Collaboration and Cooperation in Protecting Resources and Ecosystems
March 15, 2018 presented via ForestryWebinars.net

Webinar Presenter: Allen, Joshua

Presentation Title: Evaluating the Effectiveness of the L31N Canal Seepage Barrier in the Florida Everglades.

Author(s): Allen, Joshua, Florida International University, Miami, Florida; Price, René (United States)

Abstract: Hydrologic conditions in Northeast Shark River Slough (NESRS), in Everglades National Park (ENP), has been subject to many alterations over the last century that resulted in a reduction of freshwater inflows. Through the Comprehensive Everglades Restoration Plan, two projects were undertaken in order to provide additional water to the region and to reduce its seepage out of ENP. These projects included: 1) a one-mile long bridge constructed along the northern boundary of ENP to deliver additional fresh water from the Tamiami Canal into NESRS; and 2) a two-mile long groundwater seepage barrier constructed along the northeastern boundary adjacent to the L31N canal and extending to five miles long in 2016. The goal of this study was to determine the effectiveness of the seepage barrier in preventing groundwater from NESRS discharging to the adjacent L31N canal. The project goal was assessed by using the stable isotopes of oxygen as a tracer of water to detect groundwater discharge to the canal. In addition, groundwater discharge to the canal was estimated from a water balance.Groundwater and surface water were sampled in October 2015 and again in October 2017. Water samples were analyzed for the stable isotopes of oxygen and hydrogen using a Los Gatos Liquid Water Analyzer. For the water balance, hydrologic data were obtained from the South Florida Water Management District Data Base DBHYDRO. The data included canal inflows and outflows along sections of the L31N canal, water levels and climate data (rainfall and evapotranspiration) from a weather tower located about X km south. The isotopic values of d18O of surface water and groundwater corroborated the water balance calculations that groundwater seepage to the canal was greatly reduced in the region of the seepage barrier. An investigation of water levels in the NESRS indicated higher water levels in 2017 compared to 2015, suggesting that the restoration attempts were effective in retaining water in this region of ENP.

Thematic Area: Basic Research

Webinar Presenter: Amspacher, Katelyn

Presentation Title: The Translocation of Southern Fox Squirrels (Sciurus niger niger) to Parris Island, SC.

Author(s): Amspacher, Katelyn, Marshall University, Huntington, West Virginia; Holloway, John; Wiggers, Ernie; Waldron, Jayme; Welch, Shane (United States)

Abstract: Southern fox squirrels (Sciurus niger niger) are closely associated with the longleaf pine ecosystem of the Southeastern Coastal Plain. However, the decrease and fragmentation of this ecosystem has led to a decline in southern fox squirrel numbers throughout its range. Restoration of this species is a priority among many conservation groups. Our project aimed to use translocation as a conservation tool to establish a breeding population of southern fox squirrels on Parris Island, South Carolina, a site that historically would have supported fox squirrels but had none prior to this study. We translocated 62 southern fox squirrels (31 male, 31 female) from 5 trapping locations to Parris Island during 2016-17. Squirrels were monitored = 90 days post-release. Translocated squirrels had a 50% survival rate, and home ranges fell within previously reported ranges for the sub-species. Some evidence of breeding was observed during the first breeding season.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Briceno, Henry

Presentation Title: TOTAL PHOSPHOROUS LEVELS IN SURFACE WATER DISCHARGES TO SHARK RIVER SLOUGH, EVERGLADES NATIONAL PARK.

Author(s): Briceno, Henry, Florida International University, Miami, Florida;

Abstract: TOTAL PHOSPHOROUS levels in surface water discharges to Shark River Slough, Everglades NATIONAL PARKHenry Briceño1, Piero Gardinali1 and Dilip Shinde2, Reinaldo Garcia11 Southeast Environmental Research Center. Florida International University, 11200 SW 8th St, OE-148Miami, FL 33199; bricenoh@fiu.edu; regarcia@hydronia.com; gardinal@fiu.edu; telephone: 305 348 12692 South Florida Natural Resources Center, Everglades National Park, US Department of Interior950 N Krome Ave, 3rd Floor Homestead, FL-33030-4443. Dilip_Shinde@nps.gov; telephone: 305-224-4201Water levels in Everglades marshes and canals are closely tied to management and climate variability. Furthermore, as stages in the Water Conservation Area 3A (WCA-3A) start decreasing, the L67A canal rather than the marsh conveys the majority of the flow into the Everglades National Park (ENP). Canal water is typically of poorer quality than marsh water as it does not undergo much natural marsh filtering to remove nutrients. Current studies have identified a strong correlation between Total Phosphorous (TP) at S333 (inflow structure to ENP) and canal stage and WCA-3A stage. Low stages in marsh and canals are associated with high TP levels at S333, and the conditions and mechanisms that cause elevated TP are unknown. The purpose of this study is to identify the sources of the elevated TP at S333 and, if possible, characterize them as to be from either local effects and conditions at S333 or upstream of S333 within the L67A Canal, L29 Canal or the marsh. Results to date suggest that stirring of bottom sediments at low stage and high flow velocity, especially from the bottom of L29 canal (Tamiami Canal), have the potential of re-suspending and remobilizing nutrient-rich sediments that accumulate at the bottom of that canal. These phosphorus- and organic-rich sediments can be rapidly transported downstream while contributing part of their P load to canal waters to finally reach the park. Besides stage, preliminary results suggest that, pH, time of the day (insolation?) and turbidity are closely related to water TP concentrations, suggesting a biogenic mediate process as an additional mechanism of TP control. Furthermore, precisely defined stage level and time of the day thresholds seem to modulate these physical-chemical and compositional parameters.Next step in this research is to combine high frequency flow velocity measurements of bottom currents, physical-chemical monitoring and sediment sampling with high resolution GPU-based 2D hydrologic models with flexible-mesh (0.5 m to 1 m) to capture the complex water velocity fields, and pollutant concentration patterns.Contact Information: Henry O. Briceño, Florida International University, Southeast Environmental Research Center, 11200 SW 8th St, Miami, FL 33199, USA. Phone: 305-348-1269, Email: bricenoh@fiu.edu

Thematic Area: Basic Research

Webinar Presenter: Carroll, John

Presentation Title: Interactions between an oyster pest and an oyster parasite.

Author(s): Carroll, John, Georgia Southern University, Statesboro, Georgia;

Abstract: The eastern oyster, Crassostrea virginica, provides a number of ecosystem services and is an important commercial fishery species along US East and Gulf Coasts. Unfortunately, their populations have declined dramatically, due to overharvest, habitat loss, and disease. As both oyster restoration efforts and aquaculture of oysters continues to increase throughout their range, it is important to consider the impacts of a number of potential oyster pests, including the boring sponge Cliona spp. and the pea crab Zaops (Pinnotheres) ostreum on oyster populations. Both of these pests have been demonstrated to reduce oyster growth, condition, and in some instances, reproductive output. Boring sponges in particular are a major concern for both oyster growers and managers, and our monitoring efforts have suggested that pea crabs might be more prevalent in sponge-infested oysters. We conducted an observational study to

determine if there was any relationship between pea crab prevalence and sponge presence, and to examine whether the presence of both pests had synergistic effects on oyster condition. Across two very different systems (NC and NJ), sponge infested oysters were more likely to have a pea crab than the background population, both reduced oyster condition in isolation, and the effects were additive.

Thematic Area: Basic Research

Webinar Presenter: clendenin, michelle

Presentation Title: Coastal Zone Survey Initiatives.

Author(s): clendenin, michelle, USDA-Soil Science Division, raleigh, North Carolina;

Abstract: There are current needs for reliable coastal zone soil data such as spatial mapping, tabular data, and interpretations which can be used for mitigating hazards, creating resource inventories, guiding restoration efforts, and tracking environmental changes. A major limitation to science based management of shallow water habitats and near shore areas has been a lack of definitive information on the properties and spatial distribution of subaqueous and coastal wetland soils, as well as more detailed soil data on adjacent terrestrial areas. Coastal areas are often characterized by high population densities, corresponding real estate values, susceptibility to climatic changes combined with an ever increasing demand for sustainable fisheries. Reliable soil survey data can benefit more non-traditional USDA-NRCS customers, and promote tools which facilitate conservation and restoration.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Coburn, Andy

Presentation Title: Mapping beach nourishment episodes and related sediment sources.

Author(s): Coburn, Andy, Program for the Study of Developed Shorelines, Cullowhee, North Carolina;

Abstract: The Program for the Study of Developed Shorelines (PSDS) at Western Carolina University has developed and implemented a methodology to accurately illustrate the spatial and temporal distribution of sand emplacement episodes (beach nourishment) and associated sources of sediment along US Atlantic and Gulf coast shorelines since 1990. To accomplish this task, beach nourishment episodes in the PSDS beach nourishment database concluding after 1990 were extracted, and each episode's relevant attribute data (month and year of completion, nominal and real cost, volume of sediment emplaced, length of shoreline impacted) was scrutinized for accuracy. Identified errors were rectified as necessary, and confidence levels ranging from low to high were applied to indicate the veracity of metadata associated with each beach nourishment episode. Polygons delineating the geospatial footprint of sediment emplacement for each vetted beach nourishment episode, along with the area from which sediment extraction was permitted for each corresponding nourishment episode, were created using the best available data obtained through site visits, research and comprehensive literature searches. Levels of confidence analogous to those applied to metadata were used to convey the precision of each delineated polygon based on the age, type and quality of data used. Beach nourishment episode metadata and created geospatial data were maintained in an Excel spreadsheet and imported into ArcGIS by state. The resulting product is a georeferenced GIS database delineating the geographic extent of sediment emplacement and corresponding sediment sources for all identified beach nourishment episodes along the US Atlantic and Gulf coasts since 1990.

Thematic Area: Basic Research

Webinar Presenter: Estes, Dwayne

Presentation Title: The Southeastern Grasslands Initiative: Charting A New Course for Conservation in the 21st Century.

Author(s): Estes, Dwayne, Austin Peay State University/Southeastern Grasslands Initiative, Clarksville, Tennessee;

Abstract: The southeastern U.S. grasslands are imminently threatened. They supportapproximately half of the rare plant communities, two-thirds of the rare plants, and one-third ofthe rare terrestrial vertebrates in the region. Several groups of organisms, especially birds andpollinators, are in steep decline due to the loss of grasslands and related open habitats. Yet, inspite of the tremendous needs of these species, it seems that much of the focus on conservation, atleast in many parts of the South, is still overwhelmingly devoted to forests and forested wetlands.The Southeastern Grasslands Initiative (SGI), established in January 2018, is working to elevatethe profile of grasslands and grassland-related communities across a 21-state region of the Southin an effort to help chart a new course for conservation in the 21 st century. SGI has five primarygoals: (1) to establish itself as a clearinghouse for information related to the conservation,research, history, and biodiversity of Southern grasslands; (2) to work with our partners inconservation to identify priorities for grasslands conservation and research; (3) to provide on-the-ground coordination, education, and leadership across our region by employing the PlantConservation Alliance model; (4) to lobby for continued support of grasslands conservation fromlocal to national levels; and (5) to become a granting organization whereby we hope to offergrants to empower conservation at a scale not presently possible. SGI is currently working withand seeking support from a variety of partners including private philanthropic foundations,corporations, non-profit conservation organizations, and state and federal government agencies.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Franklin, Jennifer

Presentation Title: Vegetation Management on the C & O Canal.

Author(s): Franklin, Jennifer, University of Tennessee, Knoxville, Tennessee;

Abstract: A survey of vegetation in campsites and visitors centers on the Chesapeake and Ohio Canal National Historic Park was completed in the summer of 2017, to provide baseline data on forest health. The forest is primarily a mature to over-mature riparian hardwood overstory, with good regeneration of native tree species and a healthy and diverse understory. The assessment suggersted that the ecosystem services provided by the park may be enhanced by promoting the growth of native perennial plants. Units were identified within the large land area that is currently maintained in non-native grasses for conversion to native vegetation, and restoration plans were completed for these. A restoration plan was also created for riparian areas in which heavy foot traffic has resulted in a degradation of understory vegetation. GIS shapefiles delineating vegetation management zones were created for each site. These provide baseline measurements of land area under different management regimes, and along with vegetation and soil data provide a foundation on which to base long term studies of restoration success. The project provided training on restoration planning for a graduate student, and provided a case study for use in an undergraduate course in Applied Ecosystem Restoration.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Garcia, Reinaldo

Presentation Title: Hyper-resolution Water Pollution Assessments in Canals of the Everglades Water Conservation Area 3A using High Performance Modeling.

Author(s): Garcia, Reinaldo, Hydronia, LLC, Pembroke Pines, Florida;

Abstract: Hyper-resolution Water Pollution Assessments in Canals of the Everglades Water Conservation Area 3A using High Performance Modeling Reinaldo Garcia, PhDHydronia, LLC. Florida, USAE-mail: regarcia@hydronia.comPhone: (954) 682 8736AndHenry Briceño, PhDProfessorSoutheast Environmental Research Center & Department of Earth and EnvironmentFlorida International University11200 SW 8th St, OE-148Miami, FL 33199305 348 1269bricenoh@fiu.eduAbstractFlood and water pollution assessments using two-dimensional (2D) models were until recently forced to use relatively coarse resolution due to limitations in bathymetric data, and exceedingly low performance of sequential computer codes. However, often there is a need to use high resolution models in areas where many small canals, and terrain features drive and control water circulation with a significant impact on the spatial and temporal distribution of pollutants. The increased availability of high resolution bathymetric surveys, and novel water velocity and pollutant concentration instrumentation, has brought the opportunity to use flexible-mesh models with cells small enough to ensure capturing the complex environment. Still, many numerical modeling tools sometimes require days if not weeks to run typical simulations. GPU-based 2D hydrologic and hydraulic models have proven able to accelerate simulations more than 100 times with respect to conventional models, opening new opportunities for sub-meter evaluations. This presentation will discuss hyper-resolution pollutant distribution simulations in coastal areas with high performance computing models using Graphic Processing Unit parallelization. The models use unstructured meshes that can handle millions of computational cells ranging from less than 0.5 m to several meters. These meshes can resolve flow and determine solute distribution at canals, culverts, bridges, and over highly irregular bathymetry.We present preliminary results of applications to canals in the Everglades Water Conservation Area 3A (WCA-3A). Water levels in Everglades marshes and canals are closely tied to management and climate variability. Furthermore, as stages in the WCA-3A start decreasing, the L67A canal rather than the marsh conveys the majority of the flow into the Everglades National Park (ENP). Canal water is typically of poorer quality than marsh water because canal water has not benefitted from the marsh filtering removal quality of nutrients. Current studies have identified a strong correlation between Total Phosphorous (TP) and canal stage at structure S333 (inflow structure to ENP) of WCA-3A stage, suggesting that a set of hydraulic conditions may be responsible for the TP spikes observed in the water column. Initial applications of the high-resolution model demonstrate that it can simulate extremely detailed water velocity fields, and pollutant concentration patterns, and highlight the importance of mesh resolution to accurately assess pollutant mitigation solutions.

Thematic Area: Basic Research

Webinar Presenter: Gleason, Daniel

Presentation Title: Drifting for knowledge: A test of the "Outwelling Hypothesis" resulted in interesting science and unique educational opportunities in coastal Georgia.

Author(s): Gleason, Daniel, Georgia Southern University, Statesboro, Georgia; Cohen, Risa (United States)

Abstract: The idea that estuarine waters deliver subsidies in the form of dissolved and particulate materials to offshore habitats is known as the "outwelling hypothesis." This hypothesis was proposed nearly 50 years ago and was quickly accepted despite the fact that there was little empirical evidence to support it from the outset, and that it was difficult to test. We aimed to improve understanding of the potential for dissolved and particulate materials to be exported from one of the largest river outflows on the Atlantic seaboard, the Altamaha River Estuary, to critical offshore habitats of the South Atlantic Bight. In carrying out this project, we partnered with the Coastal Resources Division of the Georgia

Department of Natural Resources and Gray's Reef National Marine Sanctuary. Transport of dissolved substances out of the estuary was assessed by releasing a non-toxic water tracing dye, rhodamine WT, into the Altamaha River outflow during times of low (Fall) and high (Spring) freshwater discharge in two consecutive years. The direction of dye dispersion was determined using fluorometers moored at natural and artificial reef sites offshore. The movement of larger components, such as fragmented marsh grass, was simulated with satellite-enabled drifters constructed from basic and mostly biodegradable materials. Workshops were conducted to train secondary school teachers in the construction and deployment of these drifters. The teachers then participated in the offshore activities and released these drifters coincident with the dye deployments. A GPS locator secured atop each drifter documented its position at regular intervals and the accumulated data were available to the participating teachers for use in math and science classes in real time. These drifters provided not only educational opportunities, but also data on particle movements that were compared to dispersal of the dissolved rhodamine WT dye. Results demonstrated that both the dye and drifters escaped the southerly flow of the longshore current during the spring deployments and were transported west and north. For example, in May of 2014, the dye was transported to a reef site 48 km north of the drop site in 4 days and the drifters ended up in Atlantic waters well-east of Massachusetts in 92 days. In contrast, neither the dye nor drifters made it to offshore reefs in September and were either trapped within the estuary or hugged the coastline as they were pushed south. These findings suggested that the conduits exist for the highly heterotrophic reefs off the Georgia coast to receive estuarine subsidies, but that anthropogenic or natural processes that reduce river discharge rates could disrupt these connections. Methods and findings from this study were incorporated into several products, including drifter building training manuals and instructional videos, that were made available to the education and outreach arms of our government partners. Furthermore, this study was incorporated into an interactive multimedia display at the Georgia Southern University Museum where it is available to over 16,000 visitors per year.

Thematic Area: Basic Research

Webinar Presenter: Halls, Joanne

Presentation Title: Geospatial and Unmanned Aerial System (UAS) Applications to Environmental Research.

Author(s): Halls, Joanne, , , ; Olsen, Steele (University of North Carolina Wilmington, Wilmington, NC, United States); Pricope, Narcisa (United States)

Abstract: Government agencies are increasingly seeking services to provide drone imagery and geospatial analysis data products. Urban development and land use planning, environmental hazards (such as floods, fires, or other catastrophic events) coupled with population and infrastructure vulnerability, and conservation mapping and management, are just a few examples. The University of North Carolina Wilmington has recently established a geospatial and drone analysis service group to provide very high resolution visual and multispectral imagery and geospatial data analytics. Our mission is to provide value-added imagery and geospatial products that solve a problem or address a need. We have researched and designed workflows for capturing and photogrammetrically processing several types of unmanned aerial systems (UAS) datasets resulting in high resolution imagery that outperforms satellite imagery and can be flown on demand. Secondly, we have used publicly available data to develop spatial analytics and statistical models for quantifying trends, patterns, and predicting distributions. Some examples include: 1) spatial statistics that computes the relationship between independent variables and the death rate due to Parkinson's disease in the United States where each location has a unique prediction equation; 2) a model of population vulnerability to flooding for the coastal United States; 3) a statistical model of population vulnerability at the building scale using LiDAR data; 4) vegetation change through time to identify the rate of transition from one type (e.g. freshwater wetland) to another (e.g. salt marsh). These workflows are tailored to provide specific products that can assist in monitoring and decision-making within a variety of sectors that manage and conserve natural and cultural resources. This presentation will describe the purpose for the UNCW Geospatial and Drone Analysis Service Group and give specific examples of the work that has been accomplished. We train undergraduate and graduate students in geospatial technologies and imagery processing using applied research

and our goal is to build our program by developing new collaborations. Applied research is a focal point at UNCW and any opportunities we develop will be used to further the mission of the university by funding students and garnering research resources.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Jungen, Michael

Presentation Title: Long-distance Translocation of Eastern Diamondback Rattlesnakes (Crotalus adamanteus).

Author(s): Jungen, Michael, Marshall University, Huntington, West Virginia; Welch, Shane; Holloway, John; Wiggers, Ernie; Waldron, Jayme (United States)

Abstract: The eastern diamondback rattlesnake (Crotalus adamanteus; EDB) is a long-lived, large-bodied pit viper endemic to southeastern pine savannas and woodlands. The EDB is declining, and conservation efforts, including long-distance translocation, are being undertaken to aid in the species' recovery. Long-distance translocation to re-establish or supplement populations of viperids has yielded mixed results, with survival averaging less than 50%.We translocated EDBs (N = 21) from a sea island population to a pine savanna restoration area located on private property in South Carolina, 2016-2017, and estimated post-translocation survival probability. This study will further our understanding of the efficacy of translocation as a conservation tool for EDB restoration.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Larson, Lincoln

Presentation Title: Citizen Science and Conservation Outcomes: The Multi-project Effect.

Author(s): Larson, Lincoln, North Carolina State University, Raleigh, North Carolina;

Abstract: Citizen science projects have the capacity to influence conservation in two ways. First, they help to generate new knowledge (often through crowd-sourced data collection) to inform scientific management and decision making. Second, they may create a more informed and empowered citizenry eager to engage in environmental stewardship and to help address the complex conservation challenges of the future. Few studies have systematically explored this second pathway. To investigate factors that impact citizen science's broader impacts on conservation outcomes, we surveyed participants in Audubon's 116th Christmas Bird Count (CBC) and asked them about their participation in a variety of conservation behaviors (e.g., donating money, educating others, participating in environmental groups, restoring habitats).Based on over 3,000 responses, our multinomial regression models showed that, when controlling for socio-demographic variables, the best predictors of conservation behavior were participant's environmental efficacy (i.e., perceptions about one's ability to improve the environment) and their experience participating in different types of citizen science projects. Individuals who participated in projects spanning different disciplines (multi-topic, n=962) reported significantly greater odds of engaging in both high (OR = 3.05, p<0.001) and moderate (OR = 1.79, p<0.001) levels of conservation behavior when compared to individuals who only participated in bird-related projects (bird-only, n=1571). In fact, multi-topic participants reported significantly higher levels of participation in all nine conservation behaviors. These insights highlight strong associations between citizen science participation – particularly transdisciplinary project participation – and environmental stewardship. Ultimately, these data show that citizen science can be a valuable resource for advancing both scientific knowledge and conservation outcomes.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Lookingbill, Todd

Presentation Title: Community-engaged science and art: Richmond National Battlefield Bioblitz.

Author(s): Lookingbill, Todd, University of Richmond, Richmond, Virginia;

Abstract: As one of the Centennial Initiatives, National Parks all over the country hosted BioBlitz events to discover and document as many species as possible within a 24-hour period. As part of the first of its kind Bioblitz at the Totopotomoy Creek unit of Richmond National Battlefield Park, over 100 citizen-scientists surveyed the park's flora and fauna. Participants in the community event included three classes and 10 faculty experts from three local universities. The event was also open to the public and was attended by volunteers ranging from grade school children to Master Naturalists. Using the mobile crowd-sourcing technology app iNaturalist to leverage the global community of scientists online, we were able to verify the presence of nearly 400 species of plants, birds, reptiles, amphibians, mammals, fish, arachnids, fungi, and insects. To further the project goals of education about biodiversity, conservation, and responsible stewardship, the data from the event were visualized in an 8-foot-tall pie chart comprised of thousands of broken toy pieces. The museum installation entitled "TMT: Too Many Toys" additionally invoked the complex ecology of plastic toy reclamation. Like the data collection itself, the material for the art installation was crowd-sourced; broken or unwanted small plastic toys were collected from parents in the artist's local community of Chicago and repurposed for the display. Toys were color-sorted and arranged in taxonomic groups to reflect the Bioblitz findings logged in iNaturalist. Interestingly, many of the toys had a military theme (e.g., army men, fighter jets, etc.), which ties in with the battlefield location of the Bioblitz. The project, thus, engaged local communities in Richmond and Chicago via the global iNaturalist app to collect and display baseline inventory data for a recently acquired unit of the National Park Service.

Thematic Area: Education

Webinar Presenter: McCreary, Allie

Presentation Title: Exploring the potential of expert elicitation to inform climate adaptation of cultural resources.

Author(s): McCreary, Allie, , , ; Seekamp, Erin (NC State University, Raleigh, NC, United States); Fatoric, Sandra (United States)

Abstract: Cultural resource management involves conservation of historic structures and landscapes that hold multiple meanings for various populations (past residents, visitors, etc.). Climate change exacerbates the challenges of cultural resource management by exposing aged resources to increased natural threats (e.g., storm-related flooding, storms, and sea level rise). This is especially true in coastal areas, such as Cape Lookout National Seashore (CALO), situated along the barriers islands of North Carolina, USA. The cultural resources (CR) at CALO are maintained by the National Park Service (NPS), a federal agency that is charged with preserving natural and cultural resources for the enjoyment, education, and inspiration of present and future generations. As such, the NPS (and other agencies involved in CR management) have a vested interest in understanding the best practices regarding cultural resource adaptation and how to efficiently select the suitable adaptation strategies for the diverse structures they manage. A spectrum of adaptation strategies are available to CR managers from 'leaving things as they are' or documenting and releasing buildings to actively managing the change by improving structures' resilience or relocating key resources. While the NPS, specifically CALO administrators and planners, are proactively considering various adaptation options and scenarios, additional input from cultural resource experts will enhance how site-specific personnel consider historic structures' significance, vulnerability, and the best fit adaptation strategy. To explore the feasibility of remotely gauging experts' opinions on adaptation of cultural resources, an online questionnaire was administered to experts actively working in the field of cultural resource management within the southeastern USA. The questionnaire explored how CR managers are evaluating vulnerability and site significance and, consequently, selecting adaptation strategies for various buildings within CALO. A total of 38 usable responses were analyzed to explore the influence of building type, manager characteristics, building significance

and building vulnerability on the selection of various adaptation strategies. The small sample size allows for exploratory understanding of the influential predictors of adaptation strategies. For example with buildings that are perceived as moderately vulnerable, managers most likely seek to actively manage change and improve resilience, while low and a high vulnerability result in a tendency for more passive management (leaving things as they are or documenting and releasing, respectively). This and other findings will be presented to shed light on the key antecedents of selecting cultural resource adaptation strategies for coastal resources. Additionally, a discussion of the research design, using storytelling and geovisualizations to contextualize cultural resources and climate change to remote experts, will illustrate how to best leverage the expertise of off-site CR managers. This study can be used to inform future cultural resource management and research design.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: McRae, Susan

Presentation Title: Royal flush: behavior, ecology and management of the king rail.

Author(s): McRae, Susan, East Carolina University, Greenville, North Carolina;

Abstract: Secretive marsh birds in the rail family have largely eluded detailed study. Yet, studies that go beyond reporting occupancy are crucial for helping to identify and mitigate threats to rail populations. Migrant and resident populations of the king rail Rallus elegans breed in freshwater and brackish marshes. Loss of wetland inland habitat has led to remnant breeding populations being limited mostly to larger tracts of coastal marshes where this globally Near Threatened species faces further environmental assaults. We have studied the behavior and ecology of a resident population of king rails breeding in a managed coastal wetland for the last eight years. We find and monitor nests to characterize nest site preferences within the management framework, and to determine annual variation in reproductive effort and success. Our CESU-funded work helped uncover the king rail's seasonal variation in habitat use and home range dynamics. Radio-telemetry of adults during the breeding and non-breeding periods revealed home range size and movements, as well as previously unrecognized sex differences in habitat use. Intensive study of nesting pairs has revealed plasticity in incubation behavior including shading during periods of high ambient temperatures. Parents increase their nest building activity in relation to water level rise, but are limited in their ability to avoid nest flooding when levels rise too quickly. We are currently using this well-studied population to validate the use of autonomous recording units for passive surveys to estimate the density of breeders. Long-term monitoring of this population enables us to contribute to the development of more accurate and less invasive methodology for estimating breeder density of rail populations throughout their range.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Meyer, Kenneth D.

Presentation Title: SNAIL KITE MOVEMENTS AND PREY DYNAMICS: HABITAT ASSOCIATIONS, MULTIPLE RESIDENCE AREAS, AND SUSTAINABLE MANAGEMENT OF A RANGE-WIDE HABITAT NETWORK.

Author(s): Meyer, Kenneth D., Avian Research and Conservation Institute, Gainesville, Florida;

Abstract: Kenneth D. Meyer and Gina M. KentAvian Research and Conservation Institute, Gainesville, FL, USAThe U.S. population of Snail Kites, limited to peninsular Florida, declined substantially and became federally listed as Endangered in 1967 following massive hydrologic and agricultural changes to the Greater Everglades. The distribution of Snail Kites within Florida is a network of discrete areas of which only a portion are occupied at any given time. The relative quality of potential Snail Kite foraging sites in Florida, reflected in the density and availability of native and exotic apple snails

(Pomacea species), shifts unpredictably over time due to varying human demands for water, management of aquatic vegetation, and the spatially variable effects of rainfall and droughts. Since 2007, we have collected over 100,000 satellite-telemetry locations for 22 adult Snail Kites, documenting frequent movements of individuals over large portions of the species' Florida range. Such tracking results, combined with the rapid establishment of large, productive breeding efforts in 2015 and 2016 on Lake Okeechobee and high nesting effort and success in a newly created impoundment in central Florida, make the case that Snail Kites are well-adapted to quickly detect and exploit ephemeral, high-quality feeding conditions anywhere in their range when necessitated by local changes in food availability. This large time-stratified telemetry dataset, unique for its long duration, high detection probability, and low observer bias, provides a valuable basis for management planning. Year-round, only 36% of the satellite locations have been within the managed and monitored natural wetlands representing the Snail Kite's historic range. During the nesting season, only 17% fell within these wetlands. The rest of the time, occupied areas consisted of water-management canals, agricultural drainage ditches and impoundments, borrow pits, retention ponds, storm-water treatment areas (STAs), and remnants of natural wetlands embedded within landscapes dominated by agricultural and residential development. None of these areas are managed with consideration for Snail Kites, nor has their use been considered when assessing landscape-scale availability of prey. Furthermore, financial and logistic limitations preclude inclusion of these foraging habitats in the challenging and expensive monitoring effort devoted to this species. Sustaining the U. S. Snail Kite population will require large-scale habitat management that maintains a network in which site-specific snail densities and availability may vary substantially over time without jeopardizing kite population growth. This will require monitoring changes in Apple Snail populations and the aquatic communities on which they depend during Everglades restoration. Our ongoing remote-tracking research on Snail Kites is now linked to a study of how restoration and water-management actions influence Apple Snails. The purpose of this five-year project, which we assumed in 2017, is to help identify hydrologic targets in the Everglades Restoration Transition Plan (ERTP) that will increase Apple Snail production and, in turn, that of the Endangered Snail Kite.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Richardson, Rob

Presentation Title: Aquatic plant management in the United States Army Corps of Engineers Wilmington District Lakes.

Author(s): Richardson, Rob and Foley, Kara. North Carolina State University, Raleigh, NC

Abstract: Aquatic invasive species monitoring and management practices are important for the maintenance of high-functioning and sustainable aquatic ecosystems. This project aims to identify and manage aquatic invasiveplant populations as well as promote the establishment of native aquatic plant communities in four of theUnited States Army Corps of Engineers Wilmington District Lakes which include: Philpott Lake (Bassett, VA),Falls Lake (Wake Forest, NC), B. Everett Jordan Lake (Raleigh, NC), and W. Kerr Scott Lake (Wilkesboro, NC). The results of preliminary point-intercept and bio-volume surveys, aquatic invasive species control methods,and the establishment of native plant populations at these geologically young water bodies will be discussed.At Philpott Lake, the northernmost reservoir in this group of study sites, dioecious hydrilla (hydrilla verticillata(L.f.) Royle) was positively identified at 38% of the surveyed points. The tuber bank dynamics andmanagement strategies of this uncharacteristic population of dioecious hydrilla will also be addressed.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Sah, Jay

Presentation Title: Vegetation dynamics along hydrologic gradients in marl- and peat-dominated wetlands in Everglades, FL.

Author(s): Sah, Jay, Florida International University, Miami, Florida; Ross, Michael (United States)

Abstract: In the Everglades, where plant communities are primarily arranged along hydrologic gradients, the direction and magnitude of temporal change are determined by the extent of climatic variability and management-induced hydrologic alterations. While prolonged and extreme wet events result in loss of upland woody vegetation, persistent drying conditions initiate an opposite trend, toward an expansion of sawgrass within the sloughs, and the dominance of trees over herbaceous plants on ridges and in marl prairies We studied the interaction between hydrology and vegetation over a 17-year period, between 1999/2000 and 2017 along the marl prairie-slough gradient and within seasonally flooded portions of tree islands in Shark Slough, Everglades National Park. Using a suite of multivariate techniques, including trajectory analysis, we examined the extent and direction of vegetation change over time by quantifying the displacement of sites in relation to the hydrologic gradient in ordination space.Along the marl prairie-slough gradient, where vegetation composition correlates with changes in the relative abundance of C3 and C4 species, regional differences in management strategies influenced hydrologic regimes, resulting in spatially differentiated shifts in vegetation composition within both landscapes. In the Marl Prairie landscape, the habitat of the Cape Sable seaside sparrow, a federally listed endangered species, our study over 12 years showed that sites located west of Shark Slough showed a shift in species composition indicative of drying condition, whereas sites east of the slough exhibited the opposite trend. In the peat-dominated ridge and slough portion of the gradient, relatively dry conditions in the past decade caused an apparent increase in spikerush and sawgrass cover at the expense of open water sloughs in comparison to late 1990s. Moreover, within the complex tree island landforms, we noted an expansion of woody plants across the full suite of communities, i.e., within the Bayhead Forest, Bayhead Swamp, and Sawgrass Tail portions of the islands. This study has implications for how the marl prairie and ridge and slough landscapes are managed in the Everglades.

Thematic Area: Basic Research

Webinar Presenter: Seekamp, Erin

Presentation Title: Optimizing heritage preservation decisions: A decision analytic approach for climate adaptation planning in coastal zones.

Author(s): Seekamp, Erin, NC State University, Raleigh, North Carolina; Post van der Burg, Max; Eaton, Mitch; Xiao, Xiao; Fatoric, Sandra; McCreary, Allie (United States)

Abstract: Climate change exacerbates ongoing threats to heritage preservation posed by deferred maintenance and other fiscal constraints. For example, cultural resources in vulnerable coastal zones are threatened by flooding and erosion from storm surge and sea level rise, which necessitates additional fiscal allocation decisions for climate adaptation to maximize preservation within cultural landscapes. The National Park Service (NPS) is currently operating under policy guidance to focus climate adaptation efforts on the most vulnerable and the most significant cultural heritage assets. However, no transparent process exists for assessing trade-offs between protecting the most vulnerable cultural resources and protecting the most historically significant cultural resources under budgetary constraints. This paper provides an overview of a decision support model, the Optimal Preservation Model (OptiPres Model), designed to assist in adaptation planning for one specific set of cultural resources: buildings listed on the National Register of Historic Places. The study is part of an ongoing collaboration between researchers at NC State University, USGS and the DOI Southeast Climate Science Center, and the National Park Service. The OptiPres Model was first developed as a pilot study at Cape Lookout National Seashore, which used a co-production process with NPS personnel and other

stakeholders to frame the problem (maximize the historic value across the landscape over a 30-year planning horizon), develop a framework for measuring relative historic value (significance and use potential), identify feasible adaptation actions and estimate their costs, integrate vulnerability assessment data, and build an optimization model that accounts for dynamic conditions and the effects of actions on decreasing vulnerability while either enhancing or detracting from a building's relative historical value. We present results and visualizations from the OptiPres Model to demonstrate the consequences and timing of optimal adaptation actions under various budget scenarios. The OptiPres Model is not intended to be prescriptive; rather, it can be used as one of several information sources (e.g., stakeholder perceptions and preferences) for guiding climate adaptation planning and management. The OptiPres model enhances transparency in managers' decisions regarding tradeoffs between adaptation options under different cost scenarios. As climate changes complicates cultural resource management, science-based decision support tools, such as the OptiPres Model, provide mangers with additional evidence to support how best to maximize heritage preservation given constrained appropriations.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Shedd, Justin

Presentation Title: Integrating Science into National Park Service Resource Management via WebGIS.

Author(s): Shedd, Justin, North Carolina State University, Raleigh, North Carolina; Vukomanovic, Jelena (United States)

Abstract: A strong partnership between scientists and decision makers is essential in order to achieve a shared vision of the National Park Service mission and successfully integrate science into park management. In an effort to improve communication between park resource managers and the scientists that collect data in parks, the NPS Northeast Region's Inventory and Monitoring (I&M) Program is, leading efforts to create map products that will facilitate communication between park managers and scientists. Scientists and managers need a place to visualize, disseminate, share and reliably access the geospatial data they collected or are charged with managing. For example, data originating from local park resource staff, I&M staff, Fire Effects crews, and the Exotic Plant Management Team (EPMT) needs to be accessible to each group in order to apply the best science towards park management. NPS Units of the Mid-Atlantic Network (MIDN) located in Virginia and Pennsylvania were the focus of this agreement.North Carolina State University's Center for Geospatial Analytics (NCSU-CGA) surveyed staff at MIDN NPS Units and Wildland Fire and Aviation Management and EPMT Program leads to understand data collection and structure and to learn about group workflows. NCSU-CGA worked with program leads to ensure development of deliverables that would meet management needs. Final deliverables were developed in the ArcGIS Online (AGOL) platform and utilized hosted feature/map services to facilitate the dissemination of MIDN and EPMT data. These AGOL-hosted webmaps further leveraged ongoing efforts by the NPS Wildland Fire and Aviation Management Program to paint a complete picture of management activity. A web map was developed for each MIDN Park Unit, for a total of eight maps. Each map is accessible on both a desktop (laptop) environments and on mobile devices. The ability to visualize past fire management, exotic plant management, and species data in the field on a mobile device was a key requirement for NPS partners. NCSU-CGA developed training materials and held a webinar to demonstrate the functionality of the developed web maps and assist with creating accounts associated with the NPS AGOL Organization. To ensure web application sustainability and efficient data transfer, best practices were developed and shared with MIDN staff. The collaboratively developed web applications meet resource managers and program needs to spatially locate past management action in order to confidently and quickly address current management needs.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Shew, Roger

Presentation Title: Venus Flytrap (Dionaea muscipula): Populations, Importance of Controlled Burns, and Impacts of Poaching on Plant Distribution and Viability.

Author(s): Shew, Roger, , Wilmington, North Carolina; Shew, Dale; Carl, Angie; Ryan, Dan (United States)

Abstract: Dionaea muscipula, a federal and state species of concern, occurs naturally only in southeastern North Carolina and in northeastern South Carolina within 140 km of Wilmington, NC. The plants occupy habitats that are wet, acidic, and nutrient-poor, with the most common location in the ecotone between the wet pine savannas and pocosins. A five-year study in the Green Swamp of Brunswick County, NC has helped reveal the impacts of seasonal controlled burns and poaching on health, flowering, and numbers of plants. Fourteen plots and four transects from four different savannas were used in the study. Dormant season (winter) burns lead to reduced numbers of flowering plants immediately following the burn, but increased flowering the following year. Growing season (summer) burns mostly show increased numbers of flowering plants the following year as well as increased plant numbers over several years following burns. In the absence of fire, thick grass and thatch lead to a reduction in size and eventual numbers of plants. Habitat management with fire is most important for maintaining large plant numbers. Poaching has varied over the 5-year period with over 50% of the plants removed in some plots and leaving mostly small plants, thus reducing population vitality. Raising the penalty for poaching to a felony (2014) may be a deterrent, but poaching occurred in all three years since that time. Poaching is particularly critical for smaller populations. Well-managed large preserves, such as the Green Swamp, are critical to the plant's viability.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Slocumb, William

Presentation Title: Geospatial Information Science Applications to Resource Management PSAC CESU Program at North Carolina State University.

Author(s): Slocumb, William, NC State University, Center for Geospatial Analytics, Raleigh, NC

Abstract: Contributing Authors: William S. Slocumb, Jason A. Matney, Dr. Charlynne T. Smith, Dr. J. Aaron Hipp, Dr. Ross K. MeentemeyerAbstract: Our collaborative research program focuses on development of Geographical Information System (GIS) methods and protocols for decision-making, motivated by resource management needs of parks and programs of the Northeast Region and Conservation and Outdoor Recreation Branch of the National Park Service (NPS). Our research on emerging technologies are evaluated for application to broader NPS initiatives. Project objectives address two major collaborative areas of work: 1) evaluation of strategic and tactical planning for GIS implementation, including developing unified frameworks NPS programs and consistent approaches to the collection, organization, display, and communication of program implementation plans, and 2) operational testing and development of enterprise GIS initiatives and designs, including spatial database design with linkages to external multi-media document sets and deployment of web mapping systems focused on specific resource issues.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Solo-Gabriele, Helena

Presentation Title: Degradation of naled in natural waters collected from areas impacted by aerial spray activities.

Author(s): Solo-Gabriele, Helena, SFC CESU, University of Miami, Coral Gables, Florida;

Abstract: Degradation of naled in natural waters collected from areas impacted by aerial spray activitiesAthena Jones, Francisco Alberdi, Amanda Sanabria, Nakiya Clausell, Matthew Roca, Helena Solo-Gabriele, Elsayed ZahranUniversity of Miami, Coral Gables, FLAbstractNaled is an organophosphate pesticide that is applied aerially to control mosquito-borne disease transmission as well as areas with high bite rates by nuisance mosquitoes. During the summer of 2016 the use of naled in urban areas received considerable attention due to its use to control the first documented Zika virus outbreak in the continental U.S. Concerns were raised about the persistence of the pesticide in the environment and how this information can be used to develop protection strategies for humans and non-target organisms. Non-target organisms include pollinators, such as honeybees (Apis mellifera), butterflies, birds, beetles, and midges. The objective of this study was to evaluate the persistence of naled in natural waters in areas impacted by aerial spray activities. Two representative water samples (a freshwater and a marine water) were utilized for experimentation. Laboratory experiments were designed to evaluate the influence of hydrolysis, naturally occurring nucleophiles, and ultraviolet light on degradation rates. Water samples were also measured in the field to document levels observed immediately after the spray activities. Results show that the naturally occurring nucleophiles were necessary to promote degradation as experiments with deionized water resulted in the prolonged persistence of naled (half-life of more than 1 week). The half-life in natural waters which excluded all ultraviolet (UV) light sources was determined to be on the order of 6 hours. Naled was found to degrade into dichlorvos in all the laboratory experiments. With UV exposure, this reaction was accelerated and yielded more dichlorvos. Levels measured in the field after aerial sprays (13 ug/L in freshwater and 19 ug/L in marine water) suggest that levels are detectable in natural waters immediately after aerial sprays. Research is needed to utilize these results to assess human health and ecosystem impacts.

Thematic Area: Basic Research

Webinar Presenter: Solo-Gabriele, Helena

Presentation Title: Beach Exposure And Child HEalth Study (BEACHES).

Author(s): Solo-Gabriele, Helena, SFC CESU, University of Miami, Coral Gables, Florida;

Abstract: Beach Exposure And Child HEalth Study (BEACHES)Helena Solo-Gabriele1, Alesia Ferguson2, Kristina D. Mena3, Maribeth Gidley1, Rosalia Guerrero3,Naresh Kumar1, Patrick Tarwater31 University of Miami, Coral Gables, FL,2 University of Arkansas for Medical Sciences, Little Rock, AR,3 University of Texas Health Science Center at Houston, School of Public Health, Houston, TXResearch Goal: Evaluate health risks of oil spill chemicals (OSCs) by integrating realistic play activities and distributions of OSCs in the beach environments. BEACHES will accomplish this goal by pursuing the following objectives.• Quantify children's dermal, ingestion and inhalation related beach play and time spent activities while accounting for beach physical factors.• Utilize historical data from prior oil spills to create, test, and validate algorithms that describe time-space specific concentrations of OSCs in beach zones where children play.These contributions will be used to create an exposure modeling and estimation platform that can guide beach closures in light of health risks to promote safe beach usage for the most susceptible population. Hypotheses: The guiding hypotheses of this project are that health risks are driven by activity patterns and OSC concentrations. Both are influenced by beach physical factors, time since the spill, time of year, and age of the children. This proposal will test these hypotheses through the following three projects:. P-1, Human Activities and Exposure Factors. Beach-related activities that expose children to OSCs will be quantified at four beach sites.•Digital video-recording/video-translation to evaluate child beach play•Sand adhesion study to improve estimates of dermal exposures•Surveys to capture broader scale exposure factors for children.P-2, OSC Distributions. Algorithms to compute more precise concentrations of OSCs

in air, water and beach sands will be created using data already collected by different agencies. P-3, Risk Assessment. Human Activities and Exposure Factors research (P-1) and OSC Distributions (P-2) will be used to develop a risk assessment modeling platform that considers cumulative (multiple contaminants with same health end point) and aggregate (ingestion, dermal, and inhalation) risks. Statistical methods based upon Monte Carlo approaches will be used to provide confidence bounds on the estimated risk.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Solo-Gabriele, Helena

Presentation Title: Towards the Assessment of Possible Environmental Factors Associated with the Expression of Fibropapilloma Tumors in Chelonia mydas.

Author(s): Solo-Gabriele, Helena, SFC CESU, University of Miami, Coral Gables, Florida;

Abstract: Nicole Johnson[1,2], Helena M. Solo-Gabriele[2], Karena Nguyen[3], Anna E. Savage[4],Valerie J. Harwood[3], Brittany F. Sears[5][1]Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, Key Biscayne, FL[2]Department of Civil, Architectural, and Environmental Engineering, University of Miami, Coral Gables, FL[3]Department of Integrative Biology, University of South Florida, Tampa, FL[4]Department of Biology, University of Central Florida, Orlando, FL, USA 32816[5]Florida Consortium of Metropolitan Research Universities, Orlando, FLAn emerging concern for the endangered green sea turtle, Chelonia mydas, is the tumor-forming disease fibropapillomatosis (FP). Recent studies have attributed FP emergence to environmental contaminants, but definitive conclusions have not been reached on the role of environmental factors in the susceptibility to the disease. Recognizing these limitations, this study aimed to evaluate potential relationships between environmental factors and turtle strandings expressing fibropapilloma tumors. Specifically this study evaluated correlations between turtle strandings and water quality (nitrogen, phosphate, chlorophyll a) and geographic (human population, spatial trends) indicators of eutrophication. Results show an increase in FP positive strandings from 2011 to 2014 in the Florida Keys, which correlate with increases of phosphorous in coastal waters during the same time period. Within each study site, FP positive strandings occurred in clusters near areas of high human populations or areas characterized by distinct geomorphologic features. In conclusion, eutrophic areas and regions of coastal embayments, such as those observed in the Florida Keys and Hawaiian Islands, should be evaluated further to identify possible disease agents, including ChHV5 through qPCR screening detected in the field.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Tormey, Blair

Presentation Title: ASSESSING CLIMATE CHANGE AND HAZARD VULNERABILTY OF INFRASTRUCTURE: EXAMPLES FROM COASTAL NATIONAL PARKS.

Author(s): Tormey, Blair, Program for the Study of Developed Shorelines, Cullowhee, North Carolina; Peek, Katie; Young, Rob (United States)

Abstract: The Program for the Study of Developed Shorelines, in partnership with the National Park Service (NPS), has developed a new approach for assessing the natural hazard and climate change vulnerability of NPS infrastructure. This vulnerability assessment (VA) protocol standardizes the methodologies and data used, allowing managers to compare the vulnerability of assets across local, regional, and national levels. Asset-specific VA results can also be used by managers in developing short- and long-term adaptation strategies.Standard practice for VAs includes three metrics: exposure (degree to which a system will experience a stressor), sensitivity (how a system fares when exposed), and adaptive capacity (ability of a system to sustain itself by adapting). While this formula has been successfully applied to natural systems, certain aspects are less appropriate for application in the built environment.The new protocol for

infrastructure includes only exposure and sensitivity in the vulnerability score for each asset; adaptive capacity is evaluated separately. The rationale is that infrastructure does not have intrinsic adaptive capacity, like that of a natural system (e.g., a salt marsh). Adaptive capacity for infrastructure depends on external influences, including cost, use, politics, historic value, and park mission. In fact, with an infrastructure VA, the adaptive capacity evaluation process helps managers identify potential actions for reducing the exposure or sensitivity of an asset and, in turn, its vulnerability.The protocol has been applied at 19 coastal national parks, 11 of which are in the southeastern U.S. Coastal parks were chosen as a starting point for the VAs because of the availability of geo-referenced data for exposure mapping, as well as the clear trend for climate change stressors (e.g., sea level). This methodology need not be applied solely in parks, but could also be utilized in municipalities and other communities. Furthermore, the general VA protocol has now been adapted to assess other natural hazards and climate stressors, and is currently being piloted for inland parks.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Tuberville, Tracey

Presentation Title: Head-starting as a recovery tool for desert tortoises in the Mojave National Preserve.

Author(s): Tuberville, Tracey, University of Georgia's Savannah River Ecology Laboratory, New Ellenton, South Carolina;

Abstract: Perhaps due to failures of early high profile projects, head-starting has been long-deemed merely a "feel good" measure without serious merit as a conservation strategy. This perception has stymied research that could advance the development of rearing and release protocols most likely to lead to successful implementation. Recently, there has been a revival of interest in head-starting as a potential population recovery tool for turtles, with greater emphasis by researchers and conservation organizations on strong experimental design and effective post-release monitoring. We will summarize our ongoing head-starting efforts for desert tortoises (Gopherus agassizii) at Mojave National Preserve, California, USA. For each progressive release experiment, we will describe the experimental design, husbandry and release protocols, and the results to date, focusing on post-release site fidelity and survivorship. Emphasis will be placed on how our research objectives and implementation strategies have evolved as a result of lessons learned from earlier releases, and why we think head-starting should be considered an iterative process subject to constant evaluation and refinement rather than being judged "successful" or "unsuccessful" based on a single release. In addition, we will provide specific recommendations for husbandry and release protocols for this imperiled species of tortoise, along with recommendations for future research directions.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Tuberville, Tracey

Presentation Title: Changing the survival formula of the Mojave desert tortoise through head-starting.

Author(s): Tuberville, Tracey, University of Georgia's Savannah River Ecology Laboratory, New Ellenton, South Carolina;

Abstract: The Mojave Desert Tortoise (Gopherus agassizii) is a long-lived chelonian facing precipitous population declines throughout its range. Though conservation efforts aimed at restoring habitat and improving adult survival are of paramount importance, increasing hatchling recruitment may help recover depleted populations. Head-starting, the rearing of hatchlings in captivity to a less vulnerable size, is one management tool being investigated to enhance juvenile survival. Desert tortoises are especially vulnerable to predation during early life-stages. Previous head-starting efforts for the desert tortoise have focused on outdoor rearing in predator-proof enclosures, but rearing juveniles to the recommended release size of 100-110 mm in carapace length can take 5-9 years. As a result, a recent study at our site in the Mojave National Preserve, CA, focused on the effects and potential role of indoor head-starting. Indoor head-starts

raised for 9 months had softer shells than similar-sized, but older (4 years older) outdoor-reared individuals. They also grew over 8 times faster in both length and weight than same-aged outdoor-reared siblings. Our study will further assess the benefits of indoor head-starting. Specifically, we will measure body condition, shell hardness, and post-release survival and movement of tortoises reared under a hybrid combination of initial indoor and subsequent outdoor head-starting and compare them with tortoises raised solely outdoors.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Waldron, Jayme

Presentation Title: Eastern Diamondback Rattlesnake Demography Estimated From a South Carolina Sea Island Population.

Author(s): Waldron, Jayme, Marshall University, Huntington, West Virginia; Welch, Shane; Cooley, Jonathon (Marshall University, Huntington, WV, United States); Holloway, John (Natural Resources and Environmental Affairs Office, Parris Island, SC, United States)

Abstract: Eastern diamondback rattlesnake (Crotalus adamanteus; EDB) population declines necessitate insight into the species' demography. Using mark-recapture and radio telemetry data collected since 2008, we quantified life history parameters for the Marine Corps Recruit Depot Parris Island EDB population. Specifically, we quantified adult and neonate survival, recruitment intervals, and clutch size. We used radio telemetry data collect from 83 adults (45 males and 38 females) and 31 juveniles (18 males and 13 females) in known fate survival models to estimate monthly and annual survival and to evaluate survival covariates (e.g., body condition, body size). We estimated the percentage of adult females that gave birth annually (based on telemetry samples), and calculated apparent clutch size based on the number of neonates we observed with females following parturition. Annual adult survival averaged 0.86 ± 0.04. Body length (SVL) was negatively associated with adult survival. The probability that neonates survived until their second year was 0.18 ± 0.09. Approximately 32% of telemetry-equipped females reached parturition annually, and birthing intervals averaged 2.29 years (SD = 0.60). Apparent clutch size (N = 31) averaged nine neonates.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Welch, Shane

Presentation Title: Gopher Frog Calling Phenology.

Author(s): Welch, Shane, Marshall University, Huntington, West Virginia; Dillman, William (South Carolina Department of Natural Resources, Columbia, SC, United States); Smith, Margaret; Waldron, Jayme (Marshall University, Huntington, WV, United States)

Abstract: In light of gopher frog (Rana capito) population declines and the species' review for federal protection under the Endangered Species Act, we initiated an acoustic monitoring study to quantify gopher frog breeding phenology in South Carolina. Specifically, our goal was to examine the effects of weather on historical and current gopher frog calling activity. In collaboration with the United States Fish and Wildlife Service and the South Carolina Department of Natural Resources, we gathered historical records of gopher frog choruses from the South Carolina Natural Heritage Database and the scientific literature. Additionally, we used autonomous recording units, which were deployed year-round, to sample calling activity in ponds that supported gopher frog populations. We developed a detector in program Raven so that gopher frog calls could be analyzed autonomously, which provided a list of candidate calls that we systematically verified to avoid false positives. We used NOAA's National Climatic Data Center to examine gopher frog calling activity as a function of local weather patterns. We detected gopher frog choruses multiple times per year, and choruses were not limited to winter/spring months. For example, we detected five discrete breeding events (Spring = 2, Fall = 5) in one

pond that was monitored continuously with acoustic data loggers. It appears that gopher frog calling activity is plastic, and is tied to heavy precipitation events that affect wetland hydroperiod, regardless of season.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: White, Rickie

Presentation Title: Developing rapid assessment metrics for ecosystems to aid in conservation and restoration: a case study in longleaf pine..

Author(s): White, Rickie, NatureServe, Durham, North Carolina;

Abstract: By some estimates, longleaf and other "open pine" ecosystems only cover less than 3% of their original extent in the Southeast. Of that existing longleaf pine, much of it is of very low quality due to this ecosystem's very specific disturbance needs. There is a major need to better understand the condition of existing stands and ways to monitor change in condition over time to see whether we are making adequate progress at all spatial scales to restore this important ecosystem. Florida State University and NatureServe continue to collaborate on a suite of practical tools to assess the ecological condition of individual sites and stands so that we can better understand how to manage these important systems. In our talk, we will discuss the tools we are developing, including easy to use protocols and a web-based calculator of ecological condition.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Witcher, Todd

Presentation Title: All Taxa Biodiversity Inventory (ATBI) in the Smokies and Beyond.

Author(s): Witcher, Todd, Discover Life in America, Gatlinburg, Tennessee;

Abstract: With almost 1,000 species new to science and nearly 10,000 new species records for Great Smoky Mountains National Park Discover Life in America (DLIA) kicks off a 20 Year Anniversary Celebration in 2018 with even higher aspirations for the future.DLIA's main work is an All Taxa Biodiversity Inventory or ATBI, which seeks to document all forms of life in each space.In 1998 not, many imagined that a small, not for profit established by community leaders, scientists and the Park with funding from Friends of the Smokies and Great Smoky Mountains Association would still be going strong 20 years later. And that same organization would move forward in a Global partnership with the EO Wilson Biodiversity Foundation having just penned a new agreement with Xishuangbanna Tropical Botanical Garden in China this January.

Thematic Area: Conservation Science and Management Research

Webinar Presenter: Zink, Ian

Presentation Title: Integrated Biscayne Bay Ecological Assessment and Monitoring (IBBEAM): 6 Yr of Everglades Restoration Impacts on the Nearshore Ecosystem.

Author(s): Zink, Ian, SFC CESU, University of Miami, Miami, Florida; Lirman, Diego; Bellmund, Sarah; Stabenau, Erik; Serafy, Joe; Browder, Joan; Jobert, Herve (United States)

Abstract: The Integrated Biscayne Bay Ecological Assessment and Monitoring (IBBEAM) program was initiated in 2012 to monitor the impacts of the Comprehensive Everglades Restoration Plan (CERP) implementation on Biscayne Bay

nearshore ecosystems. The IBBEAM program consolidated four previously independent components: 1) monitoring of nearshore salinity conditions, 2) observation of coastal mangrove habitat utilization by fishes, 3) assessment of submerged aquatic vegetation (SAV), and 4) survey of nearshore epifaunal communities. The IBBEAM program involves field sampling, laboratory analyses, database management, and statistical modelling to provide a suite of ecological performance measures for assessment and use in adaptive management. A key ecological goal of CERP is to reestablish oligo- and mesohaline salinity habitats along the southwestern Biscayne Bay shoreline to restore historical SAV, fish, and invertebrate community diversity and abundance. IBBEAM evaluates progress towards this goal by: 1) collection of time-series data needed to characterize, and determine change over time in, salinity regimes, SAV communities, SAV-associated fish and invertebrate communities, and mangrove-associated fishes; 2) exploring key relationships between salinity and diversity, distribution, and abundance of SAV, epifaunal fishes and invertebrates, and shoreline fishes; and 3) formulating performance measures and targets to demonstrate the effectiveness of CERP implementation effectiveness. This presentation will describe the IBBEAM program, including field methods, data collection, scientific findings, habitat suitability models, and the development of performance measures.

Thematic Area: Conservation Science and Management Research