okefenokee alligator project was initiated in 2017 when the University of Georgia Coastal Ecology Lab partnered with Okefenokee Swamp Park. The research began with a focus on the spatial ecology of adult alligators at the northern entrance to the Okefenokee Swamp, with particular interest in reproduction and maternal care. We used Telonics® satellite tags with on-board VHF to document home ranges and wildlife game cameras to capture behaviors at frequently visited locations, such as nests. We conducted mark-recapture to develop an understanding of population size and as a secondary measure to track individual movement and distribution of animals. As part of our marking methods, we collected biological samples of tail tissue and blood, which extended our research to include graduate student work on diet, ecotoxicology, genetics and relatedness, and epigenetics. In 2019, we partnered with the Okefenokee National Wildlife Refuge and have since expanded our research efforts to the eastern and western entrances. These efforts are allowing us to compare population numbers, habitat and resource utilization, reproduction, behavioral ecology, social dynamics, and novel natural history observations across the Swamp. We additionally conduct public and visitor programs to increase awareness of the importance of alligators and the value of the Okefenokee Swamp. We have reached international audiences through media and television filming opportunities. To date, we have uniquely marked 452 individual alligators and deployed 27 satellite tags. We are approaching 10 years of research, yet just beginning, with the goal of continuing this long-term project into the unforeseeable future.

Title: Genetic and epigenetic mechanisms drive phenotypic plasticity, adaptive responses, and population structure, offering critical insights for species conservation in dynamic wetland ecosystems.

Presenter: Mark E. Hoog <mark.hoog@uga.edu> (UGA Marine Extension and Georgia Sea Grant, Georgia Southern University)

Coauthors: Kimberly M. Andrews, Coastal Ecology Lab, Marine Extension and Georgia Sea Grant, University of Georgia; and Aaron W. Schrey, Department of Biology, Georgia Southern University Armstrong Campus

Type: Ecology. Oral.

Abstract: An organism's survival depends on its capacity to respond to environmental fluctuation; however, genetic evolution occurs over extended timeframes, whereas epigenetic mechanisms enable rapid adaptation without altering underlying DNA sequences. In this study, we investigated the influence of environmental factors on DNA methylation patterns in 96 American alligators (*Alligator mississippiensis*) sampled across the three main entrances of the Okefenokee Swamp utilizing epiRADseq on the Ion Torrent PGM platform. Concurrently, we assessed genetic relatedness and population structure among 164 individuals at the northern entrance, Okefenokee Swamp Park, using microsatellite markers. Epigenetic profiling revealed significant differential methylation among cohorts grouped by sex, site, season, and collection year. These findings support two key epigenetic hypotheses: first, that DNA methylation helps regulate female seasonal reproductive cycles, and second, that *A. mississippiensis* may utilize epigenetic buffering to mediate phenotypic adaptation within highly variable microenvironments. Furthermore, genetic analysis supported two additional hypotheses, demonstrating that demographic turnover among dominant individuals alters local genetic structure and that genetic relatedness could influence spatial distribution patterns across the landscape. To our knowledge, this study provides the first empirical evidence supporting these combined epigenetic and genetic findings in *A. mississippiensis*, underscoring their importance in conservation.

Title: Okefenokee Swamp peat volume recalculated and associated carbon storage

Presenter: Sara Aicher <sara@anoleimaging.com> (Okefenokee NWR Biologist - retired)

Coauthor: Rena Ann Peck (Georgia Rivers)

Type: Ecohydrology. Oral.

Abstract: The 164,681 ha Okefenokee Swamp in southeastern Georgia and northeastern Florida preserves a wet peat volume of 2.03×10^9 – 2.14×10^9 m³ calculated from the median depths of peat depth bands identified by Cohen et al. (1984) and Cohen and Marsh (2010 unpublished). This is five times the amount originally reported by Cohen et al. (1984). Dr Arthur Cohen obtained peat depths from over 300 points within the Okefenokee Swamp in the 1970's and 1980's. These were used to map the peat depth within three-depth bands (Cohen et al., 1984) and within a six-depth band version (Cohen and Marsh, 2010 unpublished). Using the bulk densities and the percentage of carbon for three peat types found within the Swamp, 1.2×10^8 – 1.27×10^8 metric tons of carbon, the equivalent of 4.4×10^8 – 4.64×10^8 metric tons of CO₂ if emitted into the atmosphere, was calculated to exist if the peat was of the median depths within each depth band. Amounts were also calculated for comparison using the bulk densities within the top 0.91 m of peat and below where auto-compaction concentrates the carbon. This resulted in 1.4×10^8 metric tons of carbon, the equivalent of 5.15×10^8 metric tons of CO₂ emissions. These recalculated amounts show the significance of this peatland. The peat deposit not only acts as a critical carbon sink but contributes to the ecological processes within the natural landscape.

Title: Groundwater studies and data to help evaluate effects of water management practices in coastal Georgia

Presenter: Gregory Cherry <gccherry@usgs.gov> (US Geological Survey - South Atlantic Water Science Center)

Type: Hydrology. Oral.

Abstract: In 2006, the Georgia Environmental Protection Division (GaEPD) established a “red zone” in coastal Georgia in which pumping rates in the Upper Floridan aquifer (UFA) were capped at 2004 rates. The red zone includes all of Chatham County and the southern part of Effingham County. Pumping restrictions were implemented over concern of potential saltwater intrusion in the Savannah-Hilton Head Island area and plume migration toward a potentiometric low in the UFA located in the Savannah area. In the Brunswick/Glynn County area, saltwater has intruded into the UFA and formed a plume with high chloride concentrations near downtown Brunswick. Water-management practices and improved water conservation have resulted in a consistent decrease in groundwater use along coastal Georgia. Groundwater use in Chatham County decreased from 85.5 million gallons per day (Mgal/d) in 1990 to 68.2 Mgal/d in 2000, 54.3 Mgal/d in 2010, and 43.2 Mgal/d during 2020. Groundwater use in Glynn County decreased from 71.9 million gallons per day (Mgal/d) in 1990 to 53.7 Mgal/d in 2000, 49.0 Mgal/d in 2010, and 39.8 Mgal/d during 2020. Studies performed by the U.S. Geological Survey as part of the Georgia Coastal Sound Science Initiative (CSSI), a regional assessment of the FAS, site-specific assessments of the LFA, and ongoing work in the Brunswick/Glynn County area have provided new insight into multilayer groundwater-flow systems and better delineation of saltwater contamination through time in the UFA along coastal Georgia.

Title: Improving our understanding of Okefenokee and regional hydrology

Presenter: C. Rhett Jackson <rjacks@uga.edu> (UGA Warnell School of Forestry and Natural Resources)

Coauthors: Todd C. Rasmussen, Jaivime Evaristo (University of Georgia)

Type: Hydrology. Oral.

Abstract: Recently, it became important to have a detailed understanding of the hydrology of the Okefenokee Swamp. Unfortunately, data on swamp hydrology are limited, and there is no reason to expect the Swamp behaves like the rest of the regional landscape. The USGS provides surficial outflow data for the N. Prong of the St Marys River and the Suwannee River and there is local and regional climate data. However, that is not enough to answer fundamental questions about Swamp and regional hydrology. Here we explore six fundamental unanswered questions about Swamp and regional hydrology and how they could be answered: 1. What is the average annual evapotranspiration of the Swamp and how does it compare to regional evapotranspiration? 2. What is the net ecosystem respiration (carbon flux) of the Swamp? 3. How much does the Swamp leak to the Floridan aquifer? 4. What is the regional variability in the permeability of the Hawthorne formation? 5. How does the organic matrix of the Swamp retain and release water? I.e. what does the moisture release curve look like for peat and moss? 6. At low Swamp water levels is lateral movement of water across the compartments negligible?

Title: Numerical simulation of regional groundwater flow in Southeast Georgia

Presenter: Leslie Okine <lo22938@uga.edu> (University of Georgia - Engineering)

Coauthors: Franklin Ijigade, C. Brock Woodson, Adam M. Milewski (UGA)

Type: Hydrology. Oral.

Abstract: A ten-year (2015 to 2024) transient groundwater model was developed using the United States Geological Survey's MODFLOW software for southeast Georgia. The model had seven layers comprising four aquifers namely: the surficial, Brunswick, and the Upper Floridan and Lower Floridan aquifers. The model covers an area of 26,600 square kilometers with cell dimensions of 1 km by 1 km with 120 stress periods. The model is bounded on the northwestern and eastern parts by the Gulf trough and the Atlantic Ocean, respectively. On the eastern boundary, a no-flow boundary condition was used to simulate the freshwater-saltwater sharp interface. A single-density model was however used for this study. The base of the model was simulated as impermeable. Monthly groundwater recharge was estimated using the Soil and Water Assessment Tool and regional climatic and hydrologic data. Groundwater-level observations from 2015 through 2024 showed temporally variable cones of depression in the Upper Floridan aquifer near Jesup and Brunswick and in the Lower Floridan aquifer near Brunswick, with their magnitudes varying in response to changes in recharge and water use. Based on the model calibration done using the twenty-five monitoring wells in the four aquifers simulated for the ten-year period, a root mean square error and mean absolute error of 2.29 m and 1.74 m were obtained, respectively. The root mean square error normalized by the range of observed heads yielded a value of 5.27 %.

Title: Using environmental DNA (eDNA) to track the Atlantic Sturgeon population within the St. Marys River

Presenter: Victorya Adams <tory@stmarysriverkeeper.org> (St. Marys Riverkeeper)

Coauthors: Taylor Faherty and Brian Shamblin (UGA); Emily Floore (St Marys Riverkeeper)

Type: Ecology. Poster.

Abstract: Coastal Georgia is home to several endangered or threatened aquatic species, many of which utilize the river systems for migration, foraging, or spawning. The St. Marys River is one of the last free-flowing blackwater rivers in the southeast and the southernmost river system on the eastern seaboard known to support a spawning population of Atlantic Sturgeon (*Acipenser oxyrinchus*; hereafter ATS). The protection of spawning and nursery habitat is critical to their survival and the overall health of coastal, estuarine, and riverine ecosystems. Previous work in the system to detect these fish required significant sampling effort, and only resulted in a handful of fish being captured. ATS are anadromous, and feed in the benthic zones of rivers, making them difficult to track using traditional sampling methods. Collecting environmental DNA (eDNA) is a novel method for attempting to locate the spawning habitats of sturgeon and other enigmatic species. During this research, we collected three replicate eDNA samples at five locations along the St. Marys River weekly for 3 months, in both the spring and fall. Our goal is to determine if ATS are present, where they are in the system, and when they are spawning. We will conduct conventional and quantitative PCR analyses to meet these objectives. Positive detections of ATS will indicate presence and timing of the species within the system and help inform future management decisions.

Title: Morphological variation of the lingual glands in wild American alligator populations

Presenter: Benjamin Angalet <bangalet@kennesaw.edu> (Kennesaw State University)

Type Ecology. Poster.

Coauthor: Nicholas S. Green, Kennesaw State University

Abstract: American alligators (*Alligator mississippiensis*) inhabit diverse aquatic ecosystems including freshwater wetlands, swamps, and estuarine rivers. As apex predators, their physiological resilience has implications for ecosystem stability and long-term conservation. With projected sea-level rise and increasing saltwater intrusion into coastal freshwater habitats, understanding the osmoregulatory capacity of alligators is increasingly important. Unlike marine-tolerant crocodilians such as the saltwater crocodile (*Crocodylus porosus*), which possess specialized salt-secreting lingual glands in addition to renal and cloacal mechanisms, the morphology and physiological significance of lingual glands in wild American alligators remain poorly understood. This study examined lingual gland morphology and plasma ion physiology in four wild American alligator populations exposed to differing salinity regimes (Jekyll Island, Sapelo Island, Okefenokee National Wildlife Refuge, and Banks Lake National Wildlife Refuge). Plasma osmolality and ion concentrations were measured from blood samples, and lingual gland biopsies were analyzed using light microscopy to quantify pore count, gland area, secretory tubule count, tubule density, and tubule lumen area. Coastal alligators did not exhibit elevated plasma osmolality or ion concentrations relative to inland populations. Lingual gland morphology also did not differ significantly between populations, although the relationship between secretory tubule count and body size varied. Comparative analyses across crocodilian species showed that crocodile lingual glands are substantially larger and possess greater tubule lumen area and tubule density than those of American alligators, reinforcing pronounced divergence between alligators and saltwater-tolerant crocodiles.

Title: Satilla River Black Willow Island survey: A biodiversity survey of *Salix-nigra* dominated sandbar islands in Brantley County, Georgia

Presenter: James Flanders <920085733@student.ccga.edu> (College of Coastal Georgia)

Coauthors: Reese Brown and James Deemy (College of Coastal Georgia)

Type: Ecohydrology. Poster.

Abstract: River islands with dunal succession zones were noted to have built along the banks of deep turns in the Satilla River. A team surveyed a small stretch of these islands in the Satilla River for biodiversity. Five sandbar islands along four miles of the Satilla River were surveyed between Happy Landing and Deep Bend Landing in Brantley County, Georgia. Analyses were performed to compare each island's biodiversity as well as total diversity for the surveyed region using Whittaker's ratio for beta diversity. (Tuomisto 2010) The surveyed sites were found to have a beta diversity level of 2.32 suggesting a high level of dissimilar species present between islands in the surveyed region. Fungal biodiversity differing in the surveyed islands likely led to a high difference in species composition across islands in the surveyed region.

Title: DBH Survey of Southeastern Georgia's forested wetlands

Presenter: Jackson Chaney <jacksonchaney42@gmail.com> (College of Coastal Georgia, Environmental Science Program)

Coauthor: Emma Robinson and Samuel Hoover (College of Coastal Georgia, Environmental Sciences)

Type: Ecohydrology. Poster.

Abstract: Forested wetlands are important landscape features in Southeast Georgia that filter water, mitigate pollution, and contribute to global primary production. The objectives of this study were to 1) sample tree diameter in several different forested wetlands in southeastern Georgia 2) determine the general age / maturity of wetlands 3) determine the dominant species of each location 4) determine the density of the forests in each location. Eight wetlands were assessed at four locations using point quarter methods for sampling DBH. Point quarter sampling was completed through 5 branching 50 m transects established perpendicular to a 50 m base transect. Along each branching transect every 10 m section was divided into a cartesian plane and the first tree within 5 m of the origin was measured for each quadrant. Microsoft Excel and RStudio were used for data analysis. We found that the Altamaha WMA had a higher average DBH compared to other locations while Little Satilla WMA had the lowest average DBH. Clayhole WMA had the highest density of trees while Altamaha had the lowest density. Water Oak was found to be the dominant species overall with individual locations varying.

Title: Future threats to the globally significant Okefenokee Swamp and its peat deposits

Presenter: Rena Ann Peck <rena@garivers.org> (Georgia Rivers)

Coauthor: Sara Aicher (USFWS biologist - retired)

Type: Ecohydrology. Poster.

Abstract: Although mining heavy minerals from Trail Ridge, east of the Okefenokee Swamp, has been stopped twice in the last 20 years, there is still adjacent private lands on Trail Ridge that mining companies are eyeing for potential future mining. Alterations to the hydrology of the Swamp whether it is from climate change or more directly from anthropogenic activities such as mining within the greater Okefenokee landscape may result in increased intensity and/or frequency of wildfires, vegetation changes, degradation of the peat deposits and the release of carbon dioxide into the atmosphere. All these processes are intertwined. Its hydrology, frequent surface fires and vegetation have protected this 406,000 acre natural, headwater swamp and its 2.14 billion cubic meters of peat that has been accumulating over the past 6,500 years. If allowed, mining and land development within the uplands surrounding the Swamp could significantly alter its hydrology and overall integrity. Although Okefenokee National Wildlife Refuge protects 94% of the swamp and some of the surrounding pine forests, activities from outside the Refuge threaten its existence and our relationship with it. We recommend reducing risks to the hydrology of the swamp by removing future mining threats to Trail Ridge, and establishing a protective buffer around the swamp to maintain the integrity of the ecosystem and the environmental services it provides.

Title: Ecosystem water use efficiency of geographically isolated wetlands

Presenter: Carlie Blackburn <carlie.blackburn@jonesctr.org> (Auburn University, The Jones Center at Ichauway)

Coauthors: Steven Brantley, Emma Y. Marzolf (The Jones Center at Ichauway); Frances O'Donnell (Auburn University)

Type: Ecohydrology. Poster.

Abstract: Geographically isolated wetlands (GIWs) are a common landscape feature in the lower Apalachicola-Chattahoochee-Flint basin. GIWs are known for the abundance of ecosystem services they provide including water filtration, sediment and nutrient retention, and water storage which can help mitigate both floods and droughts. While GIWs are beneficial, their role in watershed hydrology and carbon cycling remains unclear. It is generally unknown how much water is used by vegetation in these wetlands or how efficiently they might be using the water to store carbon and produce biomass. This project will investigate the evapotranspiration (ET), above ground net primary productivity (NPP), and water use efficiency (WUE) of two relatively undisturbed geographically isolated wetlands (GIWs) on The Jones Center at Ichauway, Newton GA. These wetlands lack surface connections to other water bodies, and hydrology is predominantly driven by rainfall and subsurface flow. Quantifying these three variables will provide a better understanding of water use and associated ecosystem services. ET was measured every 30 minutes using a Li-Cor 710 ET sensor. Leaf level WUE of dominant plant species was assessed using a Li-Cor 6400 gas exchange system. Above ground productivity was quantified through clip plot sampling and by applying a weighted WUE value to the ET data to calculate sub-daily NPP. We found that wetland ET was near zero in winter, rapidly increased in April, and was highest in the summer months (June-August). Temporal variations in ET were driven by net radiation and phenology of dominant vegetation. WUE varied substantially by species. Species furthest from the wettest and deepest point of the wetland were more water efficient than those located at the deepest point creating a range of diversity throughout these ecotones. While we found 35 species within the wetland boundary, productivity was dominated by broomsedge (*Andropogon virginicus*) around the relatively dry outside rim. Further analysis will examine the potential role of different vegetation types in maintaining wetland productivity while reducing ET, protecting two key functions of wetlands. These findings give us a better understanding of water use and carbon storage within these ecosystems. This helps to inform us of GIWs' ecological role within the landscape to help us enhance management strategies and to better protect and conserve ecosystems.

Title: Insect mediated pollen movement in geographically isolated wetlands in the longleaf pine ecosystem

Presenter: Lindsey Grimes <lq11223@georgiasouthern.edu> (Georgia Southern University, The Jones Center at Ichauway)

Coauthors: David Mason (The Jones Center at Ichauway), Isaac Park (Georgia Southern University)

Type: Ecohydrology. Poster.

Abstract: The longleaf pine ecosystem is a threatened ecosystem that once covered much of the coastal plain. This ecosystem is incredibly diverse, and includes associated geographically isolated wetlands (GIWs) that have unique diversity from the uplands, including rare and state imperiled plant species. However, there are a lack of studies focused on wetland pollinators, and even fewer that focus on isolated wetlands. Our study aims to analyze the plant pollinator interactions within three different types of GIWs associated with the longleaf pine ecosystem: marsh, cypress savannah, and cypress gum swamp. We begin by modifying blue vane traps for non-lethal sampling of pollen carried by pollinators to create pollen collection traps. Using these pollen collection traps, we can better understand pollinator movement via the monitoring of pollen movement by the pollinator community at each site. From this information we can analyze both the amount of pollinator movement into and out of wetlands, seasonal changes in pollinator foraging behavior, and how these may change depending on wetland type. Understanding pollinator utilization of different areas is important for continued conservation of both our insects and our plants. This information will help fill in research gaps regarding how the pollinator communities interact with the various plant communities found within a heterogenous landscape of naturally isolated wetlands in uplands.

Title: Investigating the role of vegetation, water level and iron on photo-mineralization of DOC in a boreal fen

Presenter: Jae Clery <920150066@student.ccgga.edu> (College of Coastal Georgia, Georgia Institute of Technology)

Coauthors: Jason Keller (Claremont Mckenna College), Evan S Kane (Michigan Technological University), Catherine M Dieleman (University of Guelph), Jennifer C Bowen (Georgia Institute of Technology)

Type: Ecohydrology. Poster.

Abstract: Boreal peatlands are experiencing more extreme flooding and drought in recent decades. Increased and prolonged flooding during the growing summer season exposes dissolved organic carbon (DOC) in surface water to sunlight, initiating photomineralization of DOC to carbon dioxide (CO₂). However, it remains unknown how much DOC photomineralization occurs in flooded boreal peatlands. In this study, we investigated how dissolved iron concentrations, DOC chemical composition, and apparent quantum yields of DOC photomineralization varied along a vegetation and water-table gradient in a flooded boreal peatland at the Alaska Peatland Experiment (APEX) site. Surface water was collected from four locations along the gradient, which were classified as having shrub, tussock grass, intermediate fen, and rich fen vegetation communities and had increasing surface water depths going from the shrub to the rich fen community. Water-table level, oxidation-reduction potential, and pH were measured at the time of collection, total dissolved iron concentrations were measured using the ferrozine method, and DOC chemical composition was characterized by absorbance and fluorescence spectroscopy. For each surface water sample collected, apparent quantum yields of DOC photomineralization were quantified following exposures to natural sunlight. Our findings show that yields of DOC photomineralization to CO₂ at 350 nm were significantly higher in surface water overlying the rich fen compared to the shrub community. Those photomineralization yields increased linearly with dissolved iron concentration, which was higher in surface water overlying the rich fen compared to the shrub community. Higher dissolved iron concentrations in deeper surface water depths at the rich fen coincided with more reducing conditions compared to the shallower surface water at the shrub community. Together, these results suggest that higher water-table levels during the flooding of boreal peatlands may lead to higher concentrations of iron that participate in DOC photomineralization to CO₂, a process which takes place during long sunlit hours of the summer season at northern latitudes.

Title: Building a watershed resilience plan for the St. Marys River and its community

Presenter: Alec Jarboe <alec@stmarysriverkeeper.org> (St Marys Riverkeeper)

Coauthor: Emily Floore (St Marys Riverkeeper)

Type: Poster. Watershed Resilience.

Abstract: The St. Marys River is a 126-mile long river running from the Okefenokee Swamp into the Atlantic Ocean. It forms the border between Florida and Georgia and spans four counties. In 2025, St. Marys Riverkeeper, in partnership with the University of Georgia, was awarded a National Fish & Wildlife Federation (NFWF) grant to study and improve watershed resilience in the St. Marys River watershed. The expected outcome is a comprehensive cross-jurisdictional resilience plan and the identification of up to ten sites for remediation through the use of Nature-Based Solutions (NBS). A crucial component of data collection and prioritization is community engagement to gather feedback and recruit participation. To improve the practical utility of feedback, we seek to translate community responses into geospatial and quantitative data. Ultimately, this data will help determine risk and identify potential project sites.

Title: Hydraulic evidence for surface-groundwater interactions between the Okefenokee and the underlying Floridan aquifer.

Presenter: Todd C Rasmussen <trasmuss@uga.edu> (University of Georgia)

Type: Hydrology. Poster.

Abstract: The US Geological Survey provides real-time (15-min) surface and groundwater level data for many rivers and wells near the Okefenokee Swamp. The Okefenokee National Wildlife Reserve also monitors swamp water levels at numerous sites within the swamp. These time-series data can be used to develop hydraulic response functions that explain how water-level changes propagate across the swamp and how it interacts with the underlying Floridan Aquifer. Rather than showing the fluid travel time, the response functions are kinematic responses, akin to a pressure wave, that move independently of the water. Results indicate rapid interactions, on the order of one month, between the swamp and the Floridan Aquifer, as well as movement within the swamp.

Title: Following the water: Is the Okefenokee Swamp connected to the Upper Floridan Aquifer?

Presenter: Audra Werley <audra.werley@uga.edu> (University of Georgia)

Coauthor: Jaivime Evaristo (University of Georgia)

Type: Hydrology. Poster.

Abstract: Whether water moves between the Okefenokee Swamp and the Upper Floridan Aquifer (UFA) remains uncertain, limiting our understanding of groundwater recharge and flow across southeastern Georgia. The regionally extensive Hawthorne Formation is generally thought to separate the two systems, but recent isotopic and hydraulic evidence suggests that this separation may be incomplete. We still do not know where this connection occurs or how it varies across the region. We sample surface-water sites and groundwater wells, including municipal-supply wells, along a regional flow path inferred from the predevelopment potentiometric surface. This path crosses the Okefenokee Swamp and continues downgradient toward the Atlantic coast. We combine stable water isotopes ($\delta^2\text{H}$ and $\delta^{18}\text{O}$), tritium, sulfur hexafluoride (SF_6), dissolved noble gases, radon-222 (^{222}Rn), and major-ion chemistry to constrain water sources, groundwater residence times, recharge conditions, and mixing. Together, these tracers allow us to track changes in water chemistry and isotopic composition along the flowpath and distinguish local recharge and surface-water inputs from regional groundwater flow. This inland-to-coastal comparison tests whether connectivity is localized near the swamp or extends downgradient. The results will refine the conceptual model of recharge and flow in the UFA and clarify the Okefenokee Swamp's role in the regional groundwater system.

Title: Modeling mine dewatering impact on local hydrology: Insight from a calibrated steady state groundwater flow model

Presenter: Franklin Ijigade <franklin.ijigade@uga.edu> (UGA - Geology)

Coauthor: Adam M. Milewski (University of Georgia - Geology)

Type: Hydrology. Poster.

Abstract. Mining supplies raw materials needed for infrastructure, energy technologies, and economic development, but mine dewatering can alter local groundwater-flow systems. While studies have examined dewatering impacts on water resources sustainability associated with deep open-pit mines, less attention has been given to shallow heavy-mineral-sand mines developed within surficial aquifers. This study develops a three-dimensional steady-state groundwater flow model to evaluate the hydrologic impacts of dewatering within a shallow (6 m below ground surface) heavy mineral sand mine in South Georgia. The conceptual model consists of three hydro-stratigraphic units subdivided into seven layers and was developed in the Groundwater Modeling System (GMS) using data from geophysical surveys and thickness maps from South Georgia and Florida. The MODFLOW-NWT simulator was used over a 116.35 km² domain with a 75 × 75 m grid to model spatial groundwater level conditions. Mine pits were represented using a drain boundary with a bottom elevation of 16 m. Steady-state simulations representing pre-mining, active-dewatering, and post-dewatering conditions were calibrated and evaluated using groundwater-level observations (9 piezometers and 13 piezometer wells) from 2013 and 2026. Model calibration produced an RMSE of 0.17 m, NSE of 0.99, and R² of 0.98. Sensitivity analysis identified hydraulic conductivity as the most influential parameter, followed by recharge. The post-mining steady-state simulation shifted the area of highest modeled groundwater heads from the central mine area to the southern portion of the model domain, where heads were approximately 0.8 m higher than in the pre-mining simulation. The active-dewatering scenario produced a maximum drawdown of 5.5 m adjacent to the mine pit. In the post-dewatering equilibrium simulation, modeled heads were within approximately 0.3 m of pre-mining conditions, indicating limited residual drawdown under the simulated long-term conditions. Because steady-state simulations do not represent the timing of drawdown or recovery, transient modeling is needed to quantify the rate and duration of groundwater responses. This modeling framework provides a practical tool for optimizing mine dewatering while fostering environmental stewardship which will serve as regulatory compliance and sustainable groundwater management.

Title: Noyes Cut Restoration Project

Presenter: Jaxson Grotz <920153084@ccga.edu> (*College of Coastal Georgia, Environmental Sciences*)

Type: Hydrology. Poster.

Abstract. Water quality monitoring is critical to tracking Georgia's coastal ecosystem health. Noyes Cut, located in Camden County, Georgia, is a man-made channel in the Satilla River estuary created to improve the timber industry's transport of logs (USACE 2019). In 1932, multiple cuts were formerly made to improve timber transportation; however, this led to major ecological drawbacks, including tidal restrictions and altered salinity gradients, leading to a loss of freshwater reaches at low tide (USACE 2019). Marine organisms inhabiting these reaches, such as striped bass, shad, blue crab, and shrimp, declined in population as a result. The Noyes Cut Restoration Project, started and managed by the Army Corps of Engineers, Augusta University, and the Satilla Riverkeeper in 2013, aims to restore the 4,500 acres of salt marsh affected by major tidal disruptions (Dallmeyer D. 2019). Water quality data presented in this work represent the Satilla Riverkeeper's independent monitoring and are distinct from Augusta University's and the Army Corps of Engineers' dataset. As part of my internship with the Satilla Riverkeeper, I created an interactive water quality map in ArcGIS Online to give the public access to water quality data at twelve boat landings in the Satilla Basin. Sites within the Noyes Cut, labeled Dover Bluff Club Hoist (DBC Hoist) and Dover Bluff Club Dean (DBC Dean), are monitored for parameters including pH, dissolved oxygen (ppm), conductivity ($\mu\text{S}/\text{cm}$), salinity (ppt), air temperature ($^{\circ}\text{C}$), water temperature ($^{\circ}\text{C}$), and tidal fluctuations. Conductivity trends at Dover Bluff Club will be compared across construction and post-construction periods (2023 – present) along with a reference site at Woodbine outside the restoration area.

Sources:

Dallmeyer D. 2019. Restoring the Historic Satilla. Stewards of the Georgia Coast

<https://stewardsofgacoast.org/2019/12/11/restoring-the-historic-satilla/>

U.S. Army Corps of Engineers, Savannah District. 2019. Noyes Cut, Satilla River Basin, Georgia Final Integrated Feasibility Study and Environmental Assessment.

<https://www.sas.usace.army.mil/Portals/61/docs/Planning/Reviewplans/NoyesCutFONSIandIntegratedFeasibilityReportAppendices.pdf?ver=2019-01-10-104938-320>

U.S. Army Corps of Engineers, Savannah District. 2023. U.S. Army Corps of Engineers, Savannah District: First Bi-Partisan Infrastructure Law Project Complete.

<https://www.sas.usace.army.mil/Media/Public-Notices/Article/3344662/us-army-corps-of-engineers-savannah-district-first-bi-partisan-infrastructure-l/>