



NORTH CAROLINA WILDLIFE RESOURCES COMMISSION

# WILDLIFE DIVERSITY PROGRAM QUARTERLY REPORT

OCTOBER-DECEMBER 2023





The North Carolina Wildlife Resources Commission's (NCWRC) Wildlife Diversity (WD) Program is housed within the agency's Inland Fisheries (Aquatic Wildlife Diversity) and Wildlife Management divisions. Program responsibilities principally include surveys, research and other projects for nongame and endangered wildlife species. Nongame species are animals without an open hunting, fishing or trapping season.

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Cover photos from top left clockwise: Mike Walter, Eastern Region Aquatic Wildlife Diversity Biologist and NC State University students swab mussels in Swift Creek in Johnston County (NCWRC); Wildlife Diversity Biologist, Allison Medford, educates attendees of the Reed Gold Mine Homeschool Day. (Katherine Etchison); Wildlife Diversity technician, Ben Dalton, climbs a rock outcrop complex in search of salamanders. (Lori Williams); John Sealy and NCWRC geneticist Kara Carlson process rattlesnake samples. (Jeff Hall)



## Rare Hawksbill Sea Turtle Stranded on Hatteras

by Dr. Matthew Godfrey, Sea Turtle Biologist and Sarah Finn, Coastal Wildlife Diversity Biologist

Hawksbill sea turtles occur almost exclusively in tropical and semi-tropical waters, where they commonly forage on sponges and other invertebrates in coral reef habitats, and nest on nearby sandy beaches. And yet, there have been a few observations of hawksbill sea turtles in North Carolina waters, including a small post-hatchling turtle that was found washed up on Atlantic Beach in Carteret County in 2017; it was successfully released back to the wild after a short period in rehabilitation.

In late November 2023, another hawksbill sea turtle was found stranded on an inshore section of beach on Hatteras Island during a regular patrol for cold-stunned sea turtles. This hawksbill turtle was not only cold but also skinny

and covered in so many small barnacles that the patrollers did not realize it was a hawksbill sea turtle. Only when the turtle was transferred to the Sea Turtle Assistance and Rehabilitation (STAR) Center at the NC Aquarium on Roanoke Island and the barnacles were removed as part of its initial assessment, did the staff of the STAR Center realize that it was a species rare to North Carolina. One unanswered question is where this turtle could have come from. The closest major nesting sites are in the northern Caribbean, including Mexico, Cuba and the Turks and Caicos Islands. A tissue sample was collected for eventual molecular analysis, to compare its genetic markers with various nesting populations in the Atlantic. The turtle's condition

continues to improve under the care of NC Aquarium staff and, once it is well enough, it should be released back to the wild during 2024.



Above: A stranded juvenile hawksbill sea turtle found in late November 2023 on Hatteras Island. Below: The hawksbill sea turtle in its rehabilitation tank at the STAR Center in Manteo, NC (NC Aquariums)





## Nest Data Provide Insight on Population Trends for Coastal Waterbirds

by Carmen Johnson, Waterbird Biologist, and Kacy Cook, Waterbird Biologist

Building on the colonial waterbird surveys completed earlier in 2023, Wildlife Diversity staff recently gathered nest data from partner agencies and organizations in the state to assess the status and distribution of colonial waterbirds in North Carolina. This coast-wide survey, first conducted by University of North Carolina Wilmington professor emeritus, Dr. James Parnell, has been carried out roughly every three years since the late 1970s, providing biologists with a long running dataset that is used to guide species and habitat management.

Counts were conducted at all known colonies and 49,043 nests were detected for 21 species. Species with the greatest numbers of nests were the Royal Tern (12,384), Laughing Gull (12,112), White Ibis (9,003), and Brown Pelican (5,227). To better understand

population changes, counts were compared with the 15-year survey average. While some species, including the Brown Pelican (+36%), Least Tern (+30%), and Black-crowned Night Heron (+16%) increased in 2023, and highlight the success of long-term conservation efforts, other species showed declines. The Common Tern (-91%), Little Blue Heron (-73%), Snowy Egret (-70%), and Gull-billed Tern (-51%) were amongst the species showing the sharpest declines.

Awareness of these downward trends makes it possible for biologists and managers to examine knowledge gaps, prioritize research needs, and focus management decisions. One of the original motivations for Dr. Parnell's first coast-wide survey was to document the populations of nesting waterbirds (especially Brown Pelicans) due to concerns

about pesticides used in earlier decades. Through hard work, the once federally endangered Brown Pelican has increased from approximately 30 nesting pairs in the state to over 5,000 pairs in 2023. Biologists hope that by identifying species currently in decline, similar success stories will be possible for other species.



Above: Common Tern eggs; Below: A Common Tern on a nest (Melissa McGaw)



An adult Brown Pelican feeds its chicks (Melissa McGaw)





# NC Bird Atlas Wraps Up Third Year with New Tool

by John Carpenter, Eastern Landbird Biologist and Scott Anderson, Science Support Coordinator

The NC Bird Atlas ([www.ncbirdatlas.org](http://www.ncbirdatlas.org)) wrapped up its third year during the fourth quarter of 2023. During that time, the new Block Explorer, which can be accessed at: [www.blockexplorer.ncbirdatlas.org](http://www.blockexplorer.ncbirdatlas.org), was rolled out. This tool allows volunteer Atlasers and WRC staff the ability to track block completion progress, view species' breeding maps, and download data. Many of the tool's features were developed through a contract with the NC Cooperative Fish and Wildlife Research Unit of NC State University. More features are planned to be included in future versions. WRC staff leading the NCBA effort have also been assessing the status of the data collection effort and making preparations for the upcoming breeding season.

**NC Bird Atlas Explorer**  
Last Updated Dec 31, 2023

Blocks | Species Map | Overview | About

**Blocks**  
Summary statistics page for block-level data.  
Selected Priority Block: WILMINGTON-SE  
Season: All Records (selected), Breeding, Non-Breeding

**Statistics**  
NEW HANOVER county, region 2  
Breeding  
Incomplete  
Observed: 52  
Coded: 20  
Confirmed: 5 (25%)  
Possible: 13 (65%)  
Daytime Hours: 4.4  
Daytime Visits: 24  
Nocturnal Hours: 0  
Winter  
Observed: 57  
Daytime Hrs: 5.5  
Daytime Visits: 28  
Nocturnal Visits: 0  
Download Checklists

**Hours**  
Survey Hours  
Total Cumulative: 9.7  
Total Nocturnal: 0  
Year: 2022, 2023, 2021

**Species Accumulation**  
total spp vs Observation Time  
Legend: 50% total spp, confirmed, possible, probable

**Species List**  
Show 25 entries  
Search:

_id	SPECIES	BREEDING_STATUS	BREEDING_DETECTED	WINTER_DETECTED
WILMINGTON-SE	American Crow	Detected	1	1
WILMINGTON-SE	Great Blue Heron	Possible	1	1
WILMINGTON-SE	House Sparrow	Confirmed	1	1
WILMINGTON-SE	Laughing Gull	Detected	1	1
WILMINGTON-SE	Mourning Dove	Probable	1	1
WILMINGTON-SE	Northern Cardinal	Probable	1	1
WILMINGTON-SE	Brown-headed Cowbird	Possible	1	1
WILMINGTON-SE	Brown-headed Nuthatch	Possible	1	1
WILMINGTON-SE	Blue-gray Gnatcatcher	Possible	1	0

The new Block Explorer tool in NC Bird Atlas



# Biologists See Highest Nest Failure for Green Salamanders in 14 Years

by Lori Williams, Western Amphibian Biologist

Over a year ago, in fall 2022, staff reported 13 years of nest success results for state threatened Green Salamanders. That year, we observed the second-lowest nest success rate on record (50%; n = 20 nests). The number of nests monitored since 2010 have ranged from 12 to 42, and success rate has

ranged from 38% to 92% but has declined over time. In fall 2023, during an extreme and prolonged drought, we recorded the lowest nest success rate ever, at 15% (n = 20 nests; Fig. 1). Reasons for such a high nest failure remain unknown but could include predation of brooding females and eggs or nest abandon-

ment because of drought intolerance. From previous years of data analysis, we know the negative impact extreme drought can have on Green Salamander populations. Staff and volunteers will continue to closely monitor nests sites in 2024 to gauge the long-term impact of drought on local populations.

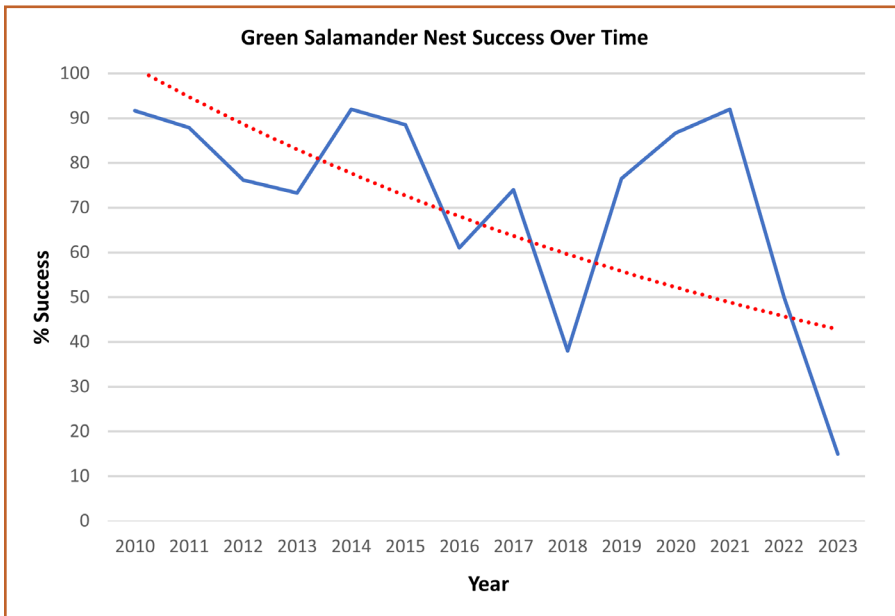
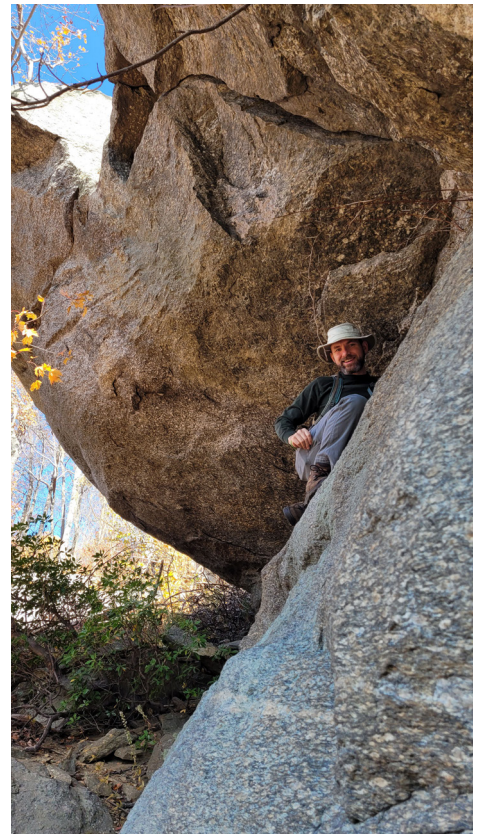


Figure 1. Green Salamander (*A. aeneus*) nest success rate (2010-2023) showing a negative trend over the last 14 years. Sample sizes ranged from 12 to 42 nests.



Top: Wildlife Diversity technician, Ben Dalton, climbs a rock outcrop complex in search of salamanders. (Lori Williams)



Left: A female Green Salamander (head visible to left of egg clutch) brooding her nest in a rock crevice. Without the female, eggs are easily predated or succumb to fungus. (Alan Cameron)





## A Busy Season for Bat Outreach and Meetings

by Katherine Etchison, Mammalogist

As summer fieldwork came to an end, public outreach events and meetings ramped up. Wildlife Diversity staff delivered bat presentations and programs on ten occasions to groups ranging from k-12 students, college students, state and federal agency colleagues, conservation groups, and more. Highlights included a homeschool educational event at Reed Gold Mine in Midland with over 1,000 attendees, a Bat Week educational event at Sierra

Nevada Brewing Co. in Mills River with over 100 attendees, and hosting the annual NC Bat Working Group meeting at the NC Zoo in Asheboro. Much of the year is spent gathering data in the field, and updates on this work through outreach and meetings with peers are crucial for continued conservation of bats in NC. Presentations and programs were well received, and many groups have requested annual bat programs in future years.



Wildlife Diversity Technician, Ellen Pierce (left), and Community Science Specialist, Karen Clark (right), deliver a presentation at the NC Bat Working Group Meeting. (Katherine Etchison)



Wildlife Diversity Biologist, Katherine Etchison (left), Community Science Specialist, Karen Clark (middle), and Wildlife Diversity Technician, Joey Weber (right), speak with attendees about the importance of bat conservation at the Sierra Nevada Brewing Co. Bats and Brews event. (Sue Cameron)



Wildlife Diversity Biologist, Allison Medford, educates attendees of the Reed Gold Mine Homeschool Day. (Katherine Etchison)



## N.C. Partners in Amphibian and Reptile Conservation News

by Jeff Hall, Partners in Amphibian and Reptile Conservation Biologist



NCPARC highlights from the fourth quarter of 2023 included presentations to many groups including the Carteret Wildlife Club, the Croatan chapter of the Society of American Foresters, the NCSU Herpetology Club, the UNCW Wildlife Club, the University of Mount Olive, the NC Herpetological Society, and the NC Longleaf Summit. Presentations ranged from regionwide overviews of WRC herpetological projects to specific details of individual species projects such as Gopher Frog and Southern Hognose Snake. Presentations such as these continue to be very popular and are an excellent way to keep the community aware and knowledgeable of WRC projects. WRC staff also hosted a congressional staffer on Sandhills game land in October (right photo). This gave staff an opportunity to share information about ongoing management efforts for numerous species including several SGCN reptiles and amphibians.



Jeff Hall



Collaborator John Sealy and NCWRC geneticist Kara Carlson process rattlesnake samples. (Jeff Hall)

### Timber Rattlesnakes

To continue efforts towards understanding the genetic diversity of Timber Rattlesnake populations in NC, staff met in Raleigh to process samples of tissues, such as shed skins, scale clips, and rattles. Staff geneticists have been invaluable in this process. An assessment of allelic diversity and heterozygosity within and between populations is needed to determine the long-term viability and conservation needs of these populations and will allow for more concerted management efforts in areas with at-risk populations.



## N.C. Partners in Amphibian and Reptile Conservation News

### Species of Greatest Conservation Need Surveys

Field work during this quarter included surveys and monitoring on both public and private lands to detect SGCN snakes such as Carolina Pigmy Rattlesnake, Timber Rattlesnake, Southern Hognose Snake, Northern Pine Snake, and Eastern Coachwhip, just to name a few. Visits to private lands often result in opportunities to discuss management actions directly benefiting reptile and amphibian species, as well as other wildlife. Additionally, sometimes these landowners are good candidates for the Wildlife Conservation Lands Program leading to further conservation actions. Additionally, staff deployed over a dozen automated audio recording devices (AKA “frogloggers”) to detect SGCN frogs and toads. Several of these were deployed on private lands, with permission from landowners.



*Clockwise from top left: Froglogger; Carolina Pigmy Rattlesnake found on private land in Hyde County; Carolina Pigmy Rattlesnake found on Sandhills Game Land.*



## Southern Appalachian Spruce Restoration Initiative Update

by: Christine Kelly, Western Bird and Carolina Northern Flying Squirrel Biologist

In October 2023, Great Smoky Mountains National Park hosted the Southern Appalachian Spruce Restoration Initiative (SASRI) annual meeting in Gatlinburg, TN. Highlights were NEPA, a spruce book, and updates to SASRI leadership. NEPA is the National Environmental Policy Act, which guides an often-lengthy process of environmental review for activities such as forest restoration on federal lands. The U.S. Forest Service is backing the development of a “subregional NEPA” decision to facilitate high elevation forest restoration on national forests in four states (NC, TN, VA, WV). A Red Spruce Technical Advisory Board has been established to provide collaborative technical recommendations along the way. A spruce book is being written by several SASRI members with technical review from a NCWRC biologist. It will be published by Springer Publishing and made available as an eBook thanks to a donation by The Nature Conservancy. Projected completion date is summer 2024. SASRI is seeking a coordinator position which will report to the SASRI steering committee. Gary Peeples of the U.S. Fish and Wildlife Service completed his two-year term as co-chair of the steering committee, and Jason Rodrigue of the U.S. Forest Service welcomes Marquette Crockett of Southern Appalachian Highlands Conservancy as his new co-chair.



Great Smoky Mountains National Park staff led SASRI members on a hike through the spruce-fir zone. (Gary Peeples/USFWS)



SASRI members embraced the spirit of Gatlinburg with their airbrushed flying squirrel t-shirts. (Gary Peeples/USFWS)



## An Update on Sucker Translocations in the French Broad River

by Dylan Owensby, Western Region Aquatic Wildlife Diversity Biologist

Reintroductions for three sucker (Catostomidae) species to the upper French Broad River continued in 2023. Biologists with the Western Region of the Aquatic Wildlife Diversity Program and the US Fish and Wildlife Service have been capturing Smallmouth Buffalo, Black Buffalo, and Smallmouth Redhorse, from the French Broad River near Marshall and transporting them approximately 55 river miles upstream to the French Broad River near Etowah. Active reintroductions are the only way for these species to return to portions of the watershed that they once inhabited; a series of dams on the French Broad River downstream of Asheville currently prevent them from swimming upstream.

During three days in October 2023, biologists used boat electrofishing to capture and translocate 165 suckers (7 Black Buffalo, 26 Smallmouth Buffalo and 132 Smallmouth Redhorse). As with past reintroductions, each fish was weighed, measured,

photographed and given a unique PIT tag before being transported in a fish hauling tank to their new home upstream. Since spring 2022, biologists have now moved 390 adult suckers (37 Black Buffalo, 103 Smallmouth Buffalo and 250 Smallmouth Redhorse) to the upper French Broad River.

Initial monitoring efforts have provided biologists with an early indication that at least some of the fish are sticking around. Two Smallmouth Redhorse were captured by boat electrofishing in the vicinity of the stocking site in late October. Specialized PIT tag antennae that have been deployed at restoration sites in the upper French Broad River have also detected one Black Buffalo and one Smallmouth Buffalo earlier in 2023. Biologists are planning to continue reintroduction efforts and will also be monitoring changes in the fish community of the upper French Broad River in the coming years.



Above: Aquatic Wildlife Diversity Biologists working up suckers downstream of Redmon Dam prior to translocation. (Luke Etchison) Right: Aquatic Wildlife Diversity Biologist, Chantelle Rondel, releasing a sucker into the upper French Broad River (Dylan Owensby)





## Appalachian Cottontail Research Update

by Andrea Shipley, Mammalogist

A research project aiming to better understand the distribution, sizes, and connectivity of Appalachian Cottontail populations in North Carolina, as well as the species' interspecific competition, population genetics, hybridization zones, is being funded by the Commission. The following is an excerpt from Tangled Bank's most recent interim report.

As of Jan. 9, 2024, we have completed scat surveys and collected habitat quantification data along 150 transects across 52 sites (Fig. 1). Fourteen of these sites are privately owned, and 38 are on public lands. An additional four privately owned sites will be surveyed in late winter to early spring 2024. We will conduct occupancy analyses on a subset of these sites; 18 total sites will receive duplicate surveys for occupancy analysis. To date, 12 sites (9 in winter 2022-23, 3 in winter 2023-24) have been surveyed twice, and the remaining 6 sites have been surveyed once. The repeat occupancy surveys at these six sites will be conducted in late winter to early spring 2024 (Fig. 2). Thirty-four new sites were surveyed from fall to winter 2023-24. We will survey an additional eight new sites in late winter to early spring 2024. As of Jan. 9, 2024, we have collected 1,388 rabbit scat samples that will be used for genetic analysis. Samples will be extracted and processed in 2024.

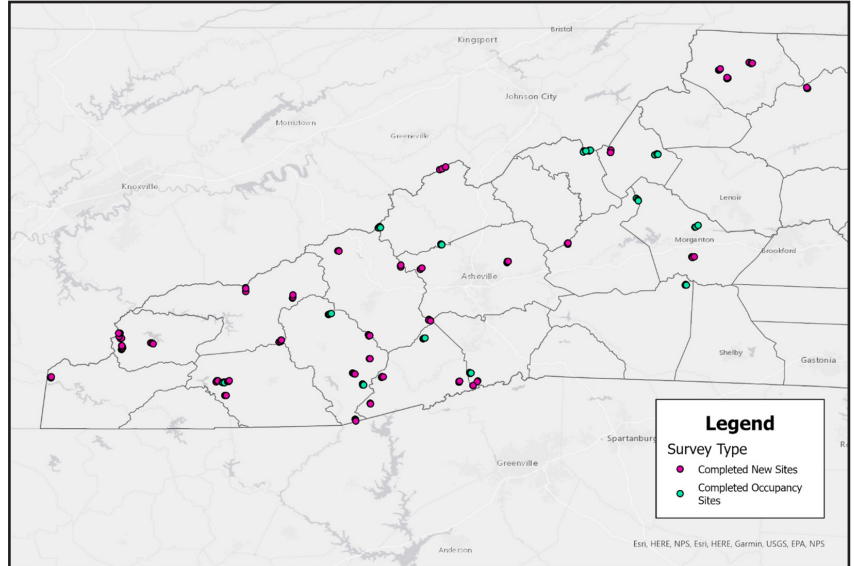


Figure 1. Locations of completed Appalachian Cottontail scat surveys as of January 9, 2024, in western North Carolina. Completed new site surveys are represented by pink circles, and completed occupancy surveys are represented by green circles.

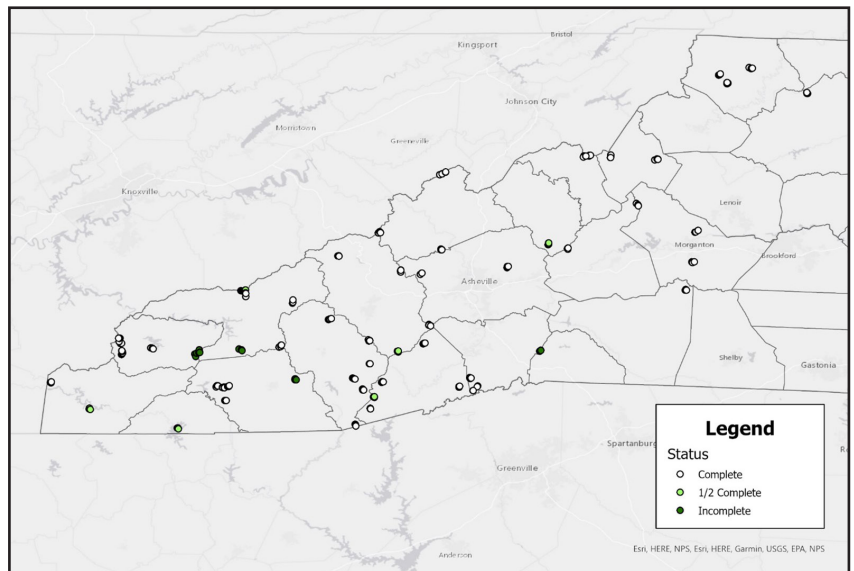


Figure 2. Locations of completed and planned Appalachian Cottontail scat surveys as of January 9, 2024, in western North Carolina. Note that there are 3 sites where transect locations have not been planned yet, so these are not represented on this map. Complete surveys (both occupancy surveys and new site surveys) are represented by white circles, incomplete surveys are represented by dark green circles, and occupancy surveys that have been surveyed once and will be surveyed a second time are represented by light green circles.



## See What Our Mountain Motus Stations Have Detected So Far!

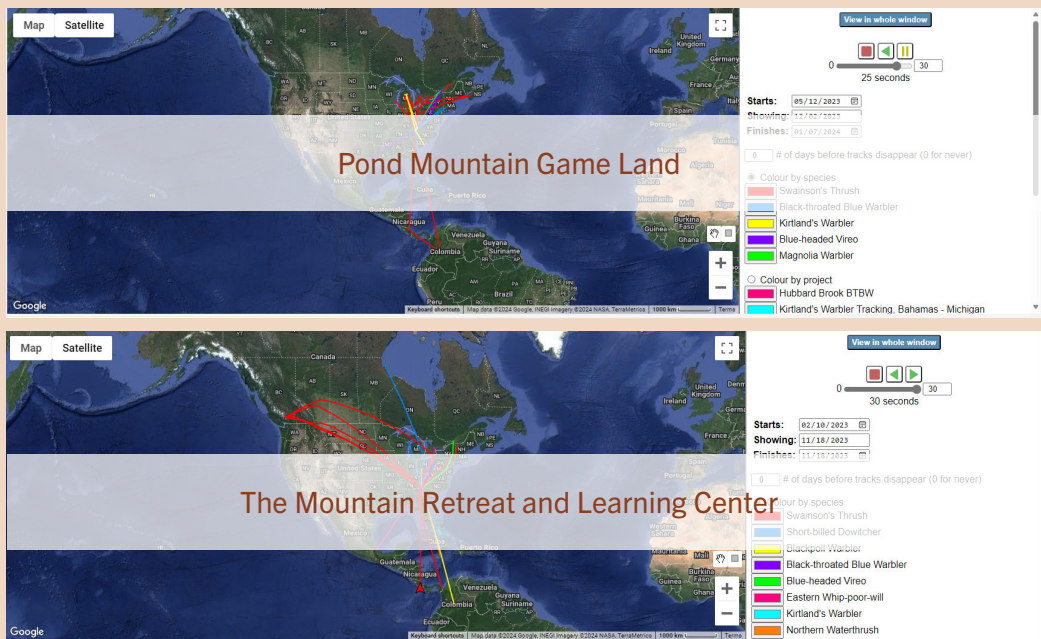
by: Christine Kelly, Western Bird and Carolina Northern Flying Squirrel Biologist

Migration season is extra exciting now that NCWRC has a growing Motus network in the mountains. In 2023, NCWRC's first mountain Motus station on Little Scaly Mountain at The Mountain Retreat and Learning Center, logged [16 detections](#), including three in spring migration and 13 in autumn migration. The Pond Mountain Game Land Motus station was operational by mid-April 2023 and logged [11 detections](#) during autumn migration. Anyone can explore the Motus website. NCWRC created simple animations of the tagged birds that passed our two mountain Motus stations. To enjoy these animations, click on: Pond Mountain or The Mountain Retreat and

Learning Center in the figure below. Motus.org notes that “these public animations have been created using broad filters based on theoretical flight speeds, logical geographic/time sequences, and at least 3 consecutive tag bursts at a single station. Individual tracks have not been inspected for accuracy.” For example, the detection of a Kirtland’s Warbler in Washington state is a false detection. Finally, the “Drones and Motus” tags listed in the table of Receiver Deployment Detections at The Mountain Retreat and Learning Center are not birds. They represent test nanotags hung from a drone being flown by researchers at Highlands Biological Station who are examining detection range of the antennas.

### Animated Migration Track Maps of Tagged Birds

Click the graphics below to animate the migration tracks. Once the page opens, click the green right arrow. Then watch the directional arrows on the map and the advancing dates to the right of the map.



Anyone can look up the latest detections from our Motus stations by visiting <https://motus.org/>.



## Conservation Partners Gather for Southern Bog Turtle Meeting

by Gabrielle Graeter, Conservation Biologist/Herpetologist

In November 2023, the U.S. Fish & Wildlife Service hosted multiple partners for a two-day meeting in Asheville, NC, with support and attendance by NCWRC biologists, to discuss an upcoming USFWS Species Status Assessment (SSA) for the southern lineage of the threatened bog turtle (*Glyptemys muhlenbergii*). The southern lineage of the bog turtle is under consideration for federal listing, and the meeting was an opportunity to share knowledge from the latest research, identify data gaps, and better inform the SSA and listing process. Each state presented information about current population status and trends, protection efforts, threats, and management needs and efforts. Attendees included South Carolina Department of Natural Resources, Georgia Wildlife Resources Division, Virginia Department of Wildlife Resources, Tennessee Wildlife Resources Agency, Eastern Band of Cherokee Indians (EBCI) Fish & Wildlife Department, Virginia Tech, Zoo Knoxville, U.S. Forest Service, and non-governmental conservation organizations including The Nature Conservancy, Tangled Bank Conservation, Amphibian and Reptile Conservancy, and Catawba Lands Conservancy.



Meeting attendees listening to a presentation by NCWRC Biologist Gabrielle Graeter during the November 2023 Southern Bog Turtle meeting in Asheville, NC.. (Gary Peebles/USFWS)



Mike Knoerr with the Amphibian and Reptile Conservancy and Byron Hamstead from the USFWS discuss placement of a bucket-camera trap as part of the C-SWG bog turtle project (Sue Cameron/USFWS)

We also heard progress updates regarding the bog turtle Competitive State Wildlife Grant (C-SWG) project in North Carolina, Virginia, and South Carolina. One of the main accomplishments in 2023 was a bucket camera trap survey in NC and VA. Seventeen bogs (9 in NC) were surveyed between the two states, with 11 of those sites confirming bog turtle presence (only 4 of 9 in NC had bog turtles detected). Other C-SWG activities accomplished this year included protection of bog turtle nests, collection of genetic samples, and habitat management workdays.

On the 2nd day of the meeting, we had two small group meetings. The state and tribal wildlife agency representatives met to discuss the SSA process in more detail and everyone involved in the C-SWG project met to coordinate logistics for the coming year. Meetings may not be the most glamorous part of a wildlife biologist's job, but it is an important part of keeping the momentum going with complex projects, facilitating collaboration, and keeping everyone well-informed. It was a very productive meeting that advanced conservation of southern bog turtles and prepared partners for the USFWS Species Status Assessment!