



Poster/Tools Networking Session Directory

September 9, 2025

POSTERS

Theme: Adaptation Challenges & Successes	
Henley Sartin, University of Tennessee	Evaluating efficacy of the SECAS Blueprint at protecting future climatically suitable regions for species of conservation concern in the Southern Appalachians Conservation planning must take into account future climate shifts in order to effectively protect species now and in the future. In this analysis, a collaborative conservation planning priority map is analyzed for its ability to protect species and habitats of interest under a range of possible future climates. Maxent predictions were calculated for the next 3 decades for 270 terrestrial vertebrate species of conservation concern in the Southeastern Appalachian region under future climate scenarios from four Shared Socioeconomic Pathways (SSPs) and four general circulation models (GCMs). Predictions were analyzed within the Appalachian subregion of the Southeast Conservation Adaptation Strategy (SECAS) Blueprint to determine how effectively the priorities in the Blueprint protect potential future species ranges. Results show that future regions of conservation priority vary in their ability to protect species and could be more efficient at protecting predicted future ranges of geographically rare species. Identification of the regions within the Southeast that are important to species under climate change is necessary to guide future conservation efforts.
Peizhe Li, North Carolina State University	Community members' place connections shape adaptation preferences for cultural resources and landscapes under climate change Climate change is threatening cultural resources and landscapes, reshaping the connections community members hold with these places. While previous research has examined adaptation preferences and place connections broadly, little is known about how distinct dimensions of place connections influence climate adaptation decisions for cultural resources and landscapes. This study addresses that gap by developing a conceptual framework linking place connections to cultural resource and landscape adaptation preferences under climate change. Using online survey data from two heritage-focused partner organizations of Cape Lookout National Seashore located in North Carolina (US), we identified six distinct constructs of place connections: community pride, economy, uniqueness, individual connections, family connections, and intangible heritage and legacy. These constructs shaped support for three types of adaptation strategies aligned with the US Department of Interior's Resist-Accept-Direct (RAD) framework. Strong family connections and weaker individual connections predicted support for structural resilience interventions (adapt to mitigate change; Direct); strong community pride and lower perceived climate change impacts on family connections predicted support for transformation to intangible heritage (Accept). Findings highlight how community members' place connections are sensitive to climate change manifestations, with decreasing access to historic districts and the proportion of historic buildings remaining in the landscape leading to stronger negative impacts to their family place connections. The study extends the RAD framework to cultural resource stewardship and emphasizes how place-based values can guide climate adaptation decisions in protected areas.
Abhinav Shrestha, Clemson University	Identifying Local Hotspots of Compound Physical and Social Impacts from Hurricane Helene-Induced Floods and Landslides Timely and effective post-disaster emergency response is critically constrained by limited resources emphasizing the need to identify areas with the greatest need. Previous research has developed various approaches to identify high-priority areas based on distinct indicators of impact or vulnerability such as severity of building damage, disruptions to road network, and



	social vulnerability indicators. However, these indicators are considered in isolation while communities are impacted by these factors simultaneously. As a result, examining hazard impacts in isolation can therefore mislead prioritization, i.e., the true severity of a disaster's aftermath emerges from the compound effect of physical destruction, service loss, and the population's pre-disaster vulnerability. Only recently have studies begun to examine compound disaster impacts to identify community-level hotspots of impact. However, these emerging efforts overlook the compounding effects of structural damage, critical service access disruption, and social vulnerability at fine spatial scales, particularly in rural or mountainous regions, limiting their ability to identify the true burden borne by affected communities. To address this research gap, we develop an event-specific, block group scale post-disaster impact assessment for Hurricane Helene (2024) in Buncombe County, North Carolina. Our framework combines flood and landslide building damage estimates, road-network-based critical service isolation and pre-existing social vulnerability to build a Composite Vulnerability Index (CVI), which allows mapping hotspots where impacts from physical destruction are amplified by service disruption and pre-existing social conditions. Our Composite Vulnerability Index shows that the most burdened locations are those simultaneously hit by severe structural impacts and critical-service isolation, with existing social vulnerability magnifying their burden. Hence, the CVI is capable of identifying additional hotspots not visible when looking at building damage alone.
Farhad Sidighi, Clemson University	EvacLLM: An Open-Source Large Language Model Framework for Predicting household Evacuation decisions and departure times The decision-making process during an evacuation in a natural disaster is a complicated process that can be influenced by psychological, contextual, or environmental factors. Modeling human evacuation behavior accurately, is key to facilitating timely and informed evacuations which is essential for efficient emergency management, resource allocation, and preventing the loss of life. While traditional approaches, including logistic regression and the Protective Action Decision Model (PADM), have provided meaningful insights, they are limited in allowing the complexities of human reasoning to be captured and do not allow for unstructured data such as narratives. Recent advances in large language models (LLMs) offer opportunities to enhance evacuation modeling, but the majority of existing methods rely on closed-source frameworks lacking transparency, interpretability, and reproducibility. In this context, the current study presents EvacLLM, an open-source LLM framework developed using the Hugging Face ecosystem that is designed specifically for evacuation behavior prediction and explanation. As a notable feature, EvacLLM supports both classification tasks (e.g., evacuation decisions) and regression tasks (e.g., departure times). We integrate structured post-disaster survey data, respondents' personal narratives, and government-published after-action reports across a range of hazard scenarios—including wildfires (Maui) and tsunamis (Palu). The modeling pipeline includes perplexity-based sample filtering, fine-tuning with multimodal inputs, and interpretability measures. We compare EvacLLM with traditional models and show its superior predictive performance and explanatory power. By offering an open, reproducible, and generalizable framework, EvacLLM represents a significant step toward ethically aligned, AI-enabled decision support systems in disaster response. This work provides a foundation for future research toward explainable and human-centered evacuation science via open LLMs.
Abigail League, Auburn University	“The Price of Living in Paradise:” Understanding Tourism Providers' Perceptions of Climate Change on the Alabama Coast The Alabama Gulf Coast has all the hallmarks of a thriving nature-based tourism destination. However, climate change poses threats to the natural resources and infrastructure that make the destination attractive and accessible to visitors. Tourism providers are important voices to consider in addressing this issue due to their unique position to observe and adapt to environmental conditions. However, considerably fewer studies have focused on tourism providers' perceptions of climate change, compared to those of visitors. To address this void in the literature, we conducted semi-structured interviews with stakeholders (n=21, on-going) from coastal Alabama tourism-related businesses, land management agencies, and tourism offices.



	Interviews covered tourism providers' observations of environmental changes, their implementation of adaptation strategies, and their perceptions and knowledge about climate change. Data generated through these conversations is being analyzed using thematic coding. Preliminary findings indicate that tourism providers, particularly those who have resided in the area for extended periods, have noticed long-term changes in weather patterns, such as more intense and frequent hurricanes and longer and hotter summers. In response, many report implementing practical measures to improve their resiliency to hurricanes, but do not necessarily frame these measures as climate change adaptation. According to participants, tourism has continued to grow not only despite major hurricanes and the Deepwater Horizon oil spill, but also because of the news coverage these disasters elicited, with some participants expressing concern that subsequent overtourism and development could threaten the natural environment and their small-town way of life. This study sheds light on the factors that shape the climate change risk perceptions of tourism providers as well as the broader factors at play that threaten the longevity of the tourism industry. This poster will highlight how an understanding of tourism provider perceptions can be leveraged to develop place-based strategies for enhancing coastal tourism resilience.
Julie Walker, Northeast CASC	From Silos to Shared Solutions: Coordinating Coastal Science Across the CASC Network The CASC system plays a critical role in funding and sharing climate science through regional networks, delivering data, tools, and information to local and regional end users. In CASC regions that include coasts, much of the portfolio focuses on sea-level rise, coastal habitat assessment, and restoration. However, without cross-region coordination and capacity-building, these resources often remain siloed, limiting the ability to learn from each other, identify shared priorities, and address the hierarchical nature of coastal challenges. Regional CASCs, comprised of local consortium partners and integrated into a national network, are ideally positioned to foster these essential conversations at all scales.
Megan Carr, Wake County	From graduate school to local government: what's the same and what's different Transitioning from academic research to public service involves applying familiar tools to new challenges. In graduate school, my work focused on modeling fecal contamination in coastal communities and analyzing how water quality affects aquaculture, recreation, and public health. I used field data, public datasets, statistical tools, machine learning, and process-based modeling to examine how environmental factors influence the degree of fecal contamination in nearshore waters and high tide floods. My dissertation addressed (1) the use of machine learning to predict contamination in shellfish growing waters based on watershed features and weather, (2) contamination from tidal flooding in coastal communities, and (3) estimating contaminant source strength during flood events. Now, in local government, my role centers on public service through watershed management and regulation. I support permitting and plan review for erosion and sedimentation control, stormwater, and floodplain management. I assist with system operations for our permit portal, project documentation, and inspections. I also support outreach through website updates and educational materials, and I provide customer service to help applicants understand relevant ordinances. Many skills carry over: science communication, data analysis, and systems thinking. However, the focus shifts from theory to practice, from research questions to regulatory compliance, and from long-term studies to daily problem-solving. This poster highlights how technical training in hydrology and climate adaptation supports work in local government, and how public service presents new priorities, timelines, and decision making contexts.
Theme: Impacts on Habitats, Animals, People	



Jamila Roth, University of Florida	Sulfide-oxidizing bacteria are consistently associated with Florida seagrasses throughout space and time Seagrasses are declining globally due to natural and anthropogenic stressors. Many drivers of seagrass loss, including heat waves, nutrient over-enrichment, hypersalinity, low oxygen, and invasion by macroalgae co-occur with sulfide toxicity, often resulting in multiple, synergistic stressors. Microbiomes can buffer the negative effects of environmental stressors. The sulfide-oxidizing bacteria, <i>Candidatus Thiodiazotropha</i>, provides a mechanism for sulfide detoxification in seagrass meadows through associations with lucinid clams and direct associations with seagrass roots. Using 16S rRNA amplicon sequencing, we analyzed the microbial communities associated with the sediment, roots, rhizomes, and leaves of three seagrass species in Florida over multiple years, and we investigated seagrass-microbe interactions in meadows that varied in abiotic and biotic conditions. We found that the rhizomes and roots of the three dominant Florida seagrass species (<i>Halodule wrightii</i>, <i>Syringodium filiforme</i>, and <i>Thalassia testudinum</i>) were consistently enriched in <i>Ca. Thiodiazotropha</i>. We then used metagenome-assembled genomes to identify genes associated with sulfide-oxidation (<i>sqr</i>) and nitrogen-fixation (<i>nifH</i>) in <i>Ca. Thiodiazotropha</i> and analyzed functional gene expression. We found that these bacteria were expressing genes related to sulfide oxidation and nitrogen fixation. These findings demonstrate the generality of associations between Florida seagrasses and <i>Ca. Thiodiazotropha</i> and indicate that <i>Ca. Thiodiazotropha</i> may positively impact seagrass meadows by actively detoxifying sulfide and fixing nitrogen, potentially reducing overall stress for seagrasses. Understanding the relationship between seagrasses and sulfide-oxidizing bacteria can help us improve seagrass management and restoration practices.
Laura Taylor, North Carolina State University	Identifying a long-term survey methodology for an endemic butterfly species The Crystal skipper (<i>Atrytonopsis quinteri</i>) is a butterfly species endemic to a 50 km strip of barrier islands along the North Carolina Crystal Coast. Like most butterfly species, the Crystal skipper lacks quantitative data necessary to inform its management (e.g., abundance estimates, demography, and behavior). While Crystal skipper relative abundance has been estimated using several methods (e.g., transects, plots, timed meanders), rigorous population estimates that are comparable across seasons and landscapes require standardized survey methods. As part of a broader study investigating Crystal skipper abundance, demography, and behavior, we conducted Pollard walks, distance sampling, and double-observer surveys in 2024 to determine the Crystal skippers' abundance and distribution across three landscape types: protected dunes, urban dunes, and dredge spoil deposits. Our objectives are to 1) evaluate the sampling methods relative to their logistical constraints and ability to provide rigorous, sustainable, and unbiased estimates of abundance and 2) quantify Crystal skipper abundance in our surveyed areas, including changes in abundance throughout the flight period and across landscape types. Our results will help identify logistically appropriate and scientifically sound survey methods to monitor Crystal skipper abundance. These results, combined with results derived from other project objectives will provide adaptive, robust and strategic improvements to the Crystal skipper's recovery implementation strategy.
Jin Bai, Duke University	Mapping the Ecological Toll of Hurricane Helene and a Deeper Dive into Stream Habitat Evaluation to Guide Eastern Hellbender Recovery in Western North Carolina Hurricane Helene in September 2024 brought significant damage to western North Carolina including vegetation loss, flooding, landslides, and infrastructure damage. It also damaged the habitat many imperiled species depend on. By mapping the damage caused by Hurricane Helene, we found that more than 67% of NC Natural Heritage Program biodiversity records overlapped with at least one form of hurricane damage, and many records coincided with multiple types. In total, 721 different species and natural community types had occurrence records overlapping with areas damaged by Hurricane Helene including the vulnerable Eastern



	Hellbender (<i>Cryptobranchus alleganiensis</i>). They were negatively impacted by the floodings including being displaced during the hurricane and having their habitats being severely altered.
Sarah Bolivar, University of Tennessee	Visualizing Biodiverse Working Landscapes Building on graduate design coursework at the University of Tennessee from Spring 2024 and 2025, this poster will highlight student projects that explore how biodiversity can be integrated into agricultural landscapes. These speculative proposals are grounded in scientific knowledge of species' physiological needs over time. I plan to include additional examples to spark conversation about the role of storytelling in conservation, particularly within the context of working landscapes.
Laura Stevens and Alexis Visovatti, North Carolina State University	State Climate Summaries: Informing Adaptation in the Southeastern United States As the southeast United States faces increased threats from climate change, communities need robust, localized information to prepare and adapt. The State Climate Summaries (statesummaries.ncics.org), originally published in 2017, provide state-by-state information on temperature, precipitation, sea level rise, and other relevant metrics for all 50 states, plus Puerto Rico and the US Virgin Islands. The information is curated for each state in order to support actions that protect people, infrastructure, and natural resources—from coastal resilience planning to understanding exposure to inland extreme events. A major update to the summaries is currently underway, with a planned release in late 2025. The revised summaries will include four years of additional data, use updated climate model projections and sea level scenarios, and discuss recent extreme events. In addition, a new interactive tool will allow users to generate figures for hundreds of additional state, regional, and national metrics and projections. This poster will highlight how these 2025 State Climate Summaries can empower stakeholders, decision-makers, and non-scientists seeking information on how climate change is impacting the southeastern United States. This localized information related to climate trends and threats such as hurricanes, drought, and flooding can guide adaptation strategies tailored to each state's unique risks and priorities.
Anna Sokol, Xiangqi Wang, Tianyu Yang, University of Notre Dame	WildInsight: AI Chatbot for Wildlife Conservation Research WildInsight is an AI-powered chatbot designed to address the challenges of information overload in wildlife management research, specifically focusing on AI and ML applications in wildlife studies. However, with a significant volume of literature published annually, researchers often struggle to find relevant methods and insights, and traditional keyword searches frequently fail due to specialized and inconsistent terminology, missing relevant studies, or an inability to grasp the nuances of scientific jargon. WildInsight overcomes these issues by querying a curated database of thousands of peer-reviewed scientific articles on wildlife management. The system understands user queries and retrieves the most relevant papers by drawing on information from their titles, abstracts, and keywords. This allows it to generate accurate, contextually grounded responses with mandatory inline citations, ensuring answers are reliable and evidence-backed. It aims to help researchers make informed decisions and improve conservation strategies, accelerating the pace of discovery in this critical field. WildInsight features an intuitive chat interface with structured answers to further enhance usability.
Mary Diez, North Carolina State University	Science to Action: foundational data to inform climate adaptation decisions Puerto Rico, the smallest and easternmost of the Greater Antilles, is home to 17 species of Eleutherodactylus frogs. These frogs are valued culturally and for their prominent role in the energy flow of the island's tropical ecosystems. All but two species (<i>E. antillensis</i>, <i>E. cochranae</i>) are endemic to the island. Three are listed as federally endangered or threatened (<i>E. cooki</i>, <i>E. jasperi</i>, <i>E. juanariveroi</i>). The 12 remaining exhibit restricted distributions, and many are



	considered rare. The vulnerability of Eleutherodactylus species is rooted in their low vagility, high philopatry, and sensitivity to environmental variability, particularly to extremes in temperature and humidity. Since 2013, SECASC and USFWS supported projects to develop foundational data required by decision makers to implement two adaptation strategies—managed translocations and identifying climate-resilient habitat. Based on projected warmer ($\geq 1.8^{\circ}\text{C}$) and drier conditions by 2060, we assessed such strategies by quantifying metabolic thresholds (e.g., CTMax), genetic diversity, factors influencing distribution and abundance, and conducted experimental translocations of representative species. We also developed a decision framework to illustrate a process for selecting suitable habitat for restoration or managed translocations under climate uncertainty. We focus on the endangered Coquí Llanero (<i>E. juanariveroi</i>) to illustrate how each of these project dimensions contributed toward a better understanding of its ecology, and help guide decision makers to conserve endemic amphibians on the island.
Hailey Shanovich, USGS SE CASC	Assessing the status and climate change vulnerability of Southeastern pollen-specialist bees for use by wildlife managers The Southeastern United States (US) are home to a large diversity of endemic, native flowering plants and their insect pollinators, including many pollen-specialist bees. Despite ongoing threats from extreme events to the region, many of these specialist bees and their host plants have not been evaluated for their conservation status or vulnerability to climate change. Wildlife and resource managers rely on species assessments to inform their conservation planning and priorities, and climate change vulnerability assessments are valuable tools for integrating climate change science into these efforts. However, these assessments require significant capacity and technical expertise. Therefore, we are collaboratively conducting assessments for at-risk bee pollinator species identified by partners via expert opinion and two NatureServe tools: climate change vulnerability index and conservation status ranks. We have developed a list of candidate species for assessments, with input from taxa experts and an advisory committee of wildlife agency partners, including both state/territory and Tribal Nation biologists. A technical team of Southeast bee experts will complete preliminary assessments, which the advisory committee will finalize. The project, set for completion by the end of 2026, will address knowledge gaps around Southeastern US bee species and plants they pollinate, strengthen partnerships, and establish a foundation for climate adaptation and biodiversity conservation in the region.
Theme: Changing Southeastern Landscapes	
Morgan Arteman, ORISE & USDA Forest Service	Lagged Tree Mortality in National Forest Inventory Data Following Drought in Southern Appalachian Forests Drought exposure is projected to increase in the coming decades for many forested regions of the U.S., including Southern Appalachian forests. Forest disturbance from drought and other interacting factors can cause increases in tree mortality, reductions in growth, and lead to demographic shifts. The ecological impacts from drought are difficult to identify and quantify, in part because they can manifest years after the drought has ended. This is particularly challenging when attributing drought effects in Forest Inventory and Analysis - National Forest Inventory (FIA) plots due to the length of remeasurement cycle, e.g. 5-7 years. The 2007-2008 record-breaking drought in the Southern Appalachian region provides a focal event to expand the understanding of drought impacts on forests and develop methods to overcome those challenges. Using FIA data from the last two decades, we calculated species-specific annual mortality metrics at the population level. We aimed to identify if and when drought affected tree mortality, quantify the effects of drought on tree mortality, and identify stand characteristics that were correlated with higher drought impacts. Background mortality rates and drought impacts differed by species, with scarlet oak having the highest mortality rates of the species studied. Effects on mortality rates in FIA data were lagged approximately 2-8 years after the drought event occurred and also depended on species and size class. These findings will inform broader regional modeling frameworks to project future forest impacts from drought using FIA and also



	inform specific management strategies that can be used to enhance forest resilience to drought.
Christina Perella, North Carolina State University	Changes in forest resources in the Southern Appalachians under long-term future climate scenarios Tribal communities have long shown resilience in the face of change, and many tribes are increasingly devoting resources to climate adaptation planning. The Eastern Band of Cherokee Indians (EBCI), a sovereign nation located in the Qualla Boundary in western North Carolina, has begun adaptation planning focused on maintaining important natural and cultural forest resources and ensuring access for current and future generations. To plan for continued tribal access to resources that may migrate or change in abundance, it is important to understand how the forested landscapes in this region may be impacted by climate change. We will simulate landscape-scale impacts for the Southern Blue Ridge Ecoregion under different climate scenarios on a long, multigenerational (500-year) timescale using LANDIS-II, a stochastic, spatially explicit landscape change model that simulates forest dynamics like succession and disturbance. The outputs of this model allow us to directly track important species like white oak, while also providing landscape-level outputs like biomass and nutrient cycling that can help us understand ecosystem dynamics. The novel duration of these long simulations will use climate projections at global warming levels of 2°C and 3°C to model how these forests respond to increased temperatures, changing moisture regimes, and shifts in the intensity and frequency of disturbance events like wind and fire. The results of this modeling will provide insights into projected shifts in forest composition and spatial extents of key species, with a focus on species groups or habitat types informed by community participatory workshops and input from EBCI government staff. The 500-year timescale aligns with a tribal multigenerational approach to land stewardship and resource use, while also remaining appropriate for modeling relatively slow processes like forest succession. This work will support long-term tribal resilience, including management and conservation initiatives, land-use partnerships, and land acquisition opportunities.
Ryan O'Connell, USDA Forest Service	Trends in the prevalence and impacts of co-occurring disturbances in U.S. forests In recent years a growing body of ecological literature has centered on the topic of compound or interacting disturbances, motivated by the hypothesis that there is a rising likelihood that species and ecosystems are experiencing multiple disturbances simultaneously due to increased human influences on the environment. Yet temporal trends in the frequency of co-occurring disturbances have not been well characterized, leaving this hypothesis empirically unsubstantiated. Understanding the degree to which disturbance co-occurrences are changing in prevalence and identifying their potential impacts is critical, as this information can guide future research on disturbance interactions and their effects on outcomes such as population persistence and ecosystem stability. Leveraging Forest Inventory and Analysis (FIA) data for the conterminous United States, in this study we ask three questions: 1) have rates at which multiple disturbances are reported on survey plots increased from 2006 to 2022?; 2) are co-occurring disturbances associated with higher levels of tree mortality?; and 3) how do co-occurring disturbance trends differ by geographic region and forest type? Our results reveal that the percentage of total FIA plots with co-occurring disturbances was 3.1 times higher in 2022 than in 2006 (1.42% vs. 0.42%, respectively). We found that the rate of tree mortality was 90.1% higher in plots with co-occurring disturbances than in plots with no reported disturbance, and 23.4% higher than the mortality rate in plots with one disturbance. Results across forest types were more variable but typically showed similar prevalence and mortality trends. Our findings suggest that U.S. forests are increasingly subject to multiple disturbances simultaneously and that tree mortality is significantly higher under such conditions. Ultimately, this work corroborates longstanding hypotheses about disturbance frequency under global change scenarios and highlights the importance of future research on disturbance interactions and their implications for long-term ecological resilience.
Jack Deppman,	Improved Land Cover Classification of Rural and Urban Development across the U.S.



North Carolina State University	Caribbean Land use maps are critical for urban planning, land management, and conservation, providing key data to inform decision-making. In the contiguous United States, the National Land Cover Database (NLCD) is the gold standard, widely used by government agencies and researchers. However, regions outside the contiguous U. S., such as Puerto Rico and the U.S. Virgin Islands (hereafter the U.S. Caribbean), lack this same data resource. Alternatives like the Land Change Monitoring System (LCMS) by the U.S. Forest Service, focus primarily on vegetation, making it unsuitable for accurately mapping rural-to-urban development. This limitation is further highlighted in LCMS's broad definition of developed land as any area 'functionally altered by human activity'. This creates considerable loss of information and introduces land uses which although human-impacted are not contributing to developed or impervious surface cover (e.g. landscaping, golf courses). Other global land use datasets also fall short due to insufficient training data in the region, failing to capture the unique development patterns, such as frequent property abandonment and fast vegetation regrowth over developments. To address this gap, we performed a supervised classification of annual LANDSAT imagery composites using Google Earth Engine's Random Forest classifier. The classification built upon existing LCMS classes by stratifying the developed class into four categories based on percentage of impervious surface cover. Training and validation data was collected using visual interpretation of the available high-resolution Google Earth imagery. This study establishes the most comprehensive record of rural and urban development in the U.S. Caribbean, providing an improved historical reference to support future projections of growth.
Savannah Swinea, North Carolina State University	Burning in the future: Prescribed fire, climate change, and how managers will adapt More than half the land intentionally burned in the United States occurs in the Southeast region. Fire-adapted habitats and associated species rely on active human management through prescribed burning to preserve biodiversity and mitigate wildfire risk. Planning when and where to burn requires fire managers to minimize risks relating to weather conditions, personnel, wildfire risk, and human hazards, while also meeting habitat quality and biodiversity objectives. Balancing these trade-offs is already a significant challenge, but the decision frame within which fire managers must act has been further complicated by climate change. The number of days that conditions are suitable for burning ("burn windows") is projected to decline in coming decades, meaning that fire managers must consider risks at several time scales. In order to maximize burning opportunities, climate change may necessitate that fire managers push beyond the boundaries of existing prescription parameters, emphasizing the importance of evaluating shifting burn windows using an approach that quantifies those shifts against prescription thresholds and impacts to objectives. The goal of our study was to illuminate fire manager priorities and constraints for prescribed burning, and quantitatively incorporate these considerations to project how burn windows will shift under climate change. We first held workshops to elicit fire manager expert knowledge to identify their prescription thresholds for key weather variables. We then projected these weather variables to 2099 using 18 Global Climate Models and quantified burn windows using our expert-derived prescription thresholds. Finally, in case studies of diverse management units across the Southeast, we ran scenarios using specific considerations for habitats, seasons, and management objectives to downscale the impacts of shifting burn windows. Employing fire manager input in concert with modeled projections is critical to contextualize shifting opportunities and risk preferences for prescribed burning under climate change.
Nina Davis, Mississippi State University Coastal Research and Extension Center	Advancing Marsh Modeling in the United States Through Co-Production and Stakeholder Collaboration Coastal marshes are integral to coastal communities, providing habitat for important species and reducing the frequency and intensity of flood impacts on our homes and businesses. As sea levels rise, coastal decision-makers need to understand how the health and extent of our marshes will change and there are many models that have been developed to characterize this



	change. However, challenges remain around model trust, accessibility, and coordination across regions. In response, a multi-phase, co-produced effort has taken shape to address these barriers and improve the application of marsh models in management. A co-production effort launched by the Southeast Climate Adaptation Center (SECASC) set the stage for addressing these barriers through a regional retrospective analysis, a collaborative process to evaluate how well different models reproduce past marsh changes using shared sites and inputs. This early work not only defined a technical path forward but also cultivated strong relationships and mutual understanding across modeling teams. Building on that foundation, a broader effort is now underway to create a national marsh modeling framework through NOAA's Coastal Ecosystem Prediction System (CEPS) initiative. This initiative aims to deliver a nationwide, user-informed marsh modeling framework. At the heart of this effort is the Marsh Modeling Community of Practice (CoP), a growing network of modelers, researchers, and coastal managers focused on improving marsh modeling for decision-making. This CoP is advancing both the retrospective analysis and marsh modeling framework by facilitating coordination, surfacing shared challenges, and co-developing solutions. Through three focused working groups, State of Science, Model Application, and Retrospective, members are tackling technical questions, developing best practices, and working to increase the relevance and usability of marsh models across regions. Together, these efforts represent a national shift toward collaborative, decision-driven modeling, where modelers and end-users co-create science that meets the evolving needs of coastal communities.
Erin Eichenberger, North Carolina State University	A Path To Recovery: Management Actions to Support <i>Echinacea laevigata</i> (Smooth coneflower) Population Growth <i>Echinacea laevigata</i> (Asteraceae,) the smooth coneflower, is a rare southeastern endemic plant listed under the US Fish and Wildlife Service Endangered Species Act (ESA) in 1992. This light-loving species is associated with open habitats which were historically maintained by fire and are presently threatened by woody overgrowth, particularly under changing climate conditions which may limit or entirely preclude the possibility of regular prescribed burning. Following successful conservation and reintroduction efforts to increase the number of safeguarded populations, the species was downlisted to Threatened in 2022. However, populations do not demonstrate consistent growth year to year. To move towards successful recovery for the species by meeting the benchmarks for self-sustaining populations required for ESA delisting, a better understanding of the factors mediating vital rates is critical to inform management decisions for long-term population persistence and growth. In 2021 the North Carolina Botanic Garden, the NC Plant Conservation Program and NC State University partnered to conduct a multi-year demographic survey of smooth coneflower to understand how populations are faring under varied environmental conditions and management plans. In conjunction with annual population surveys for survival, growth and reproduction of coneflowers, we collect shade and litter data to directly model the impacts of fire on the growing environment. Here we present preliminary results from our integral projection model of smooth coneflower population growth, where the survival of reproductive adults is the greatest driver of population growth, as is expected for long-lived perennial plants. We further explore the establishment of seedlings, which are relatively rare in our populations but critical for population persistence. Using hurdle models, we demonstrate seedling sensitivity to leaf litter accumulation, a consequence of long fire-return intervals. We aim to provide population managers with action plans for promoting population growth to support the successful recovery of smooth coneflower.
Noah Ortiz, University of North Carolina at Asheville	Monitoring Early Success of Small-Scale Riparian Zone Repair Post-Helene Riparian zones, vegetated ecosystems that border waterways, play a vital role in reducing pollution and sedimentation, regulating flow and temperature of waterways, stabilizing streambanks, and providing critical habitat for biodiversity. These functions are threatened worldwide by increasing numbers of invasive non-native species, anthropogenic development, and increased pollution, all of which are exacerbated by extreme weather events. In September



of 2024, Hurricane Helene, a storm intensified by extremely warm waters in the Gulf, caused historic flooding that severely altered many riparian zones in Western North Carolina's watersheds. Vegetative structures were uprooted, leaving behind highly eroded stretches of streambank with exposed, debris-littered layers of subsoil and, in some cases, severely incised river channels. Assisting with ecosystem repair can increase the speed of recovery, improving resilience and further protecting against extreme weather events. In this study, a space-for-time substitution is used to examine the success of four small-scale streambank repair sites within their first growing season. Treatment sites were compared to non-repaired control sites that were in close proximity to and exhibiting similar ecological and geomorphic characteristics. Sites were located in the French Broad River watershed along Reed Creek, Willow Creek, and tributaries of Rhododendron and Beaverdam Creek in Buncombe County, NC. Repair processes included debris removal, mild regrading with hand tools, placement of erosion-prevention matting, and planting of native live stakes and seeds in February and March of 2025. Data collected includes percent ground cover, presence of plant species (including distinction of native vs non-native), and a riparian health assessment, which allocates an ecosystem function score. Preliminary data suggest that repaired sites tend to have a higher percent cover (excluding one control site, which was dominated by invasive and disturbance species), as well as a higher riparian health score. This project will further our understanding of the impact that small-scale intervention has on degraded riparian zones, improving ecosystem function and conservation practices to promote ecological resilience in the face of the climate crisis.

TOOLS

Theme: Adaptation Challenges & Successes

Ansley Williamson,
U.S. Fish and
Wildlife Service

The Landscape Recovery Tool: Supporting Adaptation and Recovery Planning Across the Southeast

As climate-driven extreme events increase in frequency and intensity, and ongoing habitat loss and fragmentation continue to threaten biodiversity, land managers and conservation practitioners face growing challenges in coordinating effective recovery strategies for at-risk species. The Landscape Recovery Tool (LRT) is a data visualization platform developed by the U.S. Fish and Wildlife Service to support adaptive recovery planning in the Southeast. This interactive dashboard integrates information from over 1,100 recovery plans, species status assessments, and five-year reviews to summarize the recovery needs of 440 federally listed species. By organizing more than 8,000 documented recovery actions, the tool helps users identify shared vulnerabilities and threats across species and geographies, prioritize recovery efforts, and scale up conservation responses after disturbance events. The LRT incorporates standardized classifications, including IUCN habitat types, threat and action categories from the Conservation Measures Partnership, and ESA recovery priority criteria, to enable consistent, cross-agency planning. Data can be filtered by taxon, habitat, geography, recovery priority, threat type, and more, allowing users to customize queries for specific conservation goals or regions. The LRT is particularly useful for identifying multi-species opportunities that support proposals, partnership efforts, and post-disaster habitat recovery. It is designed to foster collaboration among federal programs, states, and partners, while streamlining planning at landscape and regional scales.

Katie Warnell,
Nicholas Institute
for Energy,
Environment &
Sustainability

DOI Nature-based Solutions Roadmap: Strategies, Case Studies, & Resources

Over the past two years, our team at Duke has collaborated with the DOI Nature-based Solutions (NBS) Working Group to develop the DOI NBS Roadmap – a comprehensive resource designed to help integrate NBS throughout DOI's work (but also relevant to a broad audience interested in NBS). The Roadmap brings together information on various NBS strategies, hundreds of case



	studies, and tools and resources to facilitate NBS work throughout the project lifecycle. Initially released as a PDF in 2023, the Roadmap was re-launched as an interactive website with additional content in December 2024. In this session, we'll demonstrate how the Roadmap can help you find relevant background information, example projects, and resources to support NBS project planning, design, implementation, monitoring, and benefits assessment.
Michael Gavazzi, USDA Forest Service	Building Agricultural Resilience to Extreme Events (Gavazzi, McNulty, Callaham) Natural disasters cause billions of dollars in damage to agricultural commodities in the Southeastern U.S. every year. However, resources to reduce risk are often outdated, buried in peer-reviewed literature, or scattered between different resource repositories (e.g., websites, Extension notes, blog posts). The USDA Southeast Climate Hub has developed guidance that synthesizes information from these disparate sources to help farmers, forest landowners, and livestock producers build resilience to and recover from these disturbances, enabling informed decision-making and quicker recovery. This poster will highlight the guides, manuals, and decision-support tools co-produced with subject-matter experts in the region. This includes hurricane preparation and recovery guides for 25 economically important commodities, drought preparation and recovery guides for 10 economically important commodities, a manual for identifying and adapting to salt-impacted lands, and a model for forecasting southern pine beetle outbreaks under different management and climate scenarios. For forest resource managers, we will also share information about an ongoing collaborative project to develop disturbance-specific guidance to better inform preparation for and recovery from natural disasters (e.g., pest and disease, wildfire, drought, flooding) on forest land.
Holly Todaro, U.S. Fish and Wildlife Service	Bridging Boundaries: A State Wildlife Action Plan Data Visualization Tool for Regional Conservation Collaboration Conservation challenges rarely stop at jurisdictional boundaries, yet management strategies are often fragmented across state lines. The State Wildlife Action Plan Data Visualization Tool (SWAP DVT) was developed to address this disconnect by transforming publicly available State Wildlife Action Plan data into an interactive, user-friendly format that supports more coordinated, data-driven conservation planning at regional and national scales. The SWAP DVT is a prototype platform that integrates and standardizes data from all 50 states and 4 territories, organized by the eight required elements of State Wildlife Action Plans. Users can explore and compare species of greatest conservation need, habitats, threats, and conservation actions across political boundaries—helping to identify common priorities, reduce duplication of effort, and align strategies for greater impact. For example, a refuge manager could quickly identify how neighboring states are addressing conservation needs for a species of conservation concern, or explore how similar habitats are being managed in other states. By highlighting opportunities for cross-state collaboration and resource sharing, the SWAP DVT complements state-specific tools and supports scalable conservation planning. The SWAP DVT also functions as a bridge between the 2015 State Wildlife Action Plans and emerging digital conservation platforms, offering a more accessible and adaptable format for current and future planning needs. By enhancing communication, transparency, and coordination across jurisdictions, the tool supports more effective collaboration among federal and state agencies, Tribal Nations, Non-Governmental Organizations, and other practitioners. It provides a practical foundation for aligning conservation efforts and advancing broader regional and national initiatives.
Sarah Love, Northeast CASC	From Framework to Climate-Adaptive Action: Integrating Resist-Accept-Direct (RAD) and Structured Decision Making (SDM) Using the Back Bay National Wildlife Refuge Case Study Climate change is driving unprecedented non-stationarity across ecosystems, requiring natural resource managers to make complex decisions under increasing uncertainty. While the



	Resist-Accept-Direct (RAD) framework provides a valuable lens for addressing ecological transitions, it is not a process for making decisions. Structured Decision Making (SDM), by contrast, is a well-established process grounded in decision theory, risk analysis, and uncertainty assessment. SDM can be used to operationalize RAD by helping managers define problems, identify objectives, develop and evaluate alternatives, and make transparent, values-driven decisions.
Theme: Impacts on Habitats, Animals, People	
Benjamin Branhoff, U.S. Forest Service	Post-Hurricane Forest Disturbance, a Rapid Response Tool Forest stakeholders, both public and private, have long sought the Forest Service's input on post-hurricane disturbance, loss, and mortality estimates. Such information is important when planning recovery efforts, and thus highly valued by the forestry community in frequently affected areas. For years, the Forest Inventory and Analysis program (FIA) with the US Forest Service Southern Research Station has worked closely with state and regional foresters across the southeast and Caribbean to provide rapid forest disturbance assessments following major hurricane landfalls. Here, we bring these assessments into the modern era, through the use of cloud computing and predictive modeling. We have built a web-based tool that ingests real-time data from the National Hurricane Center to reconstruct hurricane wind-swaths and apply them to the most recent forest inventory data from FIA. The tool allows users to control various input parameters, such as forest types (oak, pine, cypress, etc.) and variables (acreage, biomass, volume, etc.) of interest, and produces a draft report outlining the extent of potential wind damage according to the user inputs. The tool also has the option of producing maps indicating where damage and mortality are most likely to have occurred. We aim to continue developing this tool and will begin testing on storms that make landfall in the 2025 season, as well as running additional analyses to further understand forest disturbance and recovery as they relate to tropical cyclones.
Steve Irwin, Sonoma Technology	Mitigating Air Quality Impacts from Prescribed Fire in the Flint Hills, Kansas During spring in the eastern Kansas Flint Hills, ranchers and land managers conduct prescribed fires on the native grasslands, a practice that dates back several centuries. The primary objectives of prescribed fires are the removal of dead and invasive vegetation, limiting wildfire intensity, and allowing new, more nutrient-rich vegetation to grow. Often within weeks of the prescribed fire being conducted, cattle consume these new, nutrient-rich grasses, resulting in enhanced livestock performance for ranchers. Air quality impacts from Flint Hills burning have gained more attention in eastern Kansas and neighboring states. To help ranchers and land managers mitigate the air quality impacts in populated areas surrounding and downwind of the Flint Hills, the Kansas Department of Health and Environment (KDHE) commissioned Sonoma Technology to develop a smoke model and decision support website that provides daily dispersion model predictions of county-based smoke impacts from potential fires. Ranchers and land managers can refer to a map that displays potential smoke impacts of burning specific to their area on surrounding air quality. They can also enter initial fire conditions and view model animations that show where resultant smoke would be transported from potential fires in their region. Along with the smoke dispersion model output, the website also contains a daily forecast discussion provided by Sonoma Technology air quality meteorologists, which includes a summary of expected meteorological conditions, smoke transport patterns, and communities that may experience smoke impacts over the following 72 hours. In this tool demonstration, a meteorologist from Sonoma Technology will provide an overview of the KDHE Flint Hills smoke dispersion model and website. We will also discuss air quality trends in the Flint Hills over the past two decades and the potential for developing similar decision support systems for other parts of the United States, including the Southeast.
Theme: Changing Southeastern Landscapes	



Jared Bowden,
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Rainfall Intensity, Duration and Return for Observations and Projections Tool for North Carolina

This tool provides future point rainfall estimates for different storm durations and exceedance probabilities (e.g., 100-year storm) for NC. Future rainfall estimates are provided for two periods (mid-century and end-of-century) and two greenhouse gas emission scenarios (moderate and high scenarios). The tool enables side by side comparison of precipitation intensity and frequency changes between observations and future conditions as well as table values for easy comparison of plausible changes in precipitation extremes.