



*North Carolina  
Wildlife Resources Commission*



# Wildlife Diversity Program Quarterly

Second Quarter 2017



Northern Long-eared Bat (Photo by Allison Medford)

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**Brook Floater Surveys in Central North Carolina Begin**

This quarter, Aquatic Wildlife Diversity staff began status assessment surveys for the Brook Floater mussel in the upper Cape Fear and mid/lower Yadkin-Pee Dee river basins in central North Carolina.

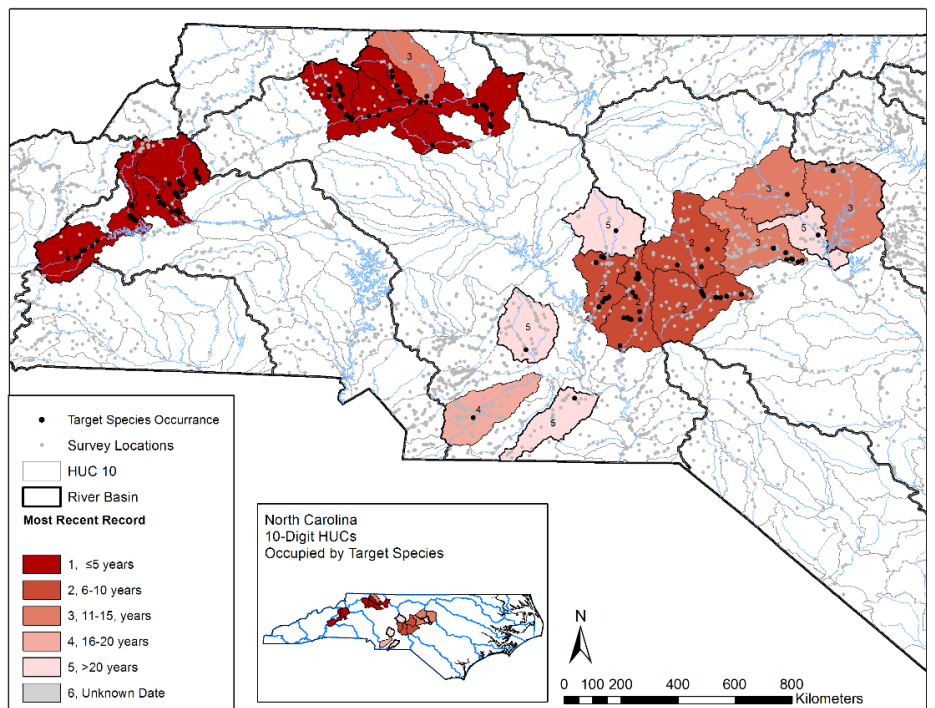
This effort will complement ongoing work across the species' range from Georgia to the north-

eastern United States to provide current distribution information to the U.S. Fish & Wildlife Service.

Biologists have detected Brook Floaters at three of 10 sites sampled in 2017 and collected a subset of genetic material for population diversity analysis. Surveys will continue through the summer and fall of 2017.



Brook Floaters



Brook Floater records in North Carolina by HUC 10 sub-watershed before 2017 surveys. Darker colors indicate more recent records.



## Sea Turtle Nesting Season Underway

Cooperators and volunteers with the N.C. Sea Turtle Project have been busy this spring and summer patrolling the beaches to identify and protect freshly laid sea turtle nests. Because sea turtles in North Carolina generally lay their nest under the cover of darkness, these cooperators and volunteers have been patrolling the beach at first light each day. However, others have been conducting nighttime patrols on Bald Head Island and Bear Island during the sea turtle nesting season, as part of long-term sea turtle mark-recapture projects. When cooperators and volunteers encounter a turtle on a nesting beach, they will tag the turtle with external metal flipper tags on the front flippers and an internal PIT tag in the turtle’s left shoulder muscle, so they can identify these tagged turtles during future encounters.

These nighttime projects provide valuable information on turtles, including numbers of nest laid per season by an individual turtle, size and growth rate, as well as remigration intervals. More recently, tagging data have been combined with genetic fingerprint ID data derived from eggshells collected from every nest to provide insight into reproductive longevity.

These data have revealed several turtles have been actively nesting in North Carolina since at least the 1990s. Sea turtle tagging in the state began in the 1980s so as older tagging data from paper records are entered in an online database, biologists may discover some individual turtles have been nesting for more than three decades on North Carolina beaches.



Loggerhead sea turtle nesting on Bald Head Island

Nesting season	Nesting events observed	Comments
1997	Two nests	Bald Head Island: flipper tags only
2000	Three nests, one false crawl	Bald Head Island: flipper tags only
2004	One false crawl	Bald Head Island: flipper tags only (likely nested elsewhere)
2008	One nest, one false crawl	Bald Head Island: flipper tags only
2012	Three nests, one false crawl	Bald Head Island: flipper tags, PIT tag, DNA
2016	Six nests, three false crawls	Bald Head Island & Fort Fisher: flipper tags, PIT tag, DNA

Nesting history of Loggerhead CC004966, based on tags and DNA information



## Saltmarsh Habitat and Avian Research Program Surveys Begin



Seaside sparrow

In mid-April, Wildlife Diversity Program staff initiated the first season of Saltmarsh Habitat and Avian Research Program (SHARP) surveys. SHARP is a collaboration of academic, governmental and non-governmental organizations gathering information that will provide management actions to conserve tidal-marsh birds. These species rely on tidal marshes throughout their life cycles. Tidal marshes are sensitive to climate change through accelerated sea level rise,



increased storm severity, flooding and salinity changes.

By conducting these surveys, staff hopes to obtain baseline data for the presence and abundance of several focal bird species with an emphasis on providing the U.S. Fish and Wildlife Service data to help the agency with its listing decision for MacGillivray’s Seaside Sparrow in 2018. This spring, staff conducted more than 424 surveys from Calabash to Kill Devil Hills, detecting 462 sparrows at 136 survey locations. Initial findings indicate that areas with the highest rates of sparrows are from more inland, brackish marshes, specifically in the Pamlico Sound region, stretching from Carteret County north to Hyde County. Biologists hope to conduct these surveys next year to strengthen the accuracy and reliability of their efforts this year.



## Support the Wildlife Diversity Program and Help Keep North Carolina Wild!



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. To make a direct donation for conservation of North Carolina’s wildlife, send this form, along with a check or money order payable to the N.C. Wildlife Resources Commission, to: N.C. Wildlife Resources Commission, 1702 Mail Service Center, Raleigh, N.C. 27699-1702. Or pay by credit card.  

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Credit Card # \_\_\_\_\_

Amount \_\_\_\_\_

Signature \_\_\_\_\_  
(if paying by credit card)

## Colonial Waterbird Surveys Underway along North Carolina Coast

In May and June, the Wildlife Commission's Waterbirds staff coordinated and conducted surveys on active nests of colonial waterbirds along North Carolina's coastal region. The Wildlife Commission partners with the U.S. Fish and Wildlife Service, National Parks Service, U.S. Marine Corps, Audubon NC, N.C. State Parks, N.C. National Estuarine Research Reserves and the Bald Head Island Conservancy to survey lands hosting nesting colonies of waterbirds. The Wildlife Commis-

sion also works with several private landowners to gain access to sites with nesting birds, including building owners whose roofs host nesting terns and skimmers.

Many volunteers help with the surveys and gain valuable experience and a greater understanding of sites protected for nesting waterbirds. Data entered into online databases managed by the Wildlife Commission are being used to assess population trends and distribution. Such assessments help biologists make popula-

tion and habitat management decisions, as well as recommendations to other agencies' projects that may affect colonial waterbirds.

Biologists and volunteers surveyed more than 220 colony sites for nesting herons, egrets, ibis, pelicans, gulls, terns and skimmers. One particularly unusual finding was the discovery of gull-billed terns nesting on a roof in Morehead City – a behavior not recorded previously. Biologists will summarize data and complete a report by this fall.



*Wading bird chicks, such as these great egrets, hatch in May, so surveyors visit egret, heron and ibis colonies as early as possible in May to avoid stress to older chicks that may leave nests if disturbed during surveys. (Annika Andersson)*



*Surveyors walk side-by-side on transects across a marsh island in the Pamlico Sound to find Forster's Terns' nests.*

## Surveys Completed for Aquatic Species in Rocky River

Aquatic Wildlife Diversity staff completed a series of both qualitative and quantitative surveys for native mussel species in the tailrace of Hoosier Dam (also referred to as Woodys Mill Dam) in the Rocky River in Chatham County. The goal was to characterize the community in the river, which includes a population of the Savannah Lilliput (State Endangered) that was newly discovered by biologists in September of 2016.

Because the dam is scheduled for removal over upcoming months, 14 Savannah Lilliputs collected thus far from this reach have been relocated to nearby sites in the Rocky River and its tributary, Bear Creek, and a subset have been PIT-tagged for relocation and monitoring. These animals will be returned to the tailrace once the dam removal is complete.

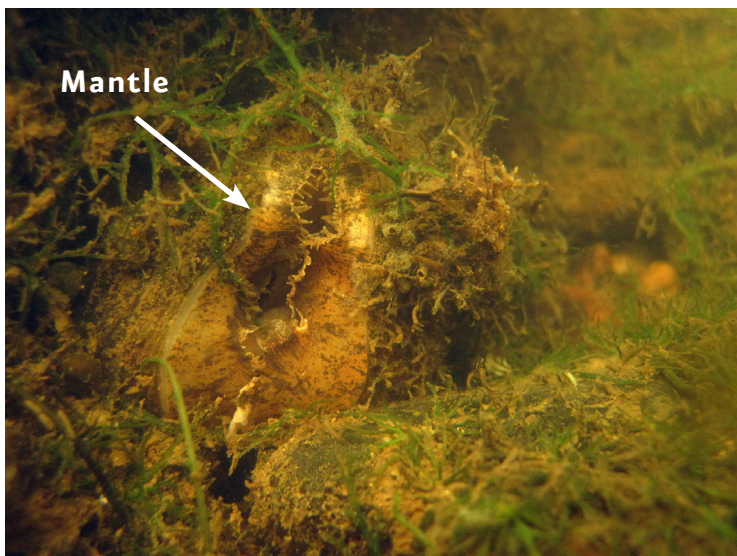
As indicated by preliminary surveys last fall, the mussel populations below the dam include at least 13 species, including five Species of Greatest Conservation Need (SGCN):

- Carolina Creekshell, Savannah Lilliput (Federal Species of Concern, State Endangered)
- Notched Rainbow (State Special Concern)
- Eastern Creekshell, Chamaeleon Lampmussel

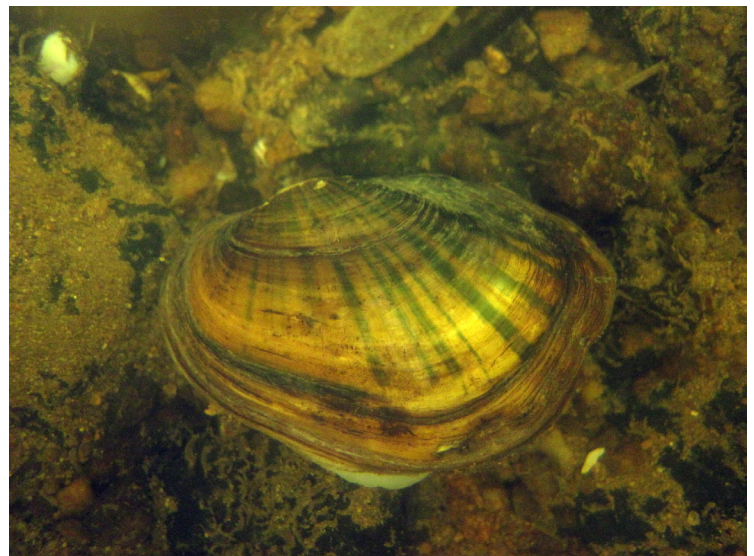
Biologists observed gravid females displaying lures (used to attract host fish for developing larval mussels called glochidia) among multiple species, and collected multiple size classes, indicating successful reproduction and recruitment are occurring in the river. Monitoring will continue as the dam removal process moves forward, along with relocation of any mussels found as the impoundment is dewatered this summer.



Savannah Lilliput with PIT tag



Gravid female Eastern Creekshell displaying mantle lure to attract host fish



Female Eastern Creekshell

## Biologists Resume Gopher Frog Release and Research

During the second quarter, Wildlife Commission biologists resumed releasing head-started juvenile gopher frogs on Sandhills Game Land in Scotland County to increase populations. In addition to releasing juvenile frogs, biologists began a radio telemetry study to assess movement patterns, habitat use and survivorship of frogs that were raised in captivity from eggs to juvenile frogs. Juvenile frogs then were released back to their collection locations. This research will guide future re-introductions of gopher frogs at restored wetlands in the area and throughout the Sandhills and Coastal Plain.

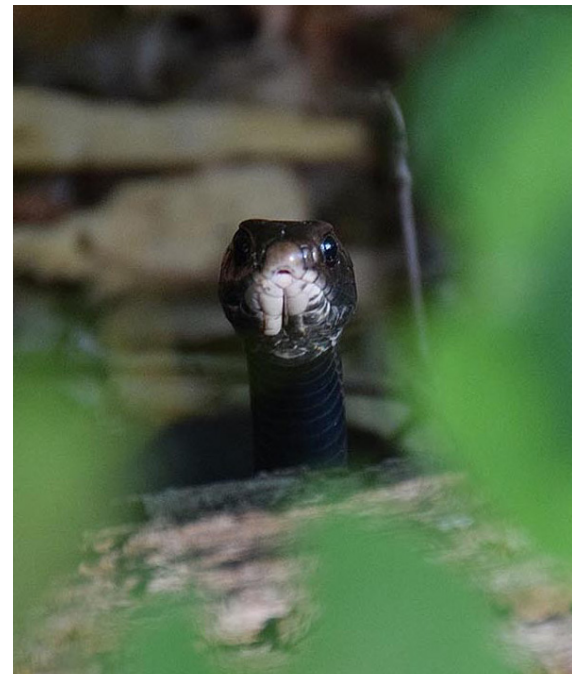
As of June 28, biologists released 28 juvenile frogs and tracked them using small transmitters (0.5g) at-

tached to belts encircling each frog's waist. They continue to track frogs this summer; however, preliminary results suggest that survivorship of released juveniles is extremely low. The majority of frogs are being eaten by black racers within one to several days after release. Another major predator appears to be fire ants, an invasive, non-native species that has spread throughout the wetter margins of isolated wetlands in the Sandhills. Other predators include banded watersnakes, possibly aquatic dragonfly larvae and likely a screech owl — a transmitter with only the legs of juvenile frog was found in a tree. Only one juvenile frog out of 28 frogs released and tracked has survived for more than a week fol-

lowing release. Frogs are not readily finding underground burrows to keep them safe from predators, mainly snakes. Stump holes and other subterranean burrows appear to be a limiting factor in the Sandhills, based on previous research on adult gopher frog habitat use. Preliminary results suggest that juvenile gopher frog survivorship is extremely low in North Carolina compared to other areas where gopher tortoise burrows provide refuge. Gopher tortoises are not native to North Carolina, but are found in states south of North Carolina. Results of this study will provide much-needed guidance for future headstarting and reintroduction efforts in North Carolina.



Biologists fit juvenile head-started gopher frogs with radiotransmitter belts before releasing them to their natal pond on the Sandhills Game Land in Scotland County.



Black racers (above) eat the majority of juvenile gopher frogs within one to several days after frogs have been released. (Jodie Owen)

## Biologists Conduct Robust Redhorse Surveys in Pee Dee River

Staff continued annual cooperative sampling and population monitoring for Robust Redhorse in the Pee Dee River downstream of Blewett Falls dam, alongside other partners in the Yadkin-Pee Dee Technical Working Group, including Duke Energy, N.C. State University, S.C. Department of Natural Resources (SCDNR), and S.C. Aquarium.

During targeted spring surveys, biologists captured 19 Robust Redhorse, eight of which were previously untagged individuals. There were six recaptures from previous years, with a recapture rate of 42.9%, which is lower than the two previous years (~68%) and the lowest rate observed since 2008 (31.8%). Four of these recaptures were animals previously tagged with radio transmitters and tracked as part

of movement studies conducted by the Wildlife Commission and N.C. State University in 2006-2008. During that time, biologists collected scales to determine individual ages and these adults are now at least 14-16 years old. They showed signs of active spawning in 2017, indicating that this species can be long-lived and one animal can contribute to the population via reproduction many times over during its life span.

In addition, biologists collected five Phase II Robust Redhorse, which had been raised in Wildlife Commission and SCDNR hatcheries and released in the Pee Dee River in November 2016. Fish ranged in size from 10 to 29.6 inches (256 to 752 mm) in total length (TL), representing multiple age classes. Unfortunately, there was

no successful spawning for captive propagation in 2017. There are still approximately 100 fish, split between hatcheries in both states, held back from the fall 2016 stocking to grow to adult size.

Duke Energy biologists captured two more individuals near Blewett Falls dam, one Phase II and one untagged 18.3-inch juvenile (TL = 466 mm), outside the targeted surveys. This brought the total number of Robust Redhorse captured to 21 fish (there were 19 in 2016).

Biologists collected fin clips from all animals and genetic analysis conducted by SCDNR this summer will determine whether the new fish are wild-spawned or if any are products of previous augmentation efforts conducted in 2014 or 2015.



Wildlife Diversity Biologist Brena Jones holds a captured Robust Redhorse during spring surveys. (Tom Kwak, NCSU)



Robust Redhorse fry in tank at McKinney Lake Fish Hatchery in 2014 (Jodie Owen)



## Forums on Alligator Management Plan Provide Informative and Productive Public Input

The Wildlife Commission and the N.C. Alligator Management Task Force conducted public forums along the Coastal Plain to get an idea of the public's reaction to the current draft of the Alligator Management Plan. The forums were organized into topics taken from the management plan and attendees were polled on various components of the plan using iClickers, which allow for instantaneous input from attendees.

The forums were informative and productive and will help members of the task force with the final draft of the plan. In general, the public was in favor of the plan's suggestions and is willing to work with Wildlife Commission staff to achieve mutually beneficial goals of alligator population management, potential hunting opportunities and

data collection through research and monitoring efforts. These forums were based on similar forums for deer, bear and coyotes.



Wildlife Commission staff and the N.C. Alligator Task Force held public forums to gather input on the N.C. Alligator Management Plan. (Alicia Davis)

## N.C. Birding Trail Celebrates 10<sup>th</sup> Year Anniversary

Each year, over 1.9 million people participate in bird watching at their home or on trips, bringing hundreds of millions of dollars to the state's economy. For 10 years, the [North Carolina Birding Trail](#) ([Facebook](#), [Twitter](#)) has served as a roadmap to the state's incredible birding and wildlife heritage, spurring ecotourism and strengthening citizens' connection with nature. By publicizing superb natural areas and highlighting their importance to the local ecotourism economy, the Trail illustrates the direct connections between conservation of bird habitat and patronage of local economies.

The Wildlife Commission has been the lead partner in the Trail, and other partners include N.C. State Parks, N.C.



SeaGrant, U.S. Fish & Wildlife Service, NCSU Extension, and Audubon NC. Currently over 25,000 paper guides are in circulation and over 2,000 people a month are reached through the website and social media.

This year, the Trail celebrates its 10th Anniversary with a reception during the [Wings Over Water Festival](#) – the largest birding festival in the state. The reception, which is open to all Wings Over Water Festival participants, will be held on Oct. 20 at the National Wildlife Refuges Visitor Center in Manteo. In addition

to celebrating past accomplishments, the Trail will work to increase public interest in birding, increase the economic impact of nature-based tourism and increase the quality of Birding Trail sites in the next five years.

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

NCPARC held its annual meeting in April at the Kanuga Conference and Retreat Center in Hendersonville, N.C. This year's meeting was a joint meeting with N.C. Partners in Flight and provided diverse opportunities for learning and networking across many taxa groups. Approximately 80 participants attended the two-day meeting, which included guided field tours of surrounding mountain areas, workshops, talks and a poster session with a social. The NCPARC coordinator also conducted a training at Carolina Beach State Park on the management and conservation of reptiles and amphibians. Natural resource managers, biologists and educators attended the training, which focused on species occurring in the Coastal Plain.



Staff found several barking treefrogs while conducting a training workshop at Carolina Beach State Park this spring. The barking treefrog is the largest treefrog species in North Carolina, averaging almost 3 inches. Unlike other tree frogs with smooth skins, the barking tree frog is known for its distinctive granular skin. (Jeff Hall)



Green salamander spotted during a field trip at the joint NCPARC/NCPIF meeting in April (Jeff Hall)

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

### Diamondback Rattlesnake Surveys Continue in the Coastal Plain

Staff continued long-running surveys for Eastern diamondback rattlesnakes at several sites in the Coastal Plain. Despite conducting extensive surveys for many years, staff often come up empty-handed for this species. However, this spring

proved extremely fruitful with at least six different individuals found at Camp Lejeune in Onslow County.

Diamondbacks appear to make significant use of sites on-base with extensive debris, such as large piles of metal and concrete. These piles

likely serve as default stump holes, and thus prove invaluable as hibernation sites, and possibly as gestational sites. Staff plan to revisit sites in the early fall to determine whether gravid females may be found in these same areas.



Eastern diamondback rattlesnake found on Camp Lejeune during spring surveys (Jeff Hall)



An Eastern diamondback hides in leaf debris on Camp Lejeune. (Jeff Hall)



An Eastern diamondback hides in leaf debris on Camp Lejeune. (Jeff Hall)



Diamondbacks appear to make significant use of sites on-base with extensive debris, such as large piles of metal and concrete. (Jeff Hall)

## Bat Surveys Expanded in Coastal Plain and Piedmont this Quarter

Wildlife Diversity Program biologists conducted bat surveys in the Coastal Plain and Piedmont this quarter to monitor summer population levels and prevalence of White-nose Syndrome (WNS), as well as to gather morphometrics and reproductive state of captured bats.

To determine mist net locations, biologists had collected bat acoustic calls at sites across the state as part of the North American Bat Monitoring Program (NABat), which was implemented in North Carolina in 2015. Based on that information, biologists selected mist netting sites that targeted the northern long-eared bat, a federally threatened species with a poorly understood distribution in the Coastal Plain of the state. No records of this species existed in Craven County, but it was acoustically recorded during NABat surveys at two sites. Biologists conducted mist netting surveys at both sites and captured one male northern long-eared bat at Croatan Game Land in May.

This once common species has been severely impacted by WNS, a deadly fungal disease that has killed millions of bats along the Eastern Seaboard since it was first discovered in New York in winter 2006-2007. The species now is rarely encountered in western North Carolina where WNS is widespread. Northern long-eared bats in the Coastal Plain may remain WNS free, so understanding the distribution and abundance of this bat in the Coastal Plain is important to helping conserve the species.

In addition to the northern long-eared bat, biologists captured six other bat species during their mist netting surveys. The most prevalent

species captured was Southeastern myotis in the Coastal Plain and Eastern red bat in the Piedmont, although capture rates in the Piedmont were considerably lower overall. Staff expanded their netting efforts this year, not only geographically but also including more staff. The goal is to continue to expand monitoring efforts each year to encompass more of the Coastal Plain and Piedmont since netting efforts in the mountains are well established and widespread. Biologists hope to increase their efforts in the rest of the state to gather the best data possible with which to monitor and make decisions about bat populations in the state.



Biologists Katherine Caldwell, Brandon Sherrill and Joey Weber collect data on captured bats in the Coastal Plain. (Allison Medford)



Site on Croatan Game Land where a northern long-eared bat was captured (Katherine Caldwell)



A captured northern long-eared bat in Craven Co., NC. (Allison Medford)



Wildlife Commission biologists Katherine Caldwell and Allison Medford set up a mist net, and caught a northern long-eared bat later that night. (Brandon Sherrill)

## Surveys in Buncombe County Bog Yield No Bog Turtles

During this quarter, Wildlife Diversity Program biologists set traps at a mountain bog in Buncombe County to confirm the continued presence of a bog turtle population found there in the past. In North Carolina, bog turtles are federally listed as Threatened by Similarity of Appearance (to northern populations) and state listed as Threatened. Conservation efforts for this species are multi-faceted. Bog turtles were last observed at the Buncombe County bog in 2008, although citizen scientists have reported seeing bog turtles there on several occasions since 2008. However, without a photo or a turtle in hand, biologists cannot count those reports as confirmation of a species' presence. Unfortunately, many bog turtle sites have a slew of threats impacting population, including issues with associated with nearby roads and habitat fragmentation, possible poaching and habitat degradation, among many others.

This particular site in Buncombe County is bisected by one busy road and bordered on all sides by roads. Additionally, the habitat was too shaded for some time, which likely limited the turtles' ability to nest successfully and an increase in meso-predators may have been a problem as there are many houses nearby. Finally, many people visit

this site, so biologists could not rule out the possibility that turtles had been illegally collected.

During this trapping effort, which lasted from May 16 through June 1, biologists were hoping to confirm the presence of bog turtles and track any captured turtles to observe their movements and use of the habitat. For 16 nights, they had 95 traps set in the wetland, which constituted 1,520 trap nights. Although they caught painted turtles, snapping turtles, a musk turtle and Eastern box turtles, they did not catch a single bog turtle. During a similar time period in 2005, with slightly fewer traps (about 85), they had seven captures of four individual bog turtles (some were recaptured).

Given that biologists had so many traps set across the wetland during the prime time to catch bog turtles, it does not bode well for

this bog turtle population. Unfortunately, with so many threats affecting this population and what appeared to be a small population even 20 years ago, it appears that this population has declined slowly. In the last 20 years this population has been studied, no juvenile turtles have been found and only eight adults have been captured. Despite such a bleak outcome from the trapping effort, biologists have not given up on this population. They will continue their efforts to find a turtle there through various means. Conservation partners are keeping an eye on where they are on the property and staff may attempt to trap next year for a longer period of time. In the meantime, biologists will begin considering what they can do to protect this special wetland complex further and to formulate a plan for the bog turtle population going forward.



*Eastern box turtle captured in a bog turtle trap in a wetland in Buncombe County*

## Staff Survey Pond Mountain Game Land in Western North Carolina

Wildlife Commission staff surveyed birds at Pond Mountain Game Land in Ashe County this quarter. For the first time, a northern saw-whet owl responded to an audio lure in a rich northern hardwood forest near the tri-state corner. Staff discovered an active vesper sparrow nest in the field that the Wilkes Conservation Technician Crew burned earlier this

spring. Approximately 540 acres of abandoned Christmas tree plots are beginning to grow in and becoming less suitable for the vesper sparrow, which is identified in the [N.C. Wildlife Action Plan](#) as a Species of Greatest Conservation Need (SGCN). Staff invited a botanist to the game land in June and compiled a list of the broad-leave herbs, grasses, sedges and

shrubs so that biologists could assess how to best manage these areas for vesper sparrows.

Staff also hosted bird walks at Pond Mountain Game Land this spring. Visits by birders already have added species to the growing bird checklist, which is to be completed in early 2018.



A vesper sparrow perches atop a cull Christmas tree in the fog at Pond Mountain Game Land. (Christine Kelly)



A single egg in a vesper sparrow nest found on Pond Mountain Game Land. (Christine Kelly)



Birders joined Wildlife Diversity staff for a bird walk on Pond Mountain Game Land in June. (Christine Kelly)



A vesper sparrow forages in a field managed by the Wildlife Commission's Wilkes Crew with a prescribed burn in early spring. (Christine Kelly)

## Staff Conduct Inventory Surveys on new William H. Silvers Game Land in Haywood County

On the new William H. Silvers Game Land, located in Haywood County, Wildlife Commission staff conducted inventory surveys to see what species are present. Staff conduct these inventory surveys on all new game lands when they come into the Wildlife Commission's Game Land Program. Staff started bird and flying squirrel surveys this quarter. Although this game land is best known for elk, spring surveys revealed the high elevation forest present on the game land also is home to eight bird species identified in the [N.C. Wildlife Plan](#) as SGCN, including the northern saw-whet owl, black-capped chickadee, brown creeper and hermit thrush.

Unlike its widespread doppel-ganger, the Carolina chickadee, the black-capped chickadee has a range limited to the Great Smoky Mountains and Plott Balsams. Pure or possible hybrid individuals occur in the Great Balsams. Thus, this game land is the only Wildlife Commission property harboring black-capped chickadees.

Biologists also began deploying acoustic survey equipment to determine if the endangered Northern flying squirrel inhabits the game land's red spruce-northern hardwood forest.

During the first field visit, an 8-foot tall rotten yellow birch snag was knocked over accidentally,

revealing a mother flying squirrel and her mouse-sized pups nestled in a nest of finely shredded birch bark inside the snag. This event was the fastest this species' presence had ever been confirmed and one of the only times staff had seen them in the wild outside of a squirrel survey box or telemetry tracking session. They deployed acoustic equipment and recorded numerous northern flying squirrel vocalizations. The property's high quality red spruce stands will serve as an important source of Great Smoky Mountains cones to use in propagation and restoration efforts by the Southern Appalachian Spruce Restoration Initiative.



Wildlife Diversity Technicians Jamie Harrelson and Charles Lawson examine a yellow birch snag containing a Carolina northern flying squirrel nest on William H. Silvers Game Land. (Christine Kelly)



Female Carolina northern flying squirrel in a red spruce tree on William H. Silvers Game Land (Christine Kelly)



Closeup of a Carolina northern flying squirrel nest, which is composed of soft mosses and finely shredded birch bark (Christine Kelly)

## Staff Conduct Bird and Flying Squirrel Surveys in Preparation for Red Spruce Restoration

This fall, the Wildlife Commission and partners in the Southern Appalachian Spruce Restoration Initiative will begin a project to restore red spruce to a historically disturbed area in the Great Balsams. In preparation for this, Wildlife Diversity staff conducted baseline bird and flying

squirrel surveys in June. Staff used acoustic equipment to assess the presence or absence of northern flying squirrels rapidly and to identify some areas where habitat connectivity could be improved. Staff also found evidence of nesting hermit thrush and Canada warblers.



A hermit thrush nest in the Great Balsams (Christine Kelly)

## Staff Discover New Salamander Population on Three Top Game Land in Ashe County

In the second quarter, Wildlife Diversity Program staff explored a newly opened access on the southern half of Three Top Game Land in Ashe County and found a new population of the Southern Riverine Salamander, listed in the [N.C.](#)

[Wildlife Action Plan](#) as a Species of Greatest Conservation Need (SGCN) and one that has been understudied. This species can thrive in the dry, partially exposed and very rocky soils present on the southern slopes of the game land. Staff discovered the new population while conducting surveys on the southern half of the game land. For many years, staff has conducted surveys on the northern half of the game land, documenting species such as the Weller's salamander, northern pygmy salamander and

Yonahlossee salamander — all listed as SGCN in the Wildlife Action Plan. Staff thought they would document these same species on the southern half. Staff worked upslope from the bottom to the top of the craggy peaks, looking for salamanders by gently lifting natural cover objects. The southern side of the game land has a more exposed hardwood forest, a drier aspect, and steep, talus slopes on shallow soils with a thin leaf litter layer, which staff quickly realized might not be

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Typical steep, rocky, talus slope in forested habitat at Three Top Game Land in Ashe County is part of the amphibolite range in the northwest part of the state. This type of metamorphic rock provides unique soil properties that support a diversity of plant and animal life. (Lori Williams)



A new discovery at Three Top Game Land in spring 2017 is the Southern Ravine Salamander, a Species of Greatest Conservation Need. This understudied species occupies the more exposed, drier, mid to high-elevation habitats and is especially fond of the thin, talus soils present on Three Top Game Land. (Lori Williams)





View from the top of Three Top Game Land, Ashe County, NC. The multiple high, rocky peaks on this game land form unique habitat and forest community types, depending on elevation, aspect, and soils. (Lori Williams)

conducive to a habitat specialist like Weller’s salamanders. These small salamanders prefer moist, high-elevation spruce and northern hardwood forests.

Southern ravine salamanders and Weller’s salamanders are two members of the same salamander genus but with very different habitat preferences. They could be partitioning habitat at Three Top Game Land according to habitat preferences and microclimate conditions, literally depending on which side of the mountain they are on. Staff will conduct more surveys on the game land to monitor all the SGCN species found there and examine where, or if any, Southern ravine

salamander and Weller’s salamander overlap in their local distribution on the game land, which would be a unique, if not rare, occurrence.



Northern Pygmy Salamander (Lori Williams)



Weller’s Salamander (Brenna Forester)