



NORTH CAROLINA WILDLIFE RESOURCES COMMISSION

WILDLIFE DIVERSITY PROGRAM QUARTERLY REPORT

JULY-SEPTEMBER 2022





The North Carolina Wildlife Resources Commission's (NCWRC) Wildlife Diversity (WD) Program is housed within the agency's Wildlife Management and Inland Fisheries 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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Table of Contents

Several Listed Mussel Species Found During Roanoke River Surveys 5

Sea Turtle Hatchling Success for 2022 Nearly 50% Above the Annual Average Based on Previous Five Years 7

New Technology Will Help Biologists Track and Study Avian Species of Greatest Conservation Need..... 8

High Number of Dead or Dying Shearwaters Concern Waterbird Biologists 9

N.C. Partners in Amphibian and Reptile Conservation News - Surveys..... 10

N.C. Partners in Amphibian and Reptile Conservation - Meetings & Workshops 11

Cape Fear Basin Crayfish Surveys Target Greensboro Burrowing Crayfish 12

Staff Conduct Mussel Surveys in Randolph and Montgomery Counties 12

Staff Observe Negative Trends in Nest Success of Green Salamanders During Summer Surveys..... 13

Summer Planning for High Elevation Forest Restoration..... 14

Golden-winged Warbler Tracking 15

Little Brown Bat Tracking Results in Largest Known Colony in State..... 16

Staff Continue Lake Waccamaw Fish and Mussel Monitoring Surveys 18

Getting the Word Out About NCWRC Reptile Projects..... 19

Staff Note Early Breeding for Gopher Frogs and Mysterious Die-offs of Amphibians 20

Sucker Translocations in the French Broad River 21

Staff Continue Mussel Surveys in the Pee Dee River 22



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Cover photos from top left clockwise: Volunteers at Pine Knoll Shores in Carteret County evaluate the contents of a sea turtle nest 72 hours after hatchlings emerged and liberate any live hatchlings stuck in the nest cavity (NCWRC); NPR Science Correspondent Neil Greenfieldboyce interviews a Box Turtle Connection project leader in July (Gabrielle Graeter); Wildlife Biologist Jeff Hall and Wildlife Technician Kabryn Mattison restrain a captured American Alligator to be measured and marked before being released (Kimberly Smith); Wildlife Technician Kabryn Mattison spies an Eastern Hellbender out on the crawl (Ben Dalton); Wildlife Diversity Technician John Lynch packs shearwater carcasses for shipment at NCSU's Center for Marine Sciences and Technology (Constance Powell)



Several Listed Mussel Species Found During Roanoke River Surveys

by Michael Fisk, Eastern Region Aquatic Wildlife Diversity Coordinator

In September, aquatic wildlife diversity staff with the N.C. Wildlife Resources Commission (NCWRC) surveyed for mussels in the Roanoke River from Hwy. 48 in Roanoke Rapids, downstream to Weldon. Historically, the Roanoke River has been impacted by dam construction, altered flow regimes and water quality issues. This 5-mile reach of river, which forms the border between Northampton and Halifax counties, can be characterized by large shoals and

braided complexes of side channels and islands. Suitable physical habitat for mussels exists in the reach, although no surveys have been conducted throughout most of the area. With improvements in water quality and flow regime over the last 20 years, mussel surveys were needed to determine current species richness and abundance. Historically, the federally threatened Atlantic Pigtoe was documented in this reach. Atlantic Pigtoe populations are fragmented

and depressed in the Roanoke Basin, and updated distribution data will help inform conservation measures moving forward.

Surveys were conducted just downstream of the Hwy. 48 bridge as well as throughout the braided section of river between Roanoke Rapids and Weldon (Figure 1). Mussels were collected, identified, enumerated and released, during timed snorkel surveys. At each site, four to seven species were encountered in-

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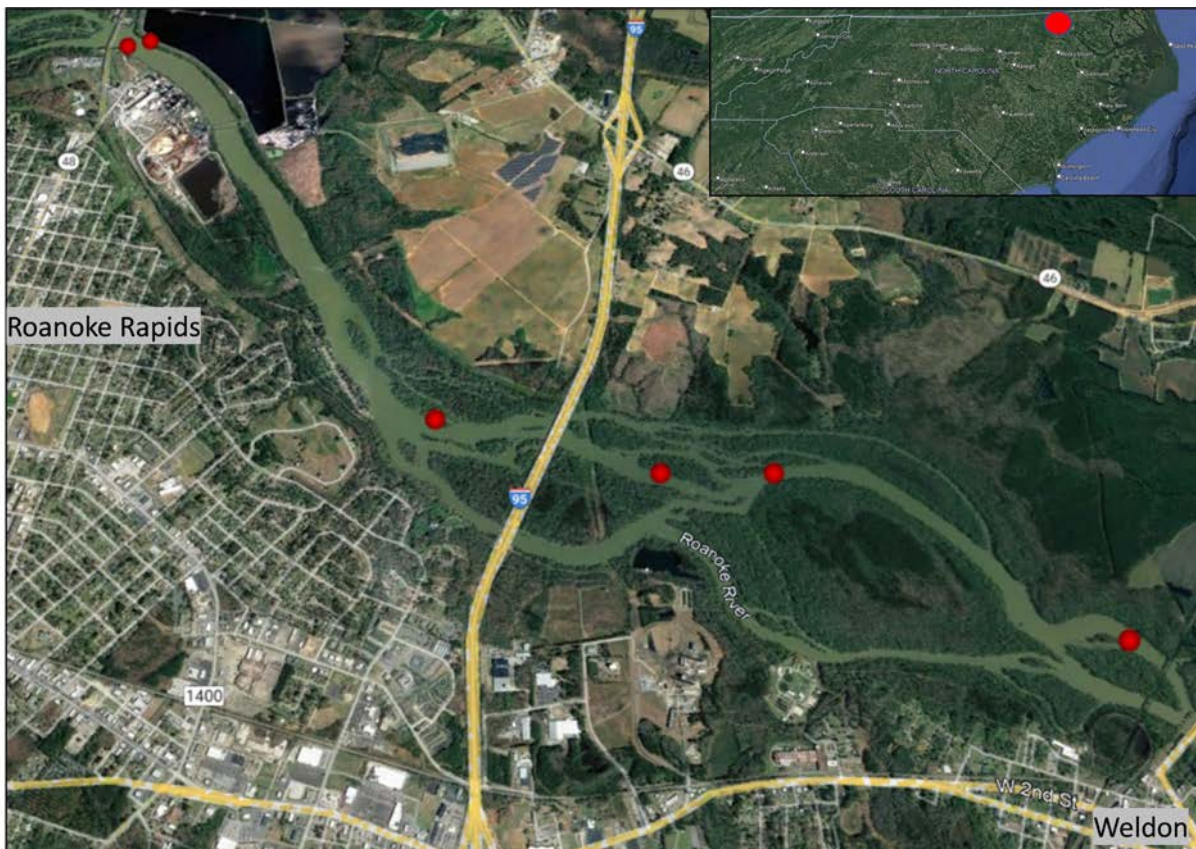


Figure 1: Map of study area in Northampton and Halifax counties. The red circles indicate study area in map inset and where mussel surveys occurred.



cluding several state listed species: the threatened Triangle Floater and Alewife Floater, as well as the state endangered Green Floater. As the name implies, the Alewife Floater is dependent on river herring (Alewife and Blueback Herring) and American Shad as host fish, and their presence in this reach is likely related to long-term management of anadromous species in the Roanoke River over the last three decades. Other species of interest were the Tidewater Mucket, Eastern Pondmussel and Roanoke Slabshell. The three most common species listed in increasing order were Eastern Lampmussel, Northern Lance and Eastern Elliptio. Multiple size classes and recruitment were documented for each species.

Based on these surveys, this section of the Roanoke River has a thriving mussel community. Although no Atlantic Pigtoes were collected, suitable habitat exists for them — additional surveys are necessary to determine if a contemporary population exists. Although the species may be extirpated from this reach, restoration efforts to re-establish the Atlantic Pigtoe in the Roanoke River has great potential.



A Green Floater collected during surveys in the Roanoke River (NCWRC)



An Alewife Floater collected during surveys in the Roanoke River (NCWRC)

How YOU Can Support Wildlife Conservation in North Carolina

Whether you hunt, fish, watch, or just appreciate wildlife, you can help conserve North Carolina's wildlife and their habitats and keep North Carolina wild for future generations to enjoy.

How? It's as easy as 1, 2, 3.

1 Donate to the Nongame and Endangered Wildlife Fund by checking Line No. 30 on your N.C. State Tax Form.

2 Purchase a Wildlife Conservation Plate, which features an illustration of a Pine Barrens Treefrog, for \$30, with \$20 going to the agency's Nongame and Endangered Wildlife Fund.

3 Donate to the Wildlife Diversity Endowment Fund, a special fund where the accrued interest — not the principal — is spent on programs that benefit species not hunted or fished. ncwildlife.org/donate





Sea Turtle Hatchling Success for 2022 Nearly 50% Above the Annual Average Based on Previous Five Years

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

As Labor Day drew to a close, the sea turtle nesting season wound down in North Carolina. In contrast, the end of the summer corresponds to the peak in hatchlings emerging from incubating sea turtle nests along the coast. Hatchling sea turtles emerge from their nests almost exclusively at night and scramble down the beach to the ocean. The network of volunteers and cooperators that make up the NCWRC's Sea Turtle Project waits three days, after

hatchlings first emerge from each nest, before inventorying its contents to check on hatching success. This is also an opportunity to liberate any live hatchlings that might be stuck in the nest, so they too can crawl down the beach to the water. Nest excavations often draw nearby beach visitors, so they provide an opportunity for people to observe hatchlings and learn about sea turtle conservation efforts in North Carolina. By mid-September, 125,866 sea

turtle hatchlings had already emerged from nests laid in the state, with more likely to come in the following several weeks. This is nearly 50% above the annual average (86,522) based on the previous five years. The high number of hatchlings is a result of not only a big nesting year in 2022, but also a relatively calm coastal storm season, which has allowed most nests to reach the end of incubation without erosion or extreme washover.



Loggerhead hatchlings in Carteret County scramble to the ocean after being released from the bottom of a nest undergoing inventory to characterize hatching success. (NCWRC)



Volunteers at Pine Knoll Shores in Carteret County evaluate the contents of a sea turtle nest 72 hours after hatchlings emerged and liberate any live hatchlings stuck in the nest cavity. (NCWRC)



New Technology Will Help Biologists Track and Study Avian Species of Greatest Conservation Need

by John Carpenter, Eastern Land Bird Biologist

Recently, Wildlife Diversity program staff, along with NC State University and UNC-Wilmington, hosted and attended a Cellular Tracking Technology (CTT) workshop to demonstrate the potential this state-of-the-art equipment has for studying many Species of Greatest Conservation Need. The workshop included both a field demonstration at the Voice of America Game Land and a virtual meeting to discuss data management. CTT is a company offering radio, cellular and satellite telemetry systems that allow researchers to track animals' movements continuously through time. A CTT system includes an array of solar-powered receiver "nodes" spaced 100-200 m apart throughout the

desired habitat in a 1 km² grid, a sensor station and transmitter tags mounted on the target animals. Typically, the sensor station is located at the center of the node array, mounted on a 20- to 30-foot tower topped with an omni-directional antenna and a variety of other antennae aimed along cardinal directions or as needed to support effective communication between nodes and the sensor station. It is powered with a solar panel and battery. Transmitter tags attached to the target animals may be battery powered, solar powered or a combination. Each node will detect an animal's unique transmitter frequency within approximately 200 m and relay its location back to the sensor sta-

tion. From there, the station uploads the animal's location data to a central repository, which communicates with a server that displays the data in near real time via the CTT user portal. This automated telemetry system not only produces significantly more accurate and detailed animal space use metrics, allowing for study of habitat utilization, home range size and seasonal movements, but it also frees up field staff from labor intensive manual telemetry methods, allowing staff to allocate more time to other components of their studies. The NCWRC is currently using this technology to study several avian Species of Greatest Conservation Need, including Henslow's and Saltmarsh Sparrows.



Left: Henslow's Sparrow wearing solar-powered transmitter (Emily Nastase); Attendees at CTT field demo, Voice of America Game Land examine the sensor station. (John Carpenter)



High Number of Dead or Dying Shearwaters Concern Waterbird Biologists

by Carmen Johnson, Waterbird Biologist, John Lynch, Constance Powell, Wildlife Diversity Technicians

This summer, the Waterbird Team worked with the Southeastern Cooperative Wildlife Disease Study (SCWDS) and Dr. Anna Robuck, a researcher with the National Oceanic and Atmospheric Administration, to increase their understanding of Great Shearwater mortality events along the coast. Throughout the spring and summer, agency staff, partners and beachgoers reported high numbers of lethargic or dead shearwaters on beaches up and down the Atlantic Coast. It is not unusual for these birds, which migrate from the south Atlantic to the waters off the coast each year, to wash up on North Carolina shores. However, the high number of animals seen this season raised concerns that Highly Pathogenic Avian Influenza (HPAI), or another disease, could be behind the event, known as a “wreck.” Although some birds were taken to wildlife rehabilitators, most did not survive and over 100 birds were collected and sent to SCWDS and Dr. Robuck for testing. Necropsies of the birds found that all were emaciated, some had internal parasites, and others had ingested micro plastics. None of the shearwaters tested positive for HPAI. Based on previous wreck events, staff believe the birds were in poor physical condition due to starvation and were then blown inland during storm events like the ones that occurred around Mother’s Day and the Fourth of July. Through earlier work, Dr. Robuck has learned that climate change is likely playing a part by producing storm events earlier in the season and disrupting the shearwaters’ prey base of forage fishes, leading them to ingest more plastics. Samples from the mortalities submitted by the Waterbird Team will be part of additional work comparing stranded birds, bycatch birds and healthy, live birds.



Wildlife Diversity technician John Lynch packs shearwater carcasses for shipment at NCSU's Center for Marine Sciences and Technology (Constance Powell)



Great Shearwater (Cornu Laurenti)



N.C. Partners in Amphibian and Reptile Conservation News - Surveys

by Jeff Hall, Partners in Amphibian and Reptile Conservation Biologist

HERP SURVEY AND MONITORING

Efforts in surveys and monitoring for amphibian and reptile Species of Greatest Conservation Need during this quarter involved many staff from the NCWRC, partner agencies and volunteers from the public and ranged across the state. Species targeted on game lands, state parks and national forests included Pigmy Rattlesnake, Timber Rattlesnake, Eastern Coachwhip, Southern Hognose Snake, Black Swamp Snake, Glossy Crayfish Snake and Gopher Frog. Additional assistance was provided for monitoring of the American Alligator and Eastern Hellbender.



Timber Rattlesnake surveys in western North Carolina (above photos, Jeff Hall) continue to be heavily assisted by community science records sent to rattlesnake@ncwildlife.org. These sightings have led to the discovery of several important areas for rattlesnakes.

Top photo: Wildlife Biologist Jeff Hall and Wildlife Technician Kabryn Mattison restrain a captured American Alligator, which was measured and marked before being released. (Kimberly Smith); Bottom photo: Wildlife Technician Kabryn Mattison spies an Eastern Hellbender out on the crawl (Ben Dalton)



N.C. Partners in Amphibian and Reptile Conservation - Meetings & Workshops

SAVANNA RIVER COLLABORATIVE MEETING

In August, partners from North and South Carolina gathered at the Savanna River Site (SRS), near Aiken, S.C., to discuss management and conservation of the Gopher Frog. Both states have assisted one another in the past with information about breeding phenology, head-starting and genetics work, and this meeting was a great opportunity to share more about these topics and delve into conservation actions needed to protect the species. Over 50 attendees participated in the discussion-based meeting. Break-out sessions tackled some of the complex issues facing conservation of the Gopher Frog, such as how best to create and restore wetlands, when to apply prescribed fire to the landscape, and protocols for head-starting animals to increase population sizes. The two-day meeting concluded with a field tour of sites on the SRS.



Field tour at the Savanna River Site during the NC-SC Gopher Frog Meeting, held in August, near Aiken (Jeff Hall)

BLADEN LAKES ISOLATED WETLANDS WORKSHOP

In September, NCWRC biologists, in conjunction with The Nature Conservancy, N.C. Forest Service, and NCSU Cooperative Extension, held a workshop focused on management of isolated wetlands in the Bladen Lakes region. The workshop covered two days including a half-day virtual meeting and a full day field tour visiting sites in Bladen County. This was the second in a series of workshops focused on management of isolated wetlands, with the first held in 2019 in the Sandhills. Presentations were given on reptiles and amphibians, plants, natural communities, and management options for both wetlands and uplands. In addition, several case studies were shared of management successes and opportunities for improvement. Although the primary focus was the conservation of reptiles and amphibians, benefits to birds, mammals, plants and invertebrates were also discussed. The virtual day attracted 143 registrants, while the field tour was limited by capacity of vehicles to around 30 participants. Field tour sites included stops at

Suggs Mill Game Land, Bladen Lakes State Forest and a private landowner. Participants shared overwhelmingly positive feedback on the value of the workshop, so staff may consider adding a third workshop in the future.



Field tour on private land during the Bladen Lakes Isolated Wetlands Management workshop (Julian Wilson)



Cape Fear Basin Crayfish Surveys Target Greensboro Burrowing Crayfish

by Katharine DeVilbiss, Central Region Aquatic Wildlife Diversity Biologist

Crayfish burrows at nine creeks were surveyed by staff biologists in July as part of ongoing efforts to update distributional records of native crayfish species. The sites were in Guilford County, specifically targeting the known geographic area of the Greens-

boro Burrowing Crayfish, which is state listed as Special Concern. Although the target species was not found, one Carolina Ladle Crayfish and individuals of the native *Cambarus* species *C. acuminatus* complex were located during the digging efforts.



Greensboro Burrowing Crayfish (Brena Jones)

Staff Conduct Mussel Surveys in Randolph and Montgomery Counties

by Katharine DeVilbiss, Central Region Aquatic Wildlife Diversity Biologist

In July and August, NCWRC staff performed mussel surveys in waterways in Randolph and Montgomery counties — the Little River, Uwharrie River, Barnes Creek and Betty McGees Creek. The objectives of the surveys were to update freshwater mussel distributional records and augment the knowledge base of a new-to-science species that was recently discovered. The undescribed species is a narrow-ranged North Carolina endemic, currently known in only 8 km of the Little River mainstem in Randolph

County. These surveys were outside of this core area and no individuals were detected. Search effort totaled 37 person-hours (p-h). Species of Greatest Conservation Need detected in these surveys included another new endemic, an *Alasmidonta* species (description ongoing), Carolina Creekshell (State Endangered) and Notched Rainbow (State Threatened). Staff biologists plan to continue surveys and studies to further their understanding of this undescribed freshwater mussel species.



Carolina Creekshell (Michael Fisk)



Notched Rainbow (Michael Fisk)



Staff Observe Negative Trends in Nest Success of Green Salamanders During Summer Surveys

by Lori Williams, Western Amphibian Biologist

In summer 2022, staff and a volunteer continued monitoring nest success of state threatened Green Salamanders as they have for over a decade. The number of nests monitored any given year has been from 12 to 42, and success rate has ranged from a low of 38% (2018) to a high of 92% (2010, 2012, 2021), with an average of 76%. This year's success rate of 50% is the second lowest on record (n = 20 nests) and adds to the downward trend they have observed over the years (Fig. 1). This quarter, staff also worked closely with a private contractor to complete a population analysis for Green Salamanders using survey data from 2000-2021. Similar to the negative trend with nest success, preliminary results of that analysis suggest a significant population decline of more than 50% for the Blue Ridge Escarpment Green Salamander population in North Carolina over the past two decades. Extensive periods of severe drought during this time (late 2006-2008 and 2016) appear to be a major factor in declines.



A female Green Salamander contorted around her egg clutch in a rock crevice. Without the female present to brood the nest, eggs quickly grow fungus and perish or are easily preyed upon. (Alan Cameron)

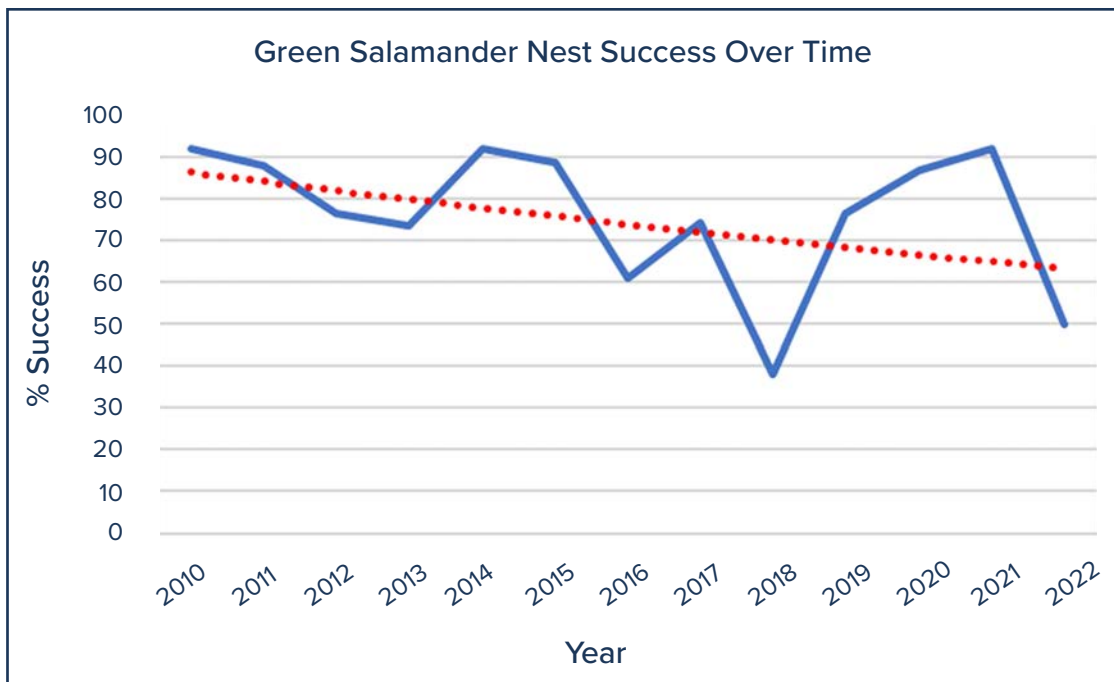


Figure 1. Green Salamander nest success rate (2010-2022) showing a negative trend over the last 13 years. Sample size ranged from 12 to 42 nests.



Summer Planning for High Elevation Forest Restoration

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

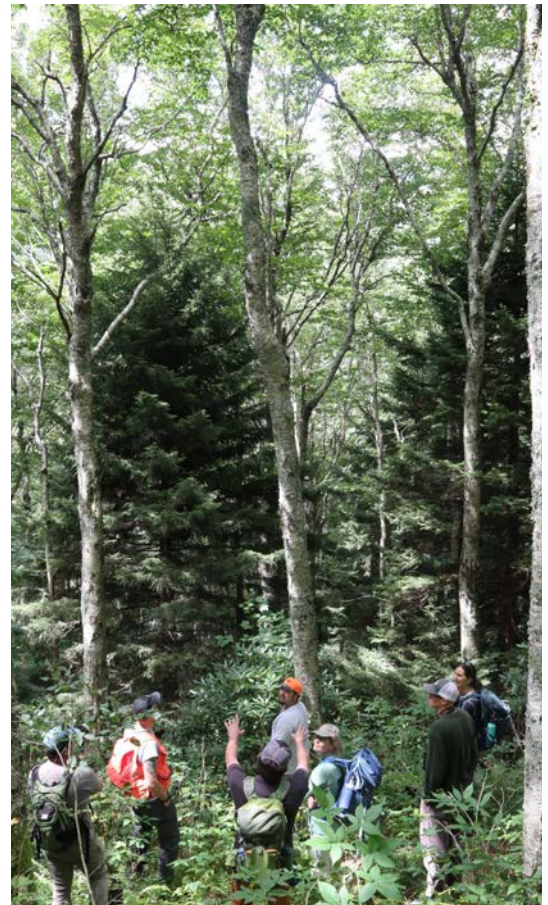
NCWRC staff and partners with the Southern Appalachian Spruce Restoration Initiative (SASRI) planned several high elevation forest restoration projects this summer. The restoration work is intended to connect habitat and to provide food and cover for species like the Carolina Northern Flying Squirrel, Red Crossbill and Northern Saw-whet Owl. SASRI's Black Mountains Sky Island Team designed two restoration

projects. The first, on private property, will incorporate "release treatments" that cull competing vegetation to encourage sub-canopy Red Spruce to reach the canopy and begin bearing cones. The team, consisting of wildlife biologists, foresters and botanists, met in September for a combined training and workday to lay out the restoration treatments. The second is proposed for Mt. Mitchell State Park property.

There, subcanopy spruce would be managed like the first project to accelerate growth into the canopy, and spruce seedlings will be planted in areas where spruce has not been able to recover on its own. The Plott Balsams Sky Island Team laid out a similar release treatment on William H. Silver Game Land. SASRI's Sky Island Teams provide members with an opportunity to learn from and support one another.



Above: Pink flagging marks a Red Spruce on William H. Silver Game Land that is targeted for release from overstory hardwood canopy (Chris Kelly); Right: Biologists and foresters from the Black Mountain Sky Island Team discuss how to accelerate growth of target Red Spruce trees while maintaining other habitat components important to the Carolina Northern Flying Squirrel. (Gary Peeples/USFWS)





Golden-winged Warbler Tracking

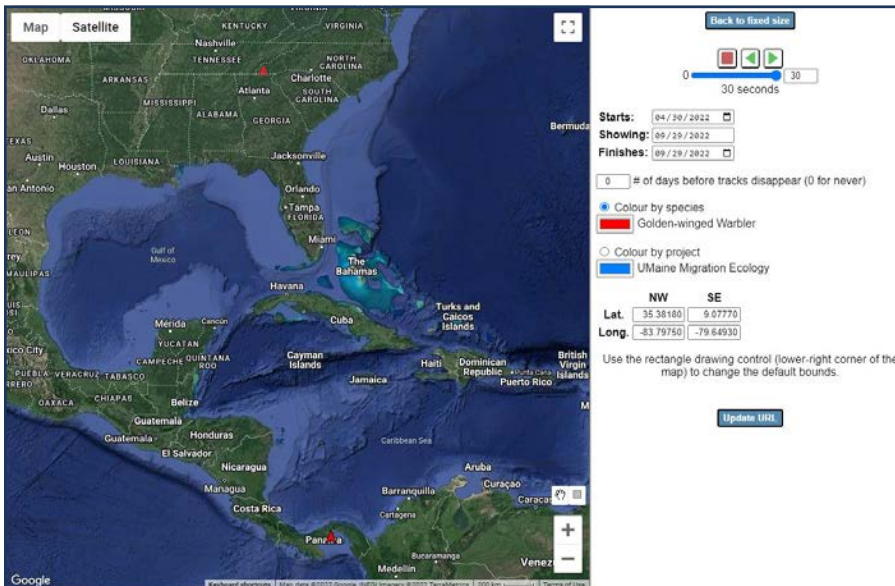
by: Christine Kelly/ Western Bird and Carolina Northern Flying Squirrel Biologist

As reported in our second quarter report, the NCWRC contributed to a rangewide survival study of Golden-winged Warblers, led by the University of Maine. The first part of the study was completed this past spring, when NCWRC biologists and other partners fitted Golden-winged Warblers with tiny radio tags (nanotags).

The second part of the study will take place in spring 2023, when biologists attempt to relocate these individuals on the breeding grounds to determine annual survival. But in

the interim, NCWRC biologists had an opportunity to observe the breeding population in the Cheoah Mountains (Graham County) more closely. The mountain bird crew checked on the tagged and color-banded individuals on a bi-weekly basis throughout the summer. Radio signals led them to tagged females on nests, while males maintained their territory boundaries from favorite song perches. As the summer progressed, staff observed spatial shifts, likely attributed to the adult birds tending to their newly volant offspring.

By Aug. 12, only two males could still be relocated by their radio signals, and by Aug. 23, none were detected. With migration in full swing, biologists were thrilled to discover that one of the birds, a male tagged on his breeding grounds in Graham County on April 30, was alive and on the move. On Sept. 29 at 10:15 p.m., his radio tag “pinged” a Motus Wildlife Tracking receiver station in Panama City, Panama. He is on his way to his wintering grounds in northern South America. Biologists await his return to North Carolina in spring 2023.



The red arrow in North Carolina marks the location where male Golden-winged Warbler #75 was captured on his breeding territory in April 2022. A Motus Wildlife Tracking receiver station in Panama City, Panama (lower red arrow) detected this bird's radio tag on the night of Sept. 29, 2022. ([Motus.org](https://www.motus.org) website)



A tiny nanotag sits on the back of a male Golden-winged Warbler (Anthony Squitieri)



Little Brown Bat Tracking Results in Largest Known Colony in State

by Katherine Etchison, Mammalogist

The once common little brown bat has become exceptionally rare in western North Carolina due to impacts from white-nose syndrome (WNS). Mist net captures of this species are down 92% compared to surveys occurring before the arrival of WNS; however, little brown bats are still consistently found at a mist net site in Avery County. NCWRC, NC State Parks, U.S. Fish and Wildlife Service and Southern Appalachian Highlands Conservancy personnel gathered for the annual mist net survey of this site in August 2022. The team caught five little brown bats and applied

radio-transmitters to four of them. The objective of this effort was to locate the bats' roost and begin to learn about the surviving population in the area. Little brown bats commonly roost in artificial structures like buildings and bridges, which can be subject to modification and become unsuitable over time. It was imperative to find the roost to ensure bats have access to a suitable roost for the future.

One tagged individual was found roosting alone under the wooden siding on a house about 2.8 miles from the mist net site. The other tagged bats were found roosting in a privately owned building

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Wildlife Diversity Technician Joey Weber searches for a radio-tagged little brown bat (inset) (Katherine Etchison)





about 2.5 miles from the mist net site. An emergence survey on the building resulted in a count of 86 bats exiting the building at sunset, making it the largest known little brown bat roost in the state. Only one additional little brown bat roost is currently

known, and the highest count is five individuals. All other known roosts for this species (six with upwards of 400 individuals) were extirpated in the years since WNS arrival.

Efforts are underway to develop a partnership with the

property owner and add bat houses to provide an array of roosting options for the colony. The next step in learning about this surviving population is to plan a second telemetry effort when the bats head to their winter hibernaculum in 2023.



Clockwise from left: NC State Parks Mountain Region Biologist, Sharon Bischof, Southern Appalachian Highlands Conservancy Land Protection Associate, Kyle Shute, and NC State Parks Inventory Biologist, Ed Corey, determine morphological measurements of a little brown bat. A little brown bat caught during a mist net survey in Avery County. A little brown bat found roosting in an Avery County building (Katherine Etchison)



Staff Continue Lake Waccamaw Fish and Mussel Monitoring Surveys

by Brena Jones, Central Aquatic Wildlife Diversity Coordinator

NCWRC staff, in partnership with NC State Parks, has conducted annual standardized surveys since 2009 for three fish Species of Greatest Conservation Need (SGCN) at multiple sites in Lake Waccamaw, including the endemic, federally Threatened Waccamaw Silverside. The mean number of Waccamaw Silversides collected per minute of seining (catch rate) at all sites combined has been highly variable over nine sampling years and was 11.8 fish/minute (fpm) of seining

in 2022. This value has ranged from 1.82 fpm in 2017 to 23.5 fpm in 2009; it was an increase from the catch rate of 3.6 fpm in 2021. Variability is likely due to the fish's schooling behavior, preference for open waters of the lake, and varied sampling conditions, such as very warm water (exceeding 33 C), which causes fish to move out into deeper habitats that cannot be seined. The highest catch rate at a single site in 2022 was 21.1 fpm. The Waccamaw Killifish and

Waccamaw Darter were also successfully collected, showing that populations persist within Lake Waccamaw.

Staff also conducted quantitative mollusk surveys in Lake Waccamaw, which are completed biennially since 2009. Data analysis from this survey is ongoing, but the Waccamaw form of *Elliptio congarea* and Tidewater Mucket remain the most abundant mollusk species, composing over 90% of the individuals at each study site.



A young Rayed Pink Fatmucket from Lake Waccamaw (Brena Jones)



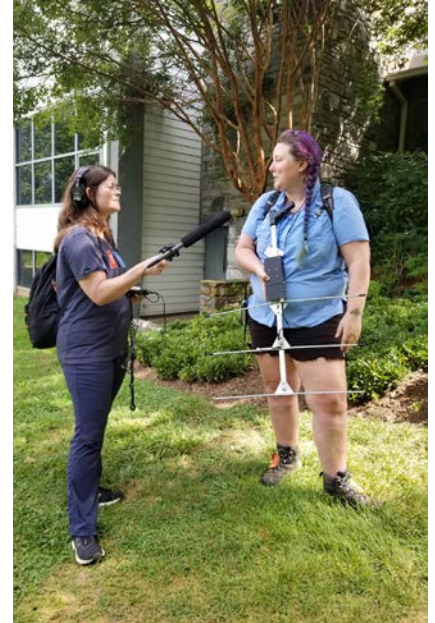
Getting the Word Out About NCWRC Reptile Projects

by Gabrielle Graeter, Conservation Biologist/Herpetologist

Recently, popular science media outlets have taken an interest in featuring NCWRC reptile projects on their platforms. NCWRC Conservation Biologist Gabrielle Graeter was interviewed by NPR and PBS to discuss the importance of two projects in the state involving box turtles and bog turtles. These interviews were great opportunities to inform the public about the importance of these species and the threats they are facing across the state. These stories highlight collaborative conservation efforts between the NCWRC, other organizations and agencies, and community scientists who are working together to gather data and conserve these two species.

The first interview featured the Box Turtle Connection (BTC) project, which is a long-term, state-wide collaborative study that aims to assess the status and trends in box turtle populations, identify their threats and determine conservation strategies. This project is community-science driven, as data are collected across the state by trained volunteer Project Leaders. NPR Science Correspondent, Nell Greenfieldboyce, joined Graeter at the NC Arboretum, one of the BTC study sites, along with other BTC staff and the NC Arbore-

tum Project Leader to discuss the project. They discussed the general status of box turtles, the objectives of the Box Turtle Connection project and the educational aspect of the BTC. The story is available on NPR's [website](http://www.npr.org) (www.npr.org). The second interview featured conservation work being done by the NCWRC and conservation partners to help manage bog turtle populations in the state. Bog turtles are listed as Threatened in North Carolina due to population declines associated mostly with habitat loss and degradation of habitat quality. There has been great effort by the NCWRC and other partner organizations to implement various conservation methods to improve bog turtle habitat, survivorship and population status. A film crew from the UNC Hussman School of Journalism and Media and a PBS North Carolina videographer joined Graeter at a bog where they discussed the natural history, ecology and status of the bog turtle, the threats the species and its habitat face, and the conservation work the NCWRC and its partners are doing. This film will come out in fall 2023 on the show, *Sci NC* on [PBS North Carolina](https://video.pbsnc.org/show/sci-nc/) (<https://video.pbsnc.org/show/sci-nc/>).



NPR Science Correspondent Nell Greenfieldboyce interviewing a Box Turtle Connection project leader, July 2022 (Gabrielle Graeter)



Students from the UNC Hussman School of Journalism and Media filming bog turtle hatchlings for the PBS North Carolina show *Sci NC*, September 2022. (Gabrielle Graeter)



Staff Note Early Breeding for Gopher Frogs and Mysterious Die-offs of Amphibians in Sandhills and Eastern North Carolina Wetlands

by Dr. Jeff Humphries, Eastern Amphibian and Reptile Biologist

In the third quarter, NCWRC biologists continued to monitor Gopher Frogs and other frog species using isolated wetlands in the Sandhills and eastern part of the state, in addition to conducting surveys for other amphibian species. Of note this fall, Gopher Frogs were detected breeding in September on Fort Bragg Military Installation, earlier than they have ever been recorded breeding in North Carolina before. These rare frogs normally breed from February to April but will occasionally breed with large storm events in the fall, such as the remnants of hurricanes or tropical storms. This is the first year staff have documented Gopher Frogs breeding in September, not coinciding with a large storm event. Gopher frogs deposited egg masses in one pond on Fort Bragg and one pond on Holly Shelter Game Land in mid-September this year, earlier than has ever been reported. These breeding events change the way biologists survey for this species, based on egg laying.

Biologists also discovered a large die-off of adult frogs on Fort Bragg, in a wetland where large populations of Gopher Frogs used to occur, but where the populations of Gopher Frogs have appeared to decline heavily over the

last decade. Several dozen Pine Woods Treefrogs and one Cope's Gray Treefrog were discovered deceased, but they were too decomposed to analyze for pathogens or cause of death. Staff will continue to monitor this site to try to figure out the cause of die-offs of adult frogs and a subsequent apparent die-off of tadpoles. The decline of frog species is a major concern for biologists throughout the world, so monitoring popula-

tions is extremely important. This is an ongoing monitoring project, and, it is hoped, they will discover reasons for die-offs in the future. Continued monitoring of isolated wetlands and understanding reasons for amphibian population fluctuations, including emerging diseases and mitigating their effects, as well as ensuring natural resources remain stable and intact, are high priorities for the Wildlife Diversity Program.



Freshly laid Gopher Frog egg mass (Mike Martin)



Ornate Chorus Frog, a quickly declining species in NC (Dr. Jeff Humphries)



A borrow pit on Fort Bragg, NC. Once a stronghold for Gopher Frogs, it no longer appears to maintain a population of this imperiled species. However, this species bred here in September 2022 (2 egg masses) for the first time in about a decade. (Mike Martin)



Sucker Translocations in the French Broad River

by Dylan Owensby, Western Region Aquatic Wildlife Diversity Biologist

Efforts have begun to reintroduce three sucker (Catostomidae) species to portions of the upper French Broad River. Biologists with the Western Region of the Aquatic Wildlife Diversity Program captured Smallmouth Buffalo, Black Buffalo and Smallmouth Redhorse from the French Broad River near Marshall and transported them approximately 55 river miles upstream to the French Broad River near Etowah. These sucker species are just a few of many fish species that are found in the lower French Broad River that are currently unable to occupy their former native range farther upstream. A combination of past water quality issues and three dams on the mainstem French Broad, all of which are located downstream of Asheville, has prevented the fish from returning to large portions of the watershed that they once inhabited.

During three days in June, biologists used boat electrofishing to capture 85 suckers for the translocation (36 Smallmouth Buffalo, 10 Black Buffalo and 39 Smallmouth Redhorse). 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. Finclips were also taken from a subset of fish for genetic records.

Biologists are hopeful the PIT tags will provide useful information if the fish are captured during later monitoring efforts. One of the translocated Smallmouth Buffalo has already been picked up by a passive PIT antenna located at the mouth of a restored slough near Mud Creek that was created with the help of NCWRC staff in 2020. Biologists are planning to continue with the translocation efforts of these species for the next few years and will be adding more native species to the upper French Broad fish community in the near future.



Smallmouth Buffalo caught in the lower French Broad River (Dr. Luke Etchison)



Dr. Luke Etchison and Hans Lohmeyer measuring and PIT tagging a Smallmouth Redhorse just downstream from Redmon Dam on the French Broad River near Marshall (Dylan Owensby)



Hans Lohmeyer tempering the suckers to the local water conditions in the upper French Broad River prior to being released (Dylan Owensby)



Staff Continue Mussel Surveys in the Pee Dee River

by Brena Jones, Central Aquatic Wildlife Diversity Coordinator

Beginning in 2009, three long-term mussel population monitoring sites were established in the lower Pee Dee River, near the state border in south-central North Carolina. In 2022, with help from partners including Duke Energy/Progress, staff conducted the seventh biennial survey for priority mussel species downstream of Blewett Falls and Tillery dams. Monitoring at the third site, below Falls Dam, has been turned over to Cube Hydro as part of its Federal

Energy Regulatory Commission (FERC) license requirements. These data provide an opportunity to document the potential changes in mussel diversity and abundance due to the improved dissolved oxygen levels and minimum flows downstream of these dams implemented under new FERC licenses for Duke Energy/Progress. In addition, this long-term dataset may provide insights into population responses to other events such as extreme floods from large hurricanes.

Data analysis from this survey is ongoing. There was an increase in species richness, with 13 detected in 2022, up from 11 in 2019, but neither “new” species was new to the site. Species richness at the Blewett Falls site remained at 10, unchanged from 2019. Mussel Species of Greatest Conservation Need collected were the Yellow Lampmussel, Eastern Lampmussel, Creeper, Eastern Pondmussel, Carolina Creekshell and Eastern Creekshell.



Top photo: Female Yellow Lampmussel (Brena Jones); Right illustration: Mussel Monitoring Area Map – Pee Dee River, NC

