NC Chapter of The Wildlife Society
Annual Meeting

"Habitat Matters:
Wildlife Conservation from the
Ground Up"

YMCA Blue Ridge Assembly
Black Mountain, NC
April 2-4, 2019

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Note: CWB®=TWS Certified Wildlife Biologist

Annual Meeting Agenda

Tuesday, April 2nd

1 – 4 PM	Concurrent Field Workshops **Option A**: Early Successional Plant ID and Management at Sandy Much Game Land – Jordan Nanney, TN Wildlife Resources Agency (Limit: 20 people) **Option B**: Marion Fish Hatchery, Conservation Aqauculture Facility Tour – Rachael Hoch, NCWRC (Limit: 25 people)
12:30 – 4:30 PM	**Option C****: Trapper Education Workshop – Todd Menke, CWB®, USDA-APHIS-WS, Dwayne Robinson, NCTA, and Casey Dukes, NCWRC (Limit: 30 people) ***Option to receive Trapper Education Certificate if you complete the online portion of training prior to this workshop*
4:00 PM	Registration (open until 5:45 PM)
6:00 PM	Dinner
7:00 PM	Social/Jam Session/Poster Session Salamander Walk with Dr. Caleb Hickman, CWB®, EBCI

Wednesday, April 3rd

7:00 AM	Bird Walk with Kendrick Weeks, NCWRC Registration (open until 8:45 AM)
8:00 AM	Breakfast
8:45 AM	Door Prizes
8:50 AM	Welcome
9:00 AM	*Let's Talk Habitat: What is Habitat and How Can We Better Use the Term?* – Dr. Chris Moorman, CWB®, NCSU
9:30 AM	*Managing Native Early Successional Plant Communities* – Jordan Nanney, TN Wildlife Resources Agency
10:30 AM	Break (registration open)
10:40 AM	Door Prizes
10:45 AM	*Managing Wildlife Habitat in Mountain Forests* – Dean Simon, CWB®, retired NCWRC
11:15 AM	*Implementing Wildlife Management on National Forests* – Sheryl Bryan, USFS

11:45 AM *In The Weeds and Wrapped in Tape: Opportunities and Challenges of Habitat Management on Private Lands* – John Isenhour, NCWRC

12:15 PM Announcements/Updates

12:30 PM Lunch

1:25 PM Door Prizes

1:30 PM *Concurrent ID/Technique Stations: Hands On*

Choose two different 30-minute sessions to attend.

1. *Herps: Marking and Tracking* – Mike Martin, NCWRC
2. *Mammals: Mountain Shrew ID and Survey Techniques* – Shannon Rabby, HCC
3. *Birds: Raptor Trapping Techniques* – Jimmy Capps, USDA-APHIS-WS

2:30 PM Break (registration open)

2:45 PM *Concurrent Sessions*

Choose one session to attend.

Session A: Herps

Engaging NC's Trout Anglers and Other Stakeholders to Help Conserve Eastern Hellbenders – Lori Williams, NCWRC (20 min)

Challenges and Successes in Manging and Restoring Habitat for Bog Turtles – Sue Camreson, USFWS (20 min)

Green Salamanders – Alan Cameron, retired (20 min)

Session B: Mammals

Piedmont Mines: Golden Opportunity for Tri-colored Bats – Katherine Caldwell, NCWRC (20 min)

Eastern Spotted Skunk Ecology and Monitoring in Western North Carolina – Stephen Harris, Clemson University (20 min)

Urban Black Bears – Nick Gould, NCSU (20 min)

3:45 PM Break (registration open)

3:55 PM Door Prizes

4:00 PM *Concurrent Sessions*

Choose one session to attend.

Session A: Birds I

Ruffed Grouse in North Carolina: History, Status, Challenges, and Opportunities – Chris Kreh, NCWRC (30 min)

Fire, Forest Management, and Birds: Research in the Southern Applachians – Dr. Katie Greenberg, USFS (30 min)

Session B: Birds II

Ground to Canopy: Why Creating Habitat for Birds Increses Forest Resiliency – Aimee Tomcho, Audubon NC (30 min)

Northern Saw-whet Owl Monitoring – Lisa Norvill, SARR (30 min)

5:00 PM Break for the Day

6:00 PM Dinner

7:00 PM Social/Poster Session/Auctions/Jam Session

Thursday, April 4th

8:00 AM Breakfast

8:55 AM Door Prizes

9:00 AM NCTWS Business Meeting—Committee updates, student chapter updates, and Passing of the Goat

10:00 AM *Spruce Restoration in the Mountains* – Chris Kelly, NCWRC

10:20 AM *Navigating Slopes and Swift Water: Habitat Management on Cherokee Lands* – Dr. Caleb Hickman, EBCI

10:40 AM Break

10:55 AM Door Prizes

11:00 AM *Rusty-patched Bumble Bee and Habitat Restoration for Pollinators* – Bryan Tompkins, USFWS

11:20 AM *Who Gives a Dam? Removing Barriers to Aquatic Connectivity One Step at a Time* – Dr. Greg Jennings, Jennings Environmental LLC

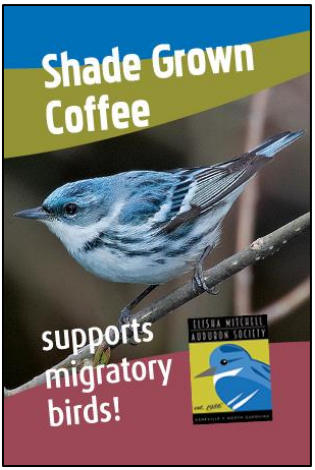
11:40 AM Awards Presentation

12:10 PM Closing Remarks/Adjourn

12:30 PM Lunch

2019-2020 Executive Board meeting

The NC Chapter would like to thank Bayer Bee Care for their continued support of The Wildlife Society as a Partner. This partnership has allowed TWS to improve their support for wildlife professionals and students, including the NC Chapter.



The NC Chapter would like to thank the Elisha Mitchell Audubon Society and Dynamite Roasting Company (Black Mountain, NC) for providing shade grown coffee during the NCTWS Annual Meeting. Shade-grown coffee provides important winter habitat for songbirds that nest in western North Carolina. For people who love birds and coffee, choosing shade-grown coffee is one of the most important things they can do to support migratory birds.

Field Trips/Workshops

Early Successional Plant ID and Management at Sandy Much Game Land

JORDAN NANNEY, Supervisory Field Forester and Wildlife Manager 3, TN Wildlife Resources Agency, Jordan.Nanney@tn.gov

Join our keynote speaker, Jordan Nanney (Tennessee Wildlife Resources Agency), along with habitat manager and Conservation Technician II, Chris Henline (North Carolina Wildlife Resources Commission), as they lead you on a series of short hikes across Sandy Mush Game Land. Bring your plant I.D. guides and cameras as Jordan will help you identify plant species that are indicative of high-quality and low-quality early successional plant communities in addition to a few unique shrub and tree species along the way. Throughout each hike, Jordan and Chris will team up to discuss techniques used when managing early successional plant communities then finish the trip by examining an opportunity to manage for young-forest-dependent wildlife.

Bio: Jordan Nanney is a native of western North Carolina. He received his AAS from the Fish and Wildlife Management program at Haywood Community College, then transferred to North Carolina State University and completed his BS in Fisheries, Wildlife, and Conservation Biology. He continued his education and received his MS in Wildlife Science under the advisement of Dr. Craig Harper at the University of Tennessee. His thesis research concentrated on combining natural and artificial disturbance techniques to convert closed-canopy hardwood forest stands to native early successional plant communities. The research project was inspired by a need to increase nutritional carrying capacity for Tennessee's reintroduced elk herd. After graduating from UT, Jordan acted as the Coordinating Wildlife Biologist in a partnered position between the U.S. Forest Service, South Carolina Department of Natural Resources, and Quail Forever. While in South Carolina, he regularly used a combination of timber harvest, prescribed fire, and herbicide applications to create and maintain high-quality quail habitat and restore diverse and productive woodland, savanna, and early successional plant communities. Jordan moved back to Tennessee in May 2018 where he began in his current position as Supervisory Field Forester and Wildlife Manager 3 with the Tennessee Wildlife Resources Agency. His primary responsibilities are to improve habitat for disturbance-dependent wildlife species by consulting with TWRA Wildlife Management Area Managers to plan, prepare, and administer timber sales on WMAs in middle and west Tennessee.

Marion Fish Hatchery, Conservation Aquaculture Facility Tour

RACHAEL HOCH, Conservation Aquaculture Center Coordinator, Division of Inland Fisheries, NC Wildlife Resources Commission, rachael.hoch@ncwildlife.org

Take a tour of the North Carolina Wildlife Resources Commission's Marion Conservation Aquaculture Center (MCAC) in Marion, NC and learn about the unique life history and conservation of freshwater mussels. Participants will take a tour of the MCAC facility and see some of the most imperiled species of freshwater mussels in the United States. The tour will discuss freshwater mussel life history, ecology, captive care and propagation. Participants will learn about NCWRC strategies to conserve and restore populations of rare aquatic species in the state.

Bio: Rachael Hoch is the Conservation Aquaculture Coordinator for the North Carolina Wildlife Resources Commission. As the Conservation Aquaculture Coordinator, she oversees the propagation, captive care, and aquaculture research of NCWRC priority mussel and fish species. She received her Bachelor and Master of Science degrees in Biology from Appalachian State University (ASU) and worked as a research assistant conducting surveys for freshwater mussels, crayfishes, and fishes throughout the southeastern US. Since 2012, Rachael has worked at the MCAC culturing rare aquatic species and participating in imperiled species conservation efforts. She has served as a guest instructor at the USFWS's National Conservation Training Center, co-teaching a course on the propagation and restoration of freshwater mussels. Rachael currently serves as the co-chair for the Freshwater Mollusk Conservation Society's Propagation and Restoration Committee.

Trapper Education Workshop

TODD MENKE, CWB®, Assistant State Director, US Department of Agriculture – Animal and Plant Health Inspection – Wildlife Services, Todd.A.Menke@aphis.usda.gov

DWAYNE ROBINSON, NCWRC Trapper Education Instructor, North Carolina Trappers Association, dwayne@dswildlife.com

CASEY DUKES, Surveys and Research Biologist, Wildlife Management Division, NC Wildlife Resources Commission, casey.dukes@ncwildlife.org

Promoting responsible trapping follows the NCTWS meeting theme "Habitat Matters: Wildlife Conservation From The Ground Up". The North Carolina Wildlife Resources Commission in partnership with the North Carolina Trappers Association offers basic trapper education courses through the Advanced Hunter Education Program. This trapper education workshop includes in-the-field demonstrations of land and water sets as well as fur handling techniques by experienced trappers. Topics covered will include: trapping regulations, trapline safety, furbearer management, traps, variations of sets, and fur handling equipment. You will learn how to safely and humanely trap animals including best management practices on different trapping techniques for coyote, fox, bobcat, raccoon, mink, muskrat, beaver, and river otter. There will be an optional session for anyone interested in hands-on trap setting or fur handling instructions. We will introduce practical aspects of how important different wildlife habitats matter when targeting specific furbearers. Trapping is wildlife conservation and the best tool for managing furbearer populations. To receive your trapper certification, attendees will also need to go to http://conservationlearning.org/ and bring their certificate of completion. Both the online and field portions are required to receive full credit. This trapper education certification is accredited with the Association of Fish and Wildlife Agencies and is reciprocal/good in all 50 states.

Bio: Todd Menke is a TWS Certified Wildlife Biologist, NCTWS Audit Committee Chair, the Assistant State Director with USDA - Wildlife Services specializing in wildlife damage management, volunteer Education Coordinator with the North Carolina Trappers Association, and certified volunteer Hunter and Trapper Education Instructor.

Bio: Casey Dukes is NCTWS Professional Development Committee Co-chair, a Surveys and Research Biologist for NCWRC specializing in game species research, and a coordinator of the NCWRC trapper education program.

Bio: Dwayne Robinson is a certified NCWRC Hunter and Trapper Education Instructor and a District 8 Director for the North Carolina Trappers Association. During his teen years, he discovered his lifelong passion for trapping. He has been a trapper for 20+ years and has his own wildlife control business (D's Wildlife Control) based in Marion, NC.

Invited Speakers

Let's Talk Habitat: What is Habitat and How Can We Better Use the Term?

DR. CHRISTOPHER E. MOORMAN, CWB®, Professor and Program Coordinator, Fisheries, Wildlife, and Conservation Biology, NC State University, chris_moorman@ncsu.edu

DR. CRAIG A. HARPER, CWB®, Professor and Extension Wildlife Specialist, University of Tenneessee, charper@utk.edu

The concept of habitat is at the core of wildlife conservation; without habitat, there is no wildlife. Hence, the word habitat often is central to conversations about wildlife conservation, whether among wildlife professionals or between professionals and lay audiences. It is crucial that we as wildlife professionals use the term correctly, to accurately and efficiently relay information and help avoid confusion. Habitat not only is commonly misused, but the word often is used so loosely that it becomes meaningless. In this presentation, we define habitat, address the common ways the term is used inappropriately, and provide alternative language that is accurate. This presentation comes after self-reflection of our own mistakes and is not meant to be critical of others. Instead, we hope to generate thought, and later conversation, that will improve how we speak about habitat in the future.

Bio: Chris Moorman is Professor, University Faculty Scholar, and Coordinator of the Fisheries, Wildlife, and Conservation Biology Program at North Carolina State University and a TWS Certified Wildlife Biologist. He holds a MS (University of Georgia) and PhD (Clemson University) in Wildlife Ecology and Management. His teaching and research programs focus on understanding wildlife habitat relationships, especially as they relate to human-induced landscape change. Chris teaches Wildlife Habitat Management, Tropical Wildlife Ecology, and Fire Ecology at NC State. Chris has co-authored over 130 journal articles and recently co-edited the books *Urban Wildlife Management: Theory and Practice* and R*enewable Energy and Wildlife Conservation*, which will be published as part of The Wildlife Society's book series.

Bio: Craig Harper is a Professor of Wildlife Management and the Extension Wildlife Specialist at The University of Tennessee and a TWS Certified Wildlife Biologist. Dr. Harper maintains an active extension program and directs graduate students in a research program that specializes in upland habitat management, including effects of silviculture, prescribed fire, and herbicide applications on habitat for various wildlife species. He routinely visits with natural resources professionals from across the US to evaluate habitat for various species and prescribe management recommendations. Craig's most recent book, *Wildlife Food Plots and Early Successional Plants*, and resource manual, *Managing Early Successional Plant Communities for Wildlife in the Eastern US*, are used as reference materials by several state wildlife agencies.

Managing Native Early Successional Plant Communities

JORDAN NANNEY, Supervisory Field Forester and Wildlife Manager 3, Tennessee Wildlife Resources Agency, Jordan.Nanney@tn.gov

Native early successional plant communities are critical for many wildlife species across the eastern United States. For some habitat specialists such as northern bobwhite, field sparrow, eastern cottontail, and certain pollinators, early successional plant communities are requisite to meet their habitat requirements. Furthermore, habitat quality for other less-specific wildlife species such as white-tailed deer, elk, black bear, wild turkey, and eastern box turtle can be greatly enhanced with the establishment and maintenance of native early successional plant communities. Wildlife managers can effectively and efficiently establish and manage these plant communities with the strategic use of four primary disturbance techniques: timber harvest, prescribed fire, herbicide applications, and mechanical disturbance. It is often necessary to combine two or more of these disturbance techniques to best manage early successional plant communities for wildlife. Maintaining and enhancing these plant communities requires persistence and must be made a priority to be successful. Succession never ceases, and plant communities are continually changing. Ultimately, it is up to us to set-back succession and strategically steer that change in a direction that helps us meet our land management objectives.

Bio: See bio in Field Trips/Workshops section.

Managing Wildlife Habitat in Mountain Forests

DEAN SIMON, CWB®, retired, NC Wildlife Resources Commission,
deansimon@hughes.net

Creating diversity in mountain landscapes of Southern Appalachian forests is key to providing optimal habitat for numerous wildlife species across the spectrum of species' specific needs from early successional conditions up to and including old growth forest types. In a "sea of green" created by an abundance of closed canopy, mature forests and added complexities created by monoculture pine forests, challenges to improving and maintaining wildlife habitat diversity, especially on the early successional end of the spectrum, are immense in mountain forests. Habitat management techniques, alone and in combination, including forestry, prescribed burning, and managing wildlife openings, are important and effective tools for achieving goals and objectives for forests across mountain landscapes, including restoration of key forest types that are perpetuated by occasional and needed disturbance. Timing, frequency, intensity, distribution of areas treated, planting options, selection and retention of key species and areas important for wildlife and controlling access to protect planted openings and sensitive wildlife habitat areas are all important factors for landowners to consider when implementing forest management, prescribed burning, and managing wildlife openings in mountain forests.

Bio: Dean Simon recently retired from the North Carolina Wildlife Resources Commission after 32 years as the Mountain Region Wildlife Biologist and Forester for western North Carolina. Prior to that, he received a BS in forestry from Louisiana State University and a MS studying fire ecology and wildlife at the University of Georgia. Dean is also a Certified Wildlife Biologist, Registered Forester, and a Certified Prescribed Burner. In the last decade, he was recognized as 'Wildlife Biologist of the Year' and 'Prescribed Burner of the Year' by NCWRC, received the Management Excellence Award by the Southeastern Section of the Wildlife Society, received the Wildlife Conservation Award from the North Carolina Chapter of The Wildlife Society, and Career Achievement Recognition from the North Carolina Prescribed Fire Council for work with prescribed burning, fire management, and fire ecology research in the Southern Appalachian Mountains. He has coauthored numerous publications associated with fire, forestry, and wildlife and currently works as a Burn Boss and Crew Member for The Nature Conservancy's Southern Blue Ridge Fire Crew. He also works as a consultant and contractor for fire management, forestry, and wildlife habitat management.

Implenting Wildlife Management on National Forests

SHERYL BRYAN, Fisheries and Wildlife Biologist, US Forest Service,
sbryan@fs.fed.us

The National Forests in North Carolina are comprised of over 1.25 million acres, in four national forests across the state, from the mountains to the sea. This presentation lays out how almost everything the U.S. Forest Service does is with wildlife habitat, and the diversity of species it supports, at the center of management focus. In addition to federal, state, and forest laws, regulations,

and policies addressing natural resource management, the 2012 planning rule specifically directs the Forest Service to ensure their management is adaptive and science-based, provides for ecological sustainability, and provides ecological conditions to support plant and animal diversity into the future. To this end, several tools have been developed to focus a plethora of data and knowledge and ensure this trend. These tools include modeling potential natural vegetation, estimating forest natural range of variability (disturbance patterns) and forest condition departure, and predicting fine-scale habitat element occurrence into the future. All of these tools work synergistically to guide resource managers to informed decision-making and management solutions that maximize wildlife habitat benefits, as well as protect unique values, while pursuing multiple-use mandates of the U.S. Forest Service. This presentation provides specific examples of this information and how habitat management decisions are framed on the National Forests in North Carolina.

Bio: Sheryl Bryan graduated from Virginia Commonwealth University in 1988 with a BS in Biology (ecology emphasis), and from Virginia Tech in 1991 with a MS in Fisheries Science. At Virginia Tech, her research focused on public perceptions of the effects of land use on trout habitat and populations in Virginia. She worked for the US Forest Service since 1990, almost exclusively in North Carolina (with brief stints in eastern Oregon, northern Georgia, Atlanta, and Washington DC). Her current position involves oversight of the fisheries and wildlife programs on four national forests: Nantahala and Pisgah in the mountains, Uwharrie in the piedmont, and Croatan on the coast. While her education and early career was (mostly) aquatic, she has been working in wildlife management for the last 10 years, a field she has grown to love. Her current focus is the revision of land management plans for the Nantahala and Pisgah National Forests, a process she intends to use as an example of the importance of managing habitat for the benefit of wildlife.

In the Weeds and Wrapped in Tape: Opportunities and Challenges of Habitat Management on Private Lands

JOHN ISENHOUR, Technical Assistance Biologist, Wildlife Management Division, NC Wildlife Resources Commission, john.isenhour@ncwildlife.org

Depending on how it is calculated, between 60 and 85 percent of North Carolina is privately owned. Management of this land base can be critical in "keeping common species common" as well as benefiting at risk and declining species. Many of these species are well researched and their habitat needs are clearly documented. Landowners on the other had can be a bit more challenging to understand as they are influenced by programmatic rules, financial realities, neighbors' opinions and their own emotions. Biologists must consider all these factors as they promote the management of private lands to meet agency goals and landowner objectives.

Bio: John Isenhour has been a Technical Assistance Biologist with the North Carolina Wildlife Resources Commission' Private Lands Program for the past 14 years. His office is in the Salisbury, Natural Resources Conservation Service Area Office and his work area covers 33 piedmont counties. As a technical assistance biologist, he provides landowners guidance to meet their wildlife objectives and helps to identify funding opportunities for habitat-oriented projects. Prior to working with the Wildlife Commission, John was employed by the NC Forest Service for 9 years as an Educational Forest Ranger in Clayton, NC. He has a bachelor's degree from NC State University in Wildlife Management. In his spare time, he enjoys "practicing what he preaches" while sharing the outdoors with family and friends.

Concurrent ID/Technique Sessions

Herps: Marking and Tracking

MIKE MARTIN, Eastern Wildlife Diversity Technician, Wildlife Management Division, NC Wildlife Resources Commission, michael.martin@ncwildlife.org

The use of animals in research requires that we be cognizant of the impacts of research on study subjects. It is the researcher's responsibility to minimize or eliminate negative outcomes for study subjects while attempting to obtain valuable information on study organisms over space and time. This workshop will cover different marking techniques, such as visible implant elastomer (VIE), visible implant alphanumeric (VIAlpha) tags, passive integrated transponder (PIT) tags, scute notching, toe clipping, telemetry, and photo-assisted identification of individual animals. We will balance the pros and cons of these techniques, including costs. Many of the materials associated with the subject matter will be present for participants to explore and participants will be encouraged to engage in Q&A throughout.

Bio: Mike Martin is a Wildlife Diversity technician with the NCWRC and has been working on research and conservation of rare herpetofauna in the sandhills and coastal regions of NC for 2 years. He received a BS in Zoology from NC State in 2005. Before coming back to NC, his studies mostly focused on the reproductive and spatial ecology of eastern diamondback rattlesnakes through work with the Amphibian and Reptile Conservancy, SC Department of Natural Resources, and University of South Carolina. Mike currently works on projects aimed at surveying and monitoring of rare species and improving degraded habitats for wildlife with a strong focus on rare winter-breeding amphibians and upland snakes.

Birds: Raptor Trapping Techniques

JIMMY CAPPS, Wildlife Biologist, US Department of Agriculture – Animal and Plant Health Inspection – Wildlife Services, James.E.Capps@aphis.usda.gov

This workshop will focus on a variety of techniques used to safely and effectively live capture raptors for relocation. Participants will be able to see demonstrations of multiple traps to target different species. For members who are interested raptor banding, handling, relocation and wildlife hazards at airports will also be discussed. Several airports in the mountains and Piedmont will be trapped the day prior to the demo, so hopefully there will be banded raptors on hand for attendees to observe.

Bio: Jimmy is a wildlife biologist for the USDA APHIS Wildlife Services based out of the WS North Carolina State office in Raleigh. Currently overseeing a statewide civil aviation agreement with the NCDOT Division of Aviation, managing wildlife hazards at airports across North Carolina. He has been an airport wildlife biologist since 2010, working on both civil and Department of Defense airfields and has been a FAA Qualified Airport Biologist since 2013. He has also worked on several overseas projects for the US Air Force in Afghanistan and Qatar. After graduating from Florida State University, he worked in the gamebird lab at Tall Timbers Research Station for four years prior to joining USDA APHIS. Jimmy is currently involved in two new wildlife projects on NC airports including wild turkey capture and translocation along with raptor trapping and relocation.

Mammals: Mountain Shrew ID and Survey Techniques

SHANNON RABBY, Lead Instructor/Fish & Wildlife Management Technology, Haywood Community College, srabby@haywood.edu

Small mammals are an important and sometimes overlooked component of most biotic communities. They serve as the primary food source for many predators, they aid in the distribution of seeds of plant species, and they assist in the distribution of mycorrhizal fungi. Survey techniques for small mammals often involve live and/or lethal trapping. Identification of some species can be difficult, especially identification of mice in the genus Peromyscus and many species of shrews (family Soricidae). This talk will cover one approach to conducting small mammal surveys as well as some of the challenges and solutions involved in the correct identification of small mammals, especially shrews, of the southern Appalachians.

Bio: Shannon Rabby is lead instructor of Fish and Wildlife Management at Haywood Community College. He hails from Auburn, Alabama by way of Dutch Harbor, Alaska, British Columbia, Canada, Roanoke, Virginia and assorted other beautiful places. He obtained his M.S. and B.S. from Western Carolina University and two A.A.S. degrees in Forest Management Technology and Fish and Wildlife Management Technology from Haywood Community College. While his focus is on training men and women to become effective wildlife technicians he has a continued interest in the ecology of small mammals, especially shrews.

Concurrent Sessions

Session A: Herps

Engaging NC's Trout Anglers and Other Stakeholders to Help Conserve Eastern Hellbenders

LORI WILLIAMS, CWB®, Wildlife Diversity Biologist, Wildlife Management Division, NC Wildlife Resources Commission, lori.williams@ncwildlife.org

Eastern hellbender (*Cryptobranchus alleganiensis alleganiensis*) is a protected species of concern in North Carolina. Despite long-term efforts by the North Carolina Wildlife Resources Commission (NCWRC) and partners to improve understanding of hellbender status in the state, census of all known and potential populations is lacking. The species' dependence upon clean, cold, well-oxygenated water restricts its distribution to North Carolina's Blue Ridge Ecoregion, overlapping much of the state's trout fishery. This overlap presented an opportunity for the NCWRC to educate anglers about hellbender conservation and supplement existing spatial and temporal species distribution data by enlisting angler help. In 2013, an advertisement within the North Carolina Inland Fishing, Hunting and Trapping Regulations Digest initiated direct outreach on hellbender conservation needs to trout anglers. I will present these and other results from this collaborative project, and as time permits, discuss species status in North Carolina and other hellbender conservation projects the NCWRC and partners are conducting.

Bio: Lori A. Williams is a Wildlife Diversity Biologist for the North Carolina Wildlife Resources Commission and a Certified Wildlife Biologist® by The Wildlife Society. She has a BS in English from Appalachian State University, a B.S. in Wildlife Science, and a MS in Fisheries and Wildlife both from Virginia Tech. Lori coordinates and conducts western region amphibian inventory, monitoring, and applied research projects for the state. She also monitors reptiles, mammals, birds, and nongame aquatic species and has worked in wildlife conservation and ecology for 20 years.

Challenges and Successes in Managing and Restoring Habitat for Bog Turtles

SUE CAMERON, Wildlife Biologist, US Fish and Wildlife Service,
susan_cameron@fws.gov

Southern Appalachian Mountain bogs are among the rarest and most imperiled habitats in the United States and are home to several species of conservation concern, including the federally threatened bog turtle. Bog turtles have undergone population declines throughout their range, largely due to habitat loss and degradation. Many of the remaining sites require management and restoration and partners have been working in these areas for many years in hopes of stabilizing bog turtle populations and reversing declines. This work is particularly challenging because all sites are unique and require different approaches. This talk will highlight challenges, recent success stories, and the power of partnerships in managing and restoring habitat for bog turtles.

Bio: Sue Cameron is a wildlife biologist with the US Fish and Wildlife Service in the Asheville Field Office where she works on terrestrial species of the southern Appalachian Mountains including small mammals, herps, and birds. Her primarily duties entail working with partners to recover federally listed species. She received her bachelor's degree in Marine Biology from Florida Tech and master's in Resource Ecology from Duke University Nicholas School of the Environment. Prior to starting with the Service, Sue worked for NC Wildlife Resources Commission as a coastal waterbird biologist and Virginia Tech as a red-cockaded woodpecker biologist.

Green Salamanders

ALAN CAMERON, retired, National Security Agency, adcamer77@bellsouth.net

Alan's presentation will cover the life history of the green salamander and management issues and strategies for the future to better understand the NC range of this species and conservation efforts to protect this rare creature.

Bio: Alan Cameron is a member of Friends of Dupont Forest and has been a volunteer with the NCWRC for 14 years. For that entire period, he has worked on the green salamander (*Aneides aeneus*) and is co-author on several papers about them. He also works on timber rattlesnakes and eastern spotted skunks. Alan periodically presents a series of educational wildlife lectures on behalf of Friends of DuPont Forest.

Session B: Mammals

Piedmont Mines: Golden Opportunities for Tri-colored Bats

KATHERINE CALDWELL ETCHISON, Mammalogist, Wildlife Management Division, NC Wildlife Resources Commission, katherine.caldwell@ncwildlife.org

The tri-colored bat (*Perimyotis subflavus*) is a hibernating species with a statewide distribution in North Carolina. This species has the longest hibernation period amongst bats in the Eastern U.S., though few caves exist east of the Southern Appalachian Mountains in N.C. to accommodate hibernation. Recent efforts to understand winter behavior of this species in the Piedmont physiographic region of N.C. elucidated a link between the nation's first Gold Rush and hibernating tri-colored bats. North Carolina Wildlife Resources Commission biologists found abandoned gold mines now hold a different kind of treasure.

Bio: Katherine is a Wildlife Diversity Biologist for the North Carolina Wildlife Resources Commission, a position she's held since 2015. She conducts surveys for rare and threatened bats and monitors populations of these and other mammal species. She received a B.S. in Ecology and Environmental Biology from the University of North Carolina at Asheville in 2010 and a M.S. in Biology from Ball State University in 2015. She is a TWS Associate Wildlife Biologist and has served as Secretary for the Executive Committee of the Southeastern Bat Diversity Network since 2017.

Eastern Spotted Skunk Ecology and Monitoring in Western North Carolina

STEPHEN HARRIS, Resarch Technician, Department of Forestry and Environmental Conservation, Clemson University, sh2@g.clemson.edu

Clemson University and the North Carolina Wildlife Resources Commission are collaborating on a multi-year study on eastern spotted skunks in western North Carolina. This species has undergone a dramatic decline and is listed as a priority mammal species in North Carolina. This research broadly seeks to increase our understanding of eastern spotted skunk ecology and life history in order to determine its current distribution and provide useful recommendations on how better to survey, monitor and manage this imperiled species. Specifically, we are conducting a regional camera trap survey to look into spotted skunk presence, occupancy, habitat selection, and interactions with other mesocarnivores across western North Carolina. This survey will also help improve long-term monitoring methodologies for the species. Additionally, we are conducting a fine-scale study on spotted skunks in the South Mountains range, where we will be using radio-telemetry to assess skunk den site selection, movement ecology, survival, and fecundity. Here we present preliminary results from three years of camera surveys and the first two years of radio-telemetry research.

Bio: Stephen Harris is a research technician in Dr. David Jachowski's lab in the Department of Forestry and Environmental Conservation at Clemson University. Prior to this position, he completed his M.S. in Wildlife and Fisheries Biology at Clemson in 2016, studying the ecology of eastern spotted skunks in Central Florida. He received his B.S. in Wildlife Ecology and Conservation at the University of Florida. He assists with various wildlife research projects in Dr. Jachowski's lab, including supervising and conducting field efforts for this study on eastern spotted skunks in western North Carolina.

Urban Black Bears

NICK GOULD, NC State University, npgould@ncsu.edu

Concurrent Sessions

Session A: Birds I

Ruffed Grouse in North Carolina: History, Status, Challenges, and Opportunities

CHRIS KREH, CWB®, Upland Game Bird Biologist, Wildlife Management Division, NC Wildlife Resoures Commission, chris.kreh@ncwildlife.org

Ruffed grouse are an iconic bird of the Southern Appalachians. They are one of only three resident game species identified as Species of Greatest Conservation Needs (SGCN) in North Carolina's 2015 Wildlife Action Plan. Grouse populations have been in decline for many decades. They face many conservation challenges and have an uncertain future in the region. My presentation will include information about the history of grouse hunting and grouse hunting regulations throughout the 1900's. We will discuss why the NCWRC continues to allow grouse hunting. Current information from NCWRC's Avid Grouse Hunter Program will be presented. Additional information will come from NCWRC's annual drumming grouse survey. Also, recent research in Pennsylvania has shown that West Nile virus has a substantial impact of ruffed grouse. We will discuss that information and I will also provide information about work going on here in North Carolina with West Nile virus and grouse. Good forest management is critical for grouse and will be address in the presentation as well.

Bio: Chris Kreh is the Upland Game Bird Biologist for the North Carolina Wildlife Resource Commission and a Certified Wildlife Biologist® by The Wildlife Society. His duties chiefly focus on coordinating survey and research activities for grouse, quail, and turkeys.

Fire, Forest Management, and Birds: Research in the Southern Applachians

DR. KATIE GREENBERG, Research Ecologist, US Forest Service,
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Multiple collaborative studies and partnerships with Universities and forest or wildlife managers are providing 'pieces to the puzzle' regarding breeding bird responses to different natural and anthropogenic disturbance types that alter forest structure in the southern Appalachians. We have completed studies addressing how breeding birds respond to large, incomplete canopy gaps created by hurricane-related wind downbursts, or to managed disturbances such as timber harvests, low- and high-severity prescribed burns, or other fuel reduction treatments. New or ongoing research is addressing how bird communities respond to: (1) wildfire across a fire-severity gradient; (2) small versus large artificially-created gaps; (3) dormant- versus early growing-season prescribed burns; (4) 16-years of change as shelterwood harvests grow into closed-canopy forests. Our studies indicate that breeding bird density and species richness is generally higher in disturbed forest patches with substantially reduced canopy cover. Retention of some canopy trees and snags in disturbed forest stands may result in higher densities of birds associated with open habitats, while retaining many forest and generalist species. Young forest patches provide a greater abundance of fleshy fruit and flying/foliar insects and may serve as magnets for breeding bird recruitment and foraging. Patches of disturbed forest provide diverse within-stand habitat structure and create a mosaic of age-classes across the forested landscape.

Bio: Dr. Cathryn (Katie) H. Greenberg is a Research Ecologist with the Upland Hardwood Ecology and Management Research Work Unit, USDA Forest Service Southern Research Station at the Bent Creek Experimental Forest in Asheville. She received her MS from the University of Tennessee and her PhD from the University of Florida, where she studied the ecology of sand pine scrub in Ocala National Forest. Her current research focuses on developing information and tools that are useful to forest managers and planners. Research areas include (1) effects of prescribed fire and wildfire, mixed-oak regeneration harvests, and other forest management practices on reptile, amphibian, and breeding bird communities; (2) production of forest food resources, such as native fleshy fruit and hard mast, in relation to forest types and silvicultural disturbances; (3) long-term monitoring of amphibian populations in longleaf pine-wiregrass sandhills in relation to forest health and climate change. She has co-edited books on early successional habitats, and natural disturbances.

Session B: Birds II

Ground to Canopy: Why Creating Habitat for Birds Increases Forest Resiliency

AIMEE TOMCHO, Conservation Biologist, Audubon North Carolina, atomcho@audubon.org

The State Wildlife Action Plan helps guide habitat management across North Carolina. Roughly ¼ of the more than 400 species of greatest conservation need are birds. You don't need to be an advanced birder to understand some basic bird-friendly habitat practices that enhance overall forest health. What do birds tell you about your forest? Learn how bird conservation can help focus your management, increase forest resiliency, and delight the fastest growing group of wildlife-related recreationists.

Bio: Aimee Tomcho has worked as Audubon North Carolina's Conservation Biologist since 2013. She earned her MS at Clemson University studying Fire Ecology in the Southern Appalachians under Dr. J. Drew Lanham. Aimee has been an ecologist and educator for more than 20 years including positions with the US Forest Service, National Park Service, Virginia Tech, and on military installations in the southeast. She currently resides in Burnsville, NC with her two sons Ben and Jayce.

Northern Saw-whet Owl Monitoring

LISA NORVILL, Bird Bander/Net Leader, Southern Applachain Raptor Research, lmnor87@hotmail.com

My presentation will include a brief introduction to Southern Appalachian Raptor Research organization and how we are involved with Northern Saw-whet Owls, along with a species profile. The discussion will address how boxes do attract owls to nest and even to return in following seasons. There will be a "how-to" for persons who have never been box checking with advice and video of what to expect. In conclusion the use of boxes is quite successful and very cost effective to encourage more birds in any area. Boxes are also another great way to have volunteers do hands on work and gain field experience besides gathering data.

Bio: Lisa Norvill originally completed the Paralegal Associates degree program at Valencia community College in Central Florida in 2010. In 2013, she attended Haywood community college's Wildlife Management and Technology Program and graduated in 2015. She found her passion of birds through volunteering at Southern Appalachian Raptor Research (SARR) in the summer of 2013, by joining the Wildlife Society's Student chapter at Haywood community college. During her time at Haywood, she won the 2014 David Dudeck Wildlife Award and an Honors award for leadership and professional involvement. As of April 2015, she was hired as a bird picker and Net leader and continues to grow in SARR's avian research and educational outreach. As of 2017, she has been a bird bander working primarily with Neotropical migratory breeding birds and resident breeding bird populations in 4 locations in western North Carolina: Big Bald, Cowee Mounds, and recently Kituah Mounds and Welch Farms.

Invited Speakers

Spruce Restoration in the Mountains

CHRIS KELLY, Wildlife Diversity Biologist, NC Wildlife Resources Commission, Christine.Kelly@ncwildlife.org

Red spruce restoration is off to a good start in western North Carolina. In the five years since the Commission's last update to NCWTWS, in which we focused on the need for restoring high elevation spruce forests, the Southern Appalachian Spruce Restoration Initiative has developed several useful planning products and implemented projects. Here we illustrate the process and tools used to identify candidate restoration sites and design suitable prescriptions. With new projects in development, SASRI partners have opportunities to conduct forestry research, educate the community, and engage nontraditional partners such as hiking clubs to help with work in remote or roadless project areas.

Bio: Chris Kelly is a Mountain Wildlife Diversity Biologist for North Carolina Wildlife Resources Commission. She oversees western region bird and Carolina northern flying squirrel conservation for NCWRC since 2005. Prior to that she worked for the U.S. Forest Service for 4 years and interned with the U.S. Fish and Wildlife Service. She has a Master of Science degree in Zoology from North Carolina State University, where she studied shorebirds, and a Bachelor of Science degree in Wildlife Biology from Ohio University.

Navigating Slopes and Swift Water: Habitat Management on Cherokee Lands

DR. CALEB HICKMAN, CWB®, Supervisory Fish and Wildlife Biologist, Fisheries and Wildlife Management, Eastern Band of Cherokee Indians, calehick@nc-cherokee.com

The southern Appalachians have some of the most dramatic topography on the American continent, leading to fast flowing waters and steep slopes. In difficult environments, we must develop new means by which we work to conserve species. Because they were pushed to the mountains within the fringes of manageable farmland, the Eastern Band of Cherokee Indians holds some of the most difficult lands and water to work in the southern Appalachians. In this talk, I summarize some of the habitat work we develop in both aquatic and terrestrial ecosystems with hellbender salamanders and elk as some of our main focal species of concern. I will detail how our staff not only work to overcome the difficulties of the ecosystem but also how we must navigate the local political and federal regulations.

Bio: Trained as an ecologist, Caleb is a certified wildlife biologist with a wide-ranging background in research and management of a variety of game and non-game fish and wildlife across the country. He received a bachelor's degree from Missouri Valley College in 2000 and masters from Missouri State University in 2002. After his masters, he worked as a field biologist at Sevilleta National Wildlife Refuge in New Mexico for the Long Term Ecological Research Program followed by time at the Savannah River Ecology Laboratory as a Research Associate. He obtained his PhD from the University of Wisconsin-Madison in 2013. Since the Fall of 2013, Caleb has been managing staff and projects that serve the interests of the tribe and federally protected species. When it comes to ecological questions, Caleb works as a research liaison for the tribe and looks to promote a vision of a socio-ecological adaptive framework for fish and wildlife management.

Rusty-patched Bumble Bee and Habitat Restoration for Pollinators

BRYAN TOMPKINS, Wildlife Biologist, US Fish and Wildlife Service,
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These days, there is a good chance that you have heard about the plight of North Carolina's native pollinators. Loss of habitat, disease, climate change, and non-native species are all issues affecting the health and diversity of native pollinators in the state. With the issuance of the Presidential Memorandum – Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators in 2014, the US Fish and Wildlife Service began prioritizing and focusing efforts on preserving and restoring pollinator habitat. Though pollinator diversity and populations are in decline across the state, one native pollinator has recently been spotlighted – the rusty-patched bumble bee. Historically, rusty-patched bumble bee was one of the most common bumble bee species in western North Carolina. In recent years, its population has plummeted and in 2017 it was federally listed as an endangered species. The USFWS is currently leading survey efforts for Rusty-Patched Bumble Bee in western North Carolina. This presentation will include a discussion of pollinator diversity in North Carolina and the habitats they require, current actions being applied toward the advancement of pollinator conservation across the state, and a review of the US Fish and Wildlife Service's efforts in their search for the rusty-patched bumble bee.

Bio: Bryan Tompkins grew up in a rural farming community near Milledgeville, Georgia. Spending much of his youth playing in the forests and swamps around his home instilled in him a great appreciation of nature. In 1995, he graduated with a Bachelor of Science degree from Georgia College and State University. Bryan started his career with the National Park Service on the Blue Ridge Parkway but has spent the past 15-years as a Wildlife Biologist with the U.S. Fish and Wildlife Service (USFWS) in Asheville, North Carolina. He currently serves as the USFWS – Southeast Region recovery biologist for the federally endangered rusty-patched bumble bee and is the Energy Project Coordinator for the Asheville Field Office where he reviews energy production and development projects such as hydropower, coal combustion, natural gas, solar arrays, and wind farms. His job responsibilities consist of coordinating with energy companies to protect threatened and endangered species and their habitats from impacts associated with energy production projects. He also coordinates with energy companies to design, plan, and implement conservation measures into projects to avoid environmental impacts and protect important natural resources and sensitive habitats.

Who Gives a Dam? Removing Barriers to Aquatic Connectivity One Step at a Time

DR. GREG JENNINGS, President, Jennings Environmental PLLC,
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Connectivity is a fundamental requirement for optimal stream function. Barriers to aquatic organism passage (AOP) are often associated with impoundments, road crossings, and utility crossings. Ecological impacts of these anthropogenic structures include habitat loss in the stream channel and floodplain, excessive erosion and sedimentation due to hydraulic adjustments, and changes to the natural fluvial sediment transport regime. Remediation measures may include complete structure removal and restoration of the natural ecosystem or a combination of ecological engineering practices to improve stream conditions while maintaining infrastructure functions. This presentation reviews several case study projects that successfully implemented habitat enhancement techniques to address AOP barriers. Some projects include replacement of undersized and perched culverts with natural bottom crossing structures, while others removed unnecessary dams and culverts entirely. Most of the projects include natural stream bed structures consisting of rocks and logs to transition bed slope from upstream to downstream while facilitating aquatic organism passage. These step structures are critical elements of AOP projects that may be designed as step-pools, cascades, or riffles depending on site conditions and organism requirements. Specific design parameters include step height, flow depth, velocity, shear stress, and hydraulic convergence/divergence length. Successful stream restoration design teams include engineers, geomorphologists, and ecologists to ensure that all objectives are optimized. Lessons learned from AOP enhancement projects should be integrated into watershed planning to restore stream functions and to avoid future impacts of development infrastructure.

Bio: Greg Jennings founded Jennings Environmental PLLC following his retirement from the biological & agricultural engineering faculty of North Carolina State University to apply ecological engineering solutions to address environmental challenges. He has provided leadership and technical support for planning, implementation, and evaluation of more than 200 ecosystem assessment and restoration projects in the Southeast. Greg is committed to advancing the science and practice of ecological engineering through collaborations with Universities, government agencies, and practitioners working to solve environmental challenges.

Posters

Influence of Different Sign-post Designs on Avian Predator Perching Activity

KAYLA S. MCNEILLY[1], Rachael E. Urbanek[1], Sara H. Schweitzer[2], and Jamie A. Rotenberg[1]

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Beach-nesting shorebirds are declining due, in part, to human disturbance in nesting areas. Therefore, sign-posts are installed around nesting areas to protect nests from people. However, sign-posts may serve as perches and attract avian predators. From March – August 2018, we used field observations and game cameras to monitor perching activity on 15 variations of sign-post designs in a 2-phase study on Lea-Hutaff Island (Phase 1) and Fort Fisher Recreation Area (Phase 2), North Carolina. We observed 110 independent perching events by common grackles (70%; *Quiscalus quiscula*) and laughing gulls (25%; *Leucophaeus atricilla*). We compared the proportion of perching activity among treatments based on sign shape, material, position on post, and presence/absence of a nail on top of the post. Sign shape did not affect perching activity in Phase 1, but slightly more ($\chi 2 = 2.89 – 3.67$ $P = 0.07 – 0.11$) perching occurred on triangular signs (5 – 8%) compared to the rectangular signs (3 – 5%) in Phase 2, and when data from both phases were pooled. There was also evidence that birds perched more ($\chi 2 = 1.04$ $P = 0.06$) frequently on the metal (21%) and plastic (21%) signs compared to laminated cardboard (15%) signs in Phase 1 but not in Phase 2 or when data were pooled. Birds perched less ($\chi 2 = 11.0 – 18.62$ $P < 0.01$) frequently on signs positioned higher than the top of the post (<1 – 8%) and slightly less (3 – 20%) on signs positioned below the post top as opposed to the signs that were flush with the top of the post (6 – 30%). Presence or absence of a nail on top of posts did not affect perching activity ($\chi 2 = 0.59$ $P = 0.52$). We recommend managers use cardboard rectangular signs positioned high on the post to reduce occurrences of predatory perching.

The Effects of Hardwood Inclusions on Avian Occupancy in Fire-maintained Upland Longleaf Pine Forests

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The fire-dependent longleaf pine (*Pinus palustris*) ecosystem, a global biodiversity hotspot, covers only a fraction of its historical range. Prescribed fire and other forest management practices aimed at restoring longleaf pine communities often focus on the reduction, or removal, of upland hardwoods with the goal of providing habitat for threatened and endangered plant and animal species. Contemporary restoration and management practices benefit species dependent on the resulting conditions, but recent research has called attention to the ecological value of retaining upland hardwoods. The appropriate amount of upland hardwood cover in restored longleaf pine community is debated, as more hardwood cover can benefit mast-dependent wildlife (e.g., fox squirrels [*Sciurus niger*]), and less hardwood cover is critical to the federally endangered red-cockaded woodpecker [*Leuconotopicus borealis*]. The distribution of birds in relation to upland hardwood distribution can help direct management of hardwood inclusions to maximize biodiversity in upland longleaf pine communities. We used fixed-radius point counts to sample the presence-absence of 15 avian species and assessed forest composition and structure at 2 scales around each point. We developed single-season single-species occupancy models with an emphasis on the influence of hardwood cover. Occupancy probability of a subset of focal species was positively influenced by hardwood cover, whereas occupancy probabilities of another subset of focal species was negatively influenced by hardwood cover. We suggest that maintaining stands comprised of 10 to 20% mid-story and canopy hardwood cover can provide habitat for species associated with mixed forest conditions while still providing habitat for species sensitive to hardwood encroachment.

How Did the Rabbit Cross the Solar Farm?

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As natural habitat is dwindling, connectivity is a crucial aspect in the conservation of native wildlife. In this study the effectiveness of wildlife-friendly fencing to restore connectivity around a solar farm was evaluated. Effectiveness was determined through small mammal presence/absence data collected by camera traps. Camera traps were aimed along the fence line to detect if wildlife crossed through the fence. This is an ongoing study but thus far has already produced results showing several species of small mammals using the fence to enter the facility. In conjunction with considerate siting, solar facilities can reduce their environmental impacts and contribute to habitat connectivity when opting to use wildlife-friendly fencing.

Spatial Analysis of Rehabilitated Black Bear (*Ursus americanus*) Cubs

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Between 1976 – 2017, the North Carolina Wildlife Resources Commission (NCWRC) rehabilitated and released 121 orphaned black bear (*Ursus americanus*) cubs accepted into the state's rehabilitation program. Historically, rehabilitated cubs were not monitored post-release due to limitations of technology. Consequently, little is known of the post-release movements and subsequent status of rehabilitated bear cubs. From 2015 – 2017, 19 rehabilitated bear cubs were released at 6 locations in the coastal plain and mountain regions of North Carolina with Vectronics GPS collars that acquired location data every 2 hours. We analyzed post-release movement data by constructing linear and Euclidean daily and total distances for 3 intervals: 1-week post release, 2-weeks post release, and the duration of the study. To examine movement behavior, we created ratios of average daily linear distance by average daily Euclidean distances. Male and female bears moved similar distances for all distance metrics over each interval ($t_{8,11} = 0.53–1.49$ $P = 0.1546–0.6056$, $W_{8,11} = 24–43$ $P = 0.1087–0.9678$). Bears released in the mountain region moved further from their release site than coastal bears for both the 1-week ($t_{13.7} = -2.74$ $P = 0.0162$) and 2-week intervals ($W_{6,13} = 16$ $P = 0.0462$). One-week post release, coastal bears displayed a more meandrous movement pattern than bears in the mountain region ($W_{6,13} = 64$ $P = 0.0285$). After 2 weeks and for the duration of the study, bears from both regions showed similar movement patterns (2-week: $W_{6,13} = 51$ $P = 0.3229$; duration: $t_{6,13} = 0.90$ $P = 0.3822$). The holistic success of the NCWRC bear cub rehabilitation program hinges on both biological metrics and public attitudes and perceptions. Increased knowledge of post-release bear movements will help inform management decisions by understanding how movements may affect nuisance behaviors, survivorship, and by evaluating the suitability of future release sites.

Measuring the Value of Game Lands Using a Hedonic Approach

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Acquisition and protection of public land is a central approach to wildlife conservation and creates a need to understand the economic impacts on nearby communities. Protected areas present a financial tradeoff for local and state governments who sacrifice explicit tax revenues from potential development for the direct and indirect benefits provided by protected areas. These include recreational opportunities, improved aesthetics, ecosystem services, explicit tax revenues through recreation expenditures and indirect economic benefits from increased property values, and thus property taxes. These proximal benefits have proven difficult to measure and are a function of both the attributes of the protected land and the socio-cultural context in which that land resides. We employed the hedonic price framework to determine how game land proximity is capitalized into property values. To understand this relationship, we chose seven game lands, varying in size, location, and proximity to urban centers to incorporate into this analysis. We extracted all properties within neighboring counties of the seven game lands (n = 68,955) and matched transaction and county assessment data from the Zillow Group real estate database. We modeled the value of specific parcels of property as the composite value of property, neighborhood, and environmental characteristics. Preliminary results show that across the seven game lands, proximity to game land is positively correlated with property value, but this relationship is highly location dependent and this correlation changes between various markets and across the urban-rural gradient. Our results also suggest proximity to other types of public land, including local and state parks, predict increased property value. This research provides preliminary evidence for a positive effect of game lands on local property values and may facilitate negotiations between stakeholders impacted by future establishment of protected areas, even those dedicated to hunting.

Efficacy of the Immunocontraceptive, GonaCon™, in Controlling White-tailed Deer Population on Bald Head Island

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Over the past few decades, white-tailed deer (*Odocoileus virginianus*, hereafter deer) populations have steadily increased, becoming locally overabundant in many urban and suburban communities. Increased urbanization and negative attitudes toward lethal control have hindered wildlife managers' ability to manage overabundant deer populations through traditional hunting and culling. Hence, some communities have explored non-lethal techniques as a means of population control. In 2014, the Village of Bald Head Island began a five-year project to stabilize the local deer population using the immunocontraceptive GonaCon™. Since 2014, seventy-seven female deer have been captured and inoculated with GonaCon™. In 2017, the Bald Head Island Conservancy and North Carolina State University began a joint study to directly determine the efficacy of GonaCon™ at reducing pregnancy and inhibiting population growth. We collected 50 blood samples for pregnancy analysis from female deer that had received either one or two doses of GonaCon™, and 19 blood samples from female deer that had received no GonaCon™. Across 2017 and 2018, 100% of untreated deer were pregnant (n = 19), 68% of deer with one dose were pregnant (n = 28), and 14% of deer with two doses were pregnant (n = 22). Thus, two doses of GonaCon™ appears necessary to reduce pregnancy rates below 50% under the current administration protocol (capture season limited to January-April by permit). Since 2014, annual spotlight surveys and trail camera indices have been used to examine deer population trends. At the beginning of the project in 2014-15, spotlight surveys estimated a population size of 113 individuals and camera indices estimated the population at 117. In 2018, spotlight surveys estimated 198 individuals and a camera index estimated 173. Two doses of GonaCon™ is effective at reducing pregnancy, but its administration across the BHI population has had limited success in controlling population growth.

Baited-tube Camera Surveys for Weasels in North Carolina

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Weasels (*Mustela sp*) are rarely seen in the Southeastern USA but we do not know if this is because they are rare and declining, or because they are just difficult to survey for. For example, there is only one weasel record for North Carolina in the iNaturalist citizen science observation database, but 19 for mink (*Neovison vison*), a similarly sized species. There are 72 museum records for NC, but only three of these since 2000. Unbaited camera traps are not effective at detecting weasels, with only 4 weasel detections recorded by the ~8000 cameras in the NC Candid Critter and eMammal database. We are testing the effectiveness of a baited-tube camera trap survey that has been successful in surveying weasels in the Western US. We use a 10.16cm x 30.48cm tube baited with raw chicken liver and Caven Gusto's scent lure, staked into the ground ~1m from a camera trap. We placed cameras in suitable habitat (dense cover) in 3 game lands in North Carolina, aiming for 20 sets per area. Preliminary results found no weasels at two sites, but did obtain one long-tailed weasel (*M. frenata*) detection at South Mountain Game Lands. Other species detected regularly include Virginia opossum (*Didelphis virginiana*), white-footed mice (*Peromyscus leucopus*), and Northern raccoon (*Procyon lotor*). Fieldwork and data collection is still being completed and we plan to survey 7 sites during 2019. The results of this study will evaluate the effectiveness of baited-tubes cameras to detect weasels in the region and contribute to our understanding about the distribution and abundance of weasels in North Carolina.

Coyote Colonization Impacts on Subordinate Carnivores: An Example at Bull Neck Swamp Research Forest, NC

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Apex predator extirpation in the eastern United States combined with large-scale land use transitions has created ideal circumstances for coyotes to capitalize on their generalist potential. We compared camera survey data from 2007 (pre-coyote colonization) and 2018 (9 years post coyote-colonization) in a localized site in eastern North Carolina. A total of 9 cameras were placed at 1 square mile spacing over a 9-square mile property from June through September in 2007 and 2018. Overall, species richness declined by 33%, while total individual captures increased by 49%. The results indicate that coyote presence as an apex predator has altered community composition and trophic structure through intraguild competition and competitive exclusion of gray fox, potentially allowing for stimulation of prey populations.

Northern Bobwhite Winter Habitat Selection in Southeastern Pine Woodlands

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Northern bobwhite (*Colinus virginianus*, hereafter bobwhite) populations have declined throughout their range, largely due to habitat loss. Research on bobwhite habitat selection can help managers direct efforts to restore habitat, but winter habitat selection remains understudied. Over a 3-year period, we used radiotelemetry to evaluate bobwhite winter habitat selection at the microsite (telemetry location) and macrosite (management unit) scales in longleaf pine woodlands of the sandhills region of North Carolina. Bobwhite telemetry locations were characterized by greater woody understory cover, switchcane cover (*Arundaria tecta*), and forb cover, as well as lower pine and hardwood basal area than was present at paired random points located within 250m. At the macrosite scale, bobwhite selection peaked at 5 m^2/ha of hardwoods in uplands and at 10 m^2/ha of pines in bottomlands, but selection probability generally declined as pine and hardwood basal area increased. Bobwhite selected management units 1 year post-fire in uplands, but time since fire did not affect selection in bottomlands. Bobwhite selected management units with low tree density, regardless of crown height, and management units with high tree density when crown heights were low (i.e., forest regeneration plots). Finally, macrosite selection decreased as distance to wildlife openings increased. Woody understory cover, which provides critical thermal and escape cover, was the key driver of bobwhite habitat selection at the microsite scale. Basal area and tree density were strong predictors for selection at the macrosite scale, likely through their influence on understory cover.

Riparian Wildlife Assemblages in Enhanced and Restored areas for a Catchment-wide Stream Mitigation Bank, Big Harris Creek, NC

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Riparian corridors play a large role in maintaining biodiversity. They are considered the most frequently used habitat type by wildlife. The diversity of vertebrate populations in riparian corridors are inherently tied to the plants and soil in the riparian zone. The NC Division of Mitigation Services (DMS) completed a restoration project on the headwaters of Big Harris Creek, located near Polkville, NC. The project involved the application of multiple restoration methods along more than 7 miles of Big Harris Creek, this included the construction of new channels and restoration on existing channels in this riparian system. They fully restored portions of the creek and created enhanced areas that were not fully restored, but were transformed to a more original state. The primary goal of this project was to compare population data of four vertebrate taxa (mammals, reptiles, amphibians and birds) between the restored and enhanced sites along Big Harris Creek. This study was performed with a combination of active and passive survey techniques including camera traps, Sherman live traps, avian point surveys, and amphibian point surveys from May to August 2018. Overall, 14 mammal species, 33 bird species, and 7 anuran species were recorded. Small mammal abundance was lower in the restored areas than in the enhanced areas. Bird abundance and diversity were similar with 22 species recorded in restored areas and 27 in enhanced areas. A total of 5 anuran species were recorded in the enhanced areas with call indexes ranging from 1- 2. A total of 7 anuran species were recorded in the restored areas with call indexes ranging from 1- 3. Overall, anurans, meso-mammals, and birds were able to establish populations in the restored areas relatively quickly post-restoration (2-3 weeks) and small mammal populations are still recovering.

Evaluating the Mortality and Activity Patterns of Black Bear, Deer, and Elk Within the I-40 Pigeon River Gorge Corridor

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Roads impede ecological flows through landscapes, mainly by acting as barriers to animal movement, reducing habitat connectivity, and increasing animal mortality. Interstate 40 in the Pigeon River Gorge (PRG) near the Tennessee-North Carolina border bisects Great Smoky Mountains National Park and Pisgah and Cherokee National Forests. This ecologically diverse and important region is home to a large black bear population, deer, and elk. Wildlife vehicle collisions and mortality occur within the PRG, however little information exists on road mortality and animal activity. The goal of our research is a better understanding of the spatial and temporal patterns of bear, deer, and elk activity and mortality along the interstate. With support from state, federal, and NGOs, our research will provide new information to help guide mitigation strategies to reduce wildlife mortality, increase wildlife habitat connectivity, and improve public safety. Focusing on a 28-mile section of I-40, our multifaceted research approach will address the following objectives: (1) determine roadway permeability using camera traps at structures (i.e., culverts, tunnels, underpasses) (2) relate road mortality from surveys to wildlife activity metrics from roadside camera traps and (3) assess movement and crossing patterns of elk relative to the roadway using elk GPS collar locations. Our research will provide a framework that identifies areas along the interstate where mitigation strategies could be focused to reduce wildlife vehicle collisions and increase wildlife habitat connectivity in the PRG. This poster will discuss our project objectives, survey methodology, and expected findings.

Understanding Human-wildlife Interactions in North Carolina

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Increasing demand from the public for assistance related to interactions between humans and wildlife led the North Carolina Wildlife Resources Commission (WRC) to create a statewide educational hotline in April 2017. Staffed by three full-time wildlife biologists, the NC Wildlife Helpline received 15,522 calls in 2017 and 20,223 calls in 2018. Reported human-wildlife interactions (HWI) ranged from complaints about wildlife to animal health concerns to sightings. Data collected by the WRC can help the agency and other wildlife professionals better understand the nature of these interactions, as well as when, where, and under what conditions they frequently occur. This information can be used to develop targeted education efforts to minimize conflicts and provide better assistance to the public when problems or concerns arise. Here we share a sample of the information gained from two years' worth of HWI data collection, including seasonal patterns in reports, geographic trends for select species, and a deeper examination of complaints about one species, *Canis latrans*. We also present a breakdown of helpline-generated referrals, which highlights professionals both within and outside of the WRC who regularly provide further assistance to the public regarding these interactions. Finally, we provide examples of how the WRC is currently using this information to provide better service to the public as it relates to HWIs.

Business Meeting Agenda

Thursday, April 4, 2019, 9:00 am
YMCA Blue Ridge Assembly, Black Mountain, NC

Welcome and Opening Comments – Colleen Olfenbuttel, CWB®

Secretary's Report – Dr. Aimee Rockhill
Review and approval of minutes from the February 28, 2019 Executive Board meeting; minutes are available at http://nctws.org/wordpress/members

Treasurer's Report and 2019-2020 Budget – Kacy Cook
Report is available at http://nctws.org/wordpress/members

Committee Reports – Committee Chairs
Reports are available at http://nctws.org/wordpress/members

Student Chapter Updates
NC State University – Kyle Watkins
Haywood Community College – Ben Parker
Western Carolina University – Candance Moreau
University of North Carolina Wilmington – Kayla McNeilly

Nominations and Elections – Colleen Olfenbuttel, CWB®
Present new officers and "Passing of the Goat"

Words from the New President – Rachael Urbanek, CWB®

Awards

NCTWS CHAPTER AWARD

This award is presented to a chapter member for individual effort and contributions to wildlife conservation through The Wildlife Society. Service to the Society and Chapter is strongly considered, along with professional achievement. The award includes a certificate or plaque and a copy of the commendation read during the awards ceremony. Presentation to the recipient is typically made at the annual meeting of the Chapter.

WILDLIFE CONSERVATION AWARD

This award is presented to individuals or groups within North Carolina who deserve recognition for achievement in wildlife conservation, education, research or related endeavors. There is no requirement for Society or Chapter membership. The recognition is for accomplishments widely recognized and publicized. The award includes a certificate or plaque and a copy of the commendation read at the awards ceremony. The award is presented to the recipient or organization at a time and location that is meaningful to the recipient and to the Chapter in terms of future interaction with others who work for the betterment of wildlife conservation.

KEN WILSON MEMORIAL AWARD

The Ken Wilson Memorial Award is presented annually to a student or students, nominated by the wildlife faculty of the various schools within the State having student chapters (NC State University, Haywood Community College, Western Carolina University, and University of North Carolina Wilmington) and selected by the Awards Committee. Awards are presented for academics, contributions to research, work projects that contribute to State wildlife conservation efforts, involvement with the student chapter of The Wildlife Society, and other accomplishments that the Chapter deems worthy of recognition. Recipients receive a cash award, a plaque, a copy of the Sand County Almanac, and a copy of the commendation signed by the Chapter President.

BEST POSTER AWARD

This award is given to a Chapter member for the most outstanding poster presented at the annual meeting. The poster must be presented during the specified poster session period when the poster evaluation is performed.