



Wildlife Diversity Program
Quarterly Update Fourth Quarter 2018



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[Taking Shape](#)**Tiger Salamander Fall Breeding Follows Heavy Hurricane Rains**

In the fourth quarter 2018, Wildlife Commission biologists continued to survey for amphibians and reptiles throughout eastern North Carolina, especially in habitats affected by fall hurricanes. One interesting outcome of the heavy rainfall from both Hurricanes Florence and Michael was areas of the Sandhills Game Land that apparently had not held water for over a decade were filled with rainwater. Staff discovered two large isolated wetlands that had gone unnoticed during normal years. Tiger salamanders used both wetlands for breeding this fall and winter. Staff found more than 70 egg masses in

one wetland and more than 270 in the other wetland. Both wetlands are in areas where tiger salamanders have never been found breeding, and only random adults had been seen on the roads in the general vicinity in the past.

The discovery of these two “new” wetlands will allow staff to monitor new populations of rare species, and allow them to focus management on maintaining or improving habitat quality. This discovery also raised questions about how some species can persist on the landscape when large rainfall events may only fill breeding wetlands once or twice in a decade.



One of two isolated wetlands discovered on the Sandhills Game Land in Richmond County after the heavy rains produced by hurricanes in the fall of 2018. (Photo: Michael Martin)

2018-19 Cold-Stun Season Has Been Mild So Far

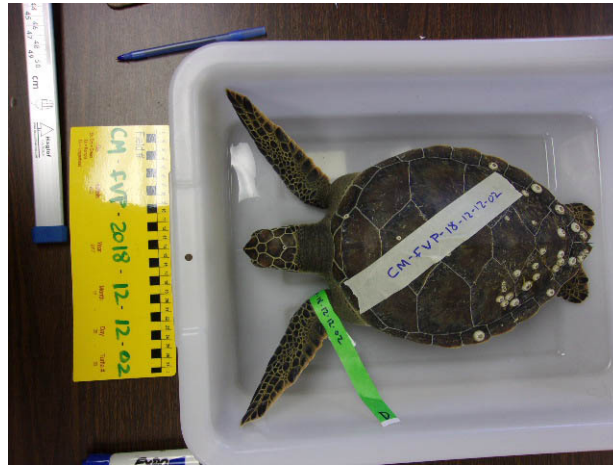
The North Carolina Sea Turtle Stranding and Salvage Network, coordinated by Wildlife Commission biologists, monitors sea turtle strandings along North Carolina's coast. During winter months, predictably when inshore water temperatures drop below 50 degrees Fahrenheit, sea turtles begin to strand due to hypothermia or cold-stunning. The 2018-19 cold-stun season in North Carolina has only produced 30 cold-stunned sea turtles so far, mostly in Dare County. Twenty-two turtles have been found alive and taken to rehabilitation facilities – the STAR Center at N.C. Aquarium Roanoke Island and the Karen Beasley Center in Surf City. Of those found alive, 11

have been released with the help of the U.S. Coast Guard-Virginia Beach and researchers at NCSU's CMAST lab.

Water temperatures have fluctuated since late No-

vember when the first cold stuns appeared, leading to warmer periods with no cold stuns. With frigid temperatures once again sweeping the coast, the cold-stun season likely will continue. At the time of this writing, reports of more cold stuns were coming in. Historically, cold stuns in North Carolina occur in two main hotspots: Cape Hatteras and Cape Lookout National Seashores. With the ongoing government shutdown, federal partners will be unable to

patrol these areas as they normally could, which could lead to reduced numbers of turtles recovered.



A cold stunned green turtle is measured, scanned for tags, and labeled with a unique stranding ID before being transported to the STAR Center for rehabilitation. (Photo: Freve Pace, NEST Volunteer)

Lake Sturgeon Stocked in French Broad River as Part of Larger Restoration Effort

Due to habitat degradation, barriers to migration, and pollution lake sturgeon have been extirpated from North Carolina and much of the Southeast United States for over 100 years. The Wildlife Commission joined surrounding states in the Southeast Lake Sturgeon Working Group in its comprehensive efforts to restore lake sturgeon to the Tennessee and Cumberland river systems. Brood stock came from the Wolf River in Wisconsin, where U.S. Fish and Wildlife Service (USFWS) staff collected eggs and milt and hatched them at the Warm Springs National Fish Hatchery in Georgia. After hatching and initial growth to the late fry stage, fish were sent to the USFWS National Fish Hatchery at Edenton, N.C. and the Wildlife Commission's State Fish Hatchery at Table Rock, N.C. for several

months of grow-out before release. Approximately 6,200 juvenile Lake Sturgeon were produced from both hatcheries and stocked in the French Broad River in Madison County, N.C. in September and October.



Lake sturgeon stocked in the French Broad River. (Photo: Luke Etchison)

North Carolina Birding Trail Update

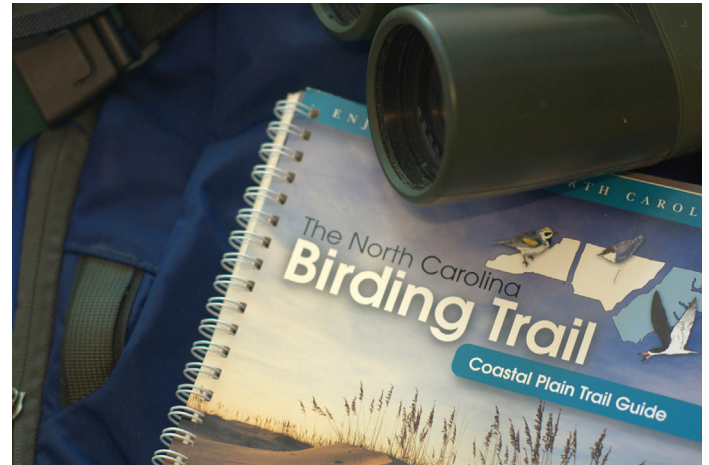
The North Carolina Birding Trail (ncbirdingtrail.org) is a cooperative project with N.C. State Parks, the U.S. Fish and Wildlife Service, NCSU Parks and Recreation, NC Sea Grant, and the N.C. Wildlife Resources Commission. This collective effort supports enthusiasm of birds in the natural world and the positive benefits they provide. The NCBT offers information on the best places to view birds and other wildlife, or just to get outside – comprising over 327 state parks, national forests, game lands, national parks and other conservation lands. By encouraging greater appreciation of the outdoors, NCBT partners hope to solidify the connection between well-managed, healthy habitats, stable bird populations, and ultimately strong local economies through tourism.

Birders may seem like a unique few among North Carolinians, easily recognized by their expensive binoculars, spotting scopes and camera equipment. Until recently, it was difficult to tell how many people use the NCBT site to view birds – and use their recreational hobby to benefit conservation.

Enter eBird (www.ebird.org) – a free, online platform for logging bird sightings built by the Cornell

Lab of Ornithology. It is wildly popular among avid birdwatchers and growing in popularity among more casual enthusiasts. Each sighting is valuable data for monitoring species of concern, allowing birders to act as citizen scientists and providing more data than the Wildlife Commission could possibly collect with staff alone. But eBird records can also measure human usage of conservation lands. Recently, Wildlife Diversity Program biologists picked through the over 529 million eBird records to glean some interesting and informative metrics to track appreciation of over 460 native bird species. As an example, in 2017 alone, 14,087 eBirders spent more than 85,916 hours logging 86,586 checklists in North Carolina alone. Seventy eight percent of these observers visited a NCBT site at least once, and collectively 50% of their birding time was spent at these sites.

The most popular NCBT site by far is Pea Island National Wildlife Refuge on the Outer Banks. This site hosts over 350 species on 5,834 acres at some point during the year, and in 2017, 397 people logged 1,376 hours birding there!



North Carolina is home to world class birding experiences, where festivals can bring attention (and birders) to a region. Each year the Wings Over Water Festival attracts birders from far and wide to view wintering waterfowl, shorebirds, wading birds and songbirds. People who recorded sightings at the festival had also recorded birds in over 105 countries, and increased birder visitation to the region by 3.6 times during the festival.

Now that biologists can track indices of visitation at all 327 NCBT sites, they can give site managers and local communities valuable information about impacts of human use and inform efforts to engage birding tourists. Much like the health of the Great Smoky National Park is tied to its popularity, Wildlife Diversity Program staff hope to see increased support for conservation of those lands that attract these “bird tourists” among the local communities that benefit from them.

Staff and Partners Conduct American Oystercatcher Roost Surveys

With the nesting season finished, coastal birds begin to flock together for migration and roosting. This provides an opportunity to survey large numbers of birds roosting on beaches, islands and docks. Each winter, the Waterbirds Investigations & Management Project staff, in coordination with Audubon North Carolina, conduct roost surveys for American oystercatchers as part of an ongoing project.

Wintering birds roost in flocks during periods surrounding high tide when foraging grounds are inaccessible, therefore roost surveys are

conducted within one hour of high tide to increase detection probability. These surveys typically run from August through March.

High powered cameras, scopes, and binoculars are used to identify field readable bands placed on the upper leg when the birds are still flightless juveniles. American oystercatchers are banded along the east coast from Massachusetts to Florida, as well as Texas and Northwest Mexico.

The roost surveys help to provide a migration “roadmap” for banded birds as well as identifying important roosting habitat. There are four main

survey locations that are surveyed biweekly. The sites include the intra-coastal waterway from Snows Cut to Masonboro Inlet, Masonboro Island, the Cape Fear River, and Kure Beach. In addition, the team surveyed Beaufort Inlet in early December, a historically large roosting site and found 233 American oystercatchers. The only other known site in North Carolina that regularly has numbers this high is the Cape Fear River. Most of the banded birds at Beaufort Inlet were from northern states, such as New York and New Jersey.



Banded American oystercatcher roosting on a dock along the Intracoastal Waterway (Photo: NCWRC)

Wildlife Diversity Staff Begin Loggerhead Shrike Banding Program in North Carolina



Color-banded adult loggerhead shrike near Whiteville
 (Photo: NCWRC)

The Loggerhead Shrike Working Group was formed in 2013 to develop an action plan with recommendations for on-the-ground conservation efforts for the loggerhead shrike, a thick-bodied songbird that has seen a range-wide decline of at least 74 percent since the 1940s. Along the Atlantic Coast, the bird has experienced the highest regional population loss percentages — 89 percent — between 1970 and 2014. In addition to developing an action plan, the Loggerhead Shrike Working Group has established a framework for coordinated research and conservation activities across the species' range.

Loggerhead shrikes are found in North Carolina year-round and the Wildlife Commission has been an active participant in the working group to assist in the species' recovery. In

early 2016, staff with the Wildlife Diversity Program completed comprehensive road-side surveys of wintering shrikes throughout much of the Coastal Plain. The surveys filled knowledge gaps in shrike distribution and established a database of candidate locations to focus future banding efforts.

In late 2018, staff began contributing to the working group's banding program to help quantify population demographics and movements on a regional scale throughout the year. This on-going banding project will improve biologists' understanding of the connections between breeding and wintering populations, including shrike genetics, which they hope will help them identify factors that contribute to shrike population declines.

Mussel Expansion in the French Broad River

Western region Aquatic Wildlife Diversity staff and co-operators from U.S. Fish and Wildlife Service-Asheville Field Office conducted six mussel surveys (25 person-hours) in the lower French Broad River near Hot Springs, NC in October. Staff found seven pink heelsplitters, which is the first record of any live mussel species in the lower section of the French Broad River. The pink heelsplitters, which are thought to be located nowhere else in the state, were found from multiple year classes and likely represent a reproducing population. This is an apparent expansion of the species that is found across Tennessee. Aquatic Wildlife Diversity staff will continue to monitor the species and track expansion going forward.



Pink heelsplitter found in the French Broad River near Hot Springs, N.C.
 (Photo: Luke Etchison)

Spruce Restoration Updates - Meetings and Events

The Southern Appalachian Spruce Restoration Initiative (SASRI) meeting was held Nov. 8, 2018 in Asheville. SASRI is primed to grow, and the board is seeking more Sky Island champions to lead restoration projects in other massifs. The U.S. Fish and Wildlife Service facilitated a work-

shop to encourage those interested in launching their own restoration projects, and Wildlife Diversity biologist, Chris Kelly, used last year's Flat Laurel restoration project as an example. Appalachian Trail Conservancy staff have since proposed a restoration project at Roan Mountain that would

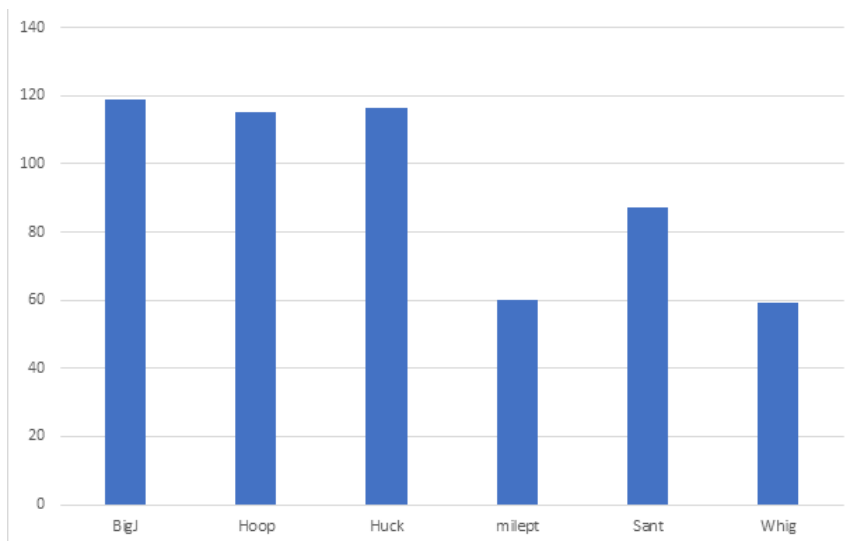
thin a spruce plantation and develop additional age classes by planting seedlings and preparing the site for seed germination in anticipation of the next big cone crop. SASRI's new website southernspruce.org is now online. It is hosted by the U.S. Fish and Wildlife Service Asheville field office.

Spruce Restoration Updates - From the Field

With foresters from the Cheoah Ranger District, Wildlife Diversity Program staff monitored growth of spruce seedlings in the Unicoi Mountains in Graham County using Carolina Vegetation Survey's level 1 protocol. This protocol tracks the fate of a subset of individual planted stems over time. Staff monitored six plots that encompassed just 47 of the ~1,700 seedlings planted in the Unicois. Of this subset, average seed-

ling height at each plot was >16 inches and had increased by 4 to >6 inches since 2013. Most of the 2013 seedlings now overtop competing vegetation, such as sedges and broad-leaved herbaceous plants. Seedlings growth and vigor were best on moderately exposed sites dominated by Pennsylvania sedge understories. At three such sites, the percent change in seedling height from the first year exceeded 100% (Big Junction 118%, Huckleberry

116%, Hooper 115%). Seedling growth and vigor were poorer on sheltered sites with a taller or more diverse herbaceous understory. Here the percent change in height was lower (Santeetlah 87% and Whigg 59%). The height of seedlings at the milepost-3 site planted in 2015 increased by 60%.



Percent change in average height of red spruce seedlings from first year planted to 2018, Unicoi Mountains.



A red spruce seedling growing on a forested slope north of the Cherokee Skyway (Photo: Chris Kelly)

North Carolina Partners in Amphibian and Reptile Conservation (NCPARC) News - Meetings and Events

Wildlife Commission staff gave presentations on the eastern diamondback rattlesnake and the gopher frog to several groups during the quarter, including the N.C. Museum of Natural Sciences Junior Curator program, the Onslow Bight Conservation Forum, a Threatened and Endangered Species Workshop for the North Carolina chapter of

The Wildlife Society, the NC Herpetological Society Fall Meeting, and the East Carolina University herpetology class. These presentations provided great opportunities to share details of the ongoing work with these species with partners and the public. For the eastern diamondback rattlesnake, staff shared details about field surveys and trail cam-



era work at Camp Lejeune. For the gopher frog, staff explained specifics about head-starting efforts of several populations, as well as monitoring egg masses of all populations.



Gopher frog head-start juvenile released onto Holly Shelter game land (Photo: Jeff Hall)



Eastern Diamondback Rattlesnake found during surveys on Camp Lejeune (Photo: Jeff Hall)

North Carolina Partners in Amphibian and Reptile Conservation (NCPARC) News - Upland Snake Surveys

Wildlife Diversity Program staff conducted upland snake surveys in the Sandhills in October and encountered many reptiles designated as Species of Greatest Conservation Need. One of the most exciting encounters for staff was the discovery of an active northern pine snake nest.

Jeff Beane, a herpetologist with the N.C. Museum of Natural Sciences, found an adult female pine snake at the site through radio-telemetry. Beane thought the site might harbor a nesting female underground but wasn't certain. On Oct. 3, Wildlife Diversity Program staff accompanied Beane to the location of the potential nest and found a hatchling snake. After searching the area, they discovered six more hatchlings for a total of seven live hatchling pine snakes. About a month later, staff explored the nest area further and found eight hatched eggs – great information to have on this very secretive species.

Staff also conducted field surveys for the southern hognose snake, and participated in several conference calls and webinars directed toward a Species Status Assessment with the U.S. Fish and Wildlife Service. The SSA for the southern hognose is expected to be completed in late

2019, with the potential of a listing decision by USFWS in early 2020. Currently, the southern hognose snake is state-listed as threatened.



Jeff Beane, herpetologist with the NC Museum of Natural Sciences, holding some of the hatchling northern pine snakes found on Sandhills game land (Photo: Jeff Hall)



Two hatchling Northern Pine Snakes found on Sandhills game land (Photo: Jeff Hall)

The Search for Rafinesque's Big-eared Bats at South Mountains State Park

As winter approaches, bats in western North Carolina seek caves and mines to use as winter hibernacula. This offers biologists an opportunity to monitor bat populations as individuals typically return to the same hibernacula each winter, and bats in hibernation are easily countable. The Rafinesque's big-eared bat, a Species of Greatest Conservation Need, is not often encountered in western North Carolina hibernacula, though several summer roosts are known. Two such summer roosts occur on South Mountains State Park in roost towers created specifically for this species. Park staff monitor the roost towers throughout the year and find few bats during autumn, likely because bats are moving to hibernacula. The hibernacula for this population are unknown, which prompted Wildlife Commission biologists to



A radio-tagged Rafinesque's big-eared bat (Photo: Katherine Etchison)

attempt to locate it by using radio telemetry. Two Rafinesque's big-eared bats were captured from roost towers in early November and were fitted with radio-transmitters.

These bats were tracked from the roost towers to two caves and a hollow tree on the park. Both radio-tagged bats moved from their respective roosts at the onset of a cold front and were not found despite extensive searching.

Biologists didn't reach their primary goal of finding the hibernaculum; however, they did find one of the tagged bats roosting in a cave that was easily accessible to the public. Rafinesque's big-eared bat will abandon roosts when frequently disturbed, so measures will be taken to limit entry into this cave, resulting in better roosting conditions for bats. Surveyors will check this cave periodically to ascertain use by Rafinesque's big-eared and other bats.



State Parks Inventory Biologist, Ed Corey, checks a roost tower for Rafinesque's big-eared bats at South Mountains State Park (Photo: Katherine Etchison)



Wildlife Diversity Technician, Kristi Confortin, tracks a radio-tagged Rafinesque's big-eared bat on South Mountains State Park (Photo: Katherine Etchison)



Fish and Mussel Stockings Address Low Densities in Cheoah River

Cheoah River Recovery Project was created to restore historic species diversity in the Cheoah River. In 2008, the Wildlife Commission received support from the Cheoah River Resource Management and Enhancement Fund and other partners to enable propagation and culture of mussel species in the Cheoah River. As a result, the Wildlife Commission constructed the Conservation and Aquaculture Center, in Marion, N.C.

Since the mussel reintroduction and augmentation began in 2012, more than 30,000 mussels have been stocked in the Cheoah River. In October and November 2018, Appalachian elktoe, slippershell, rainbow, and wavy-rayed lampmussel were stocked (Table 1) in the Cheoah River. Following the August 2018 fish surveys, staff determined that potential host fish densities were low for most species including common taxa (e.g. greenfin darters, river chubs, etc.).

To address the low fish densities, staff focused translocations on common species that could be easily collected. In 2018, staff collected seven species and reintroduced them (Table 2) into the Cheoah River (Figure 1). Additionally, Conservation Fisheries Inc., continued stocking efforts of the federally threatened spotfin chub. Staff hope to continue this effort in subsequent years and will work to increase overall fish densities, including species that are suitable host fish for Little Tennessee native mussel reproduction.

Table 1. Summary of mussels stocked in Cheoah River in 2018

Date Stocked	Species	Cohort	# Stocked
11/15/2018	Appalachian Elktoe	2017	2
11/15/2018	Slippershell	2017	359
10/08/2018	Rainbow	2017	6,808
10/08/2018	Wavy-rayed Lampmussel	2017	1,094
Total			8,261

Table 2. Summary of fish stocked in Cheoah River in 2018

Species	Latitude	Longitude	Type	# Stocked	SMS#
Banded Darter	35.38237	-83.8775	Translocated	5	143
Fatlips Minnow	35.38237	-83.8775	Translocated	11	143
Gilt Darter	35.38237	-83.8775	Translocated	130	143
Greenfin Darter	35.38237	-83.8775	Translocated	42	143
River Chub	35.38237	-83.8775	Translocated	36	143
Spotfin Chub	35.44302	-83.9374	Translocated	1,000	6
Spotfin Chub	35.38128	-83.8638	CFI Propagated	830	128
Telescope Shiner	35.38237	-83.8775	Translocated	92	143
Tennessee Shiner	35.38237	-83.8775	Translocated	73	143

Earlier Mudpuppy Trapping Efforts Yield Better Results

In the fourth quarter, Wildlife Diversity Program staff and a volunteer conducted a short trapping effort in the French Broad River in Transylvania County for mudpuppies. The mudpuppy is a Species of Greatest Conservation Need in the 2015 N.C. Wildlife Action Plan and is state-listed as a Special Concern species, and one whose distribution and population status have proven difficult to ascertain.

Mudpuppies are occasionally encountered in summer snorkel surveys although a more efficient strategy purported for finding the species

is winter trapping when mudpuppies are active and breeding. However, during 13 previous winter trapping efforts in six mountain region counties from 2013 to 2017, biologists failed to detect the species despite historical and/or anecdotal records in targeted waterways, which might allude to rarity of the species. However, trapping in late winter has also been complicated by increased river flows. So, biologists decided to trap earlier in winter. In December, they finally had success by capturing five adult mudpuppies at two new sites in the French Broad River after only

three nights of trapping (n=15 traps across 4 sites). All animals apparently moved on the same night, approximately 12 to 24 hours ahead of a major snowstorm moving over the region. Approaching precipitation events and changes in barometric pressure may help prompt mudpuppy movements and increase trap success. Or, maybe just trapping earlier in the winter is a more ideal survey window. The new capture locations expand biologists' understanding of mudpuppy distribution in the French Broad River and will help guide future survey efforts.



A large, adult mudpuppy in Transylvania County (Photo: Kevin Parker)



Adult mudpuppy in measuring board (Photo: Andy Bullwinkle)



Wildlife Diversity technician, Kevin Parker, measuring an adult Mudpuppy (Photo: Andy Bullwinkle)

Piedmont Barn Owl Project Taking Shape

Biologists in the Piedmont are working to increase their knowledge about barn owls in the region. Barn owls are listed as Species of Greatest Conservation Need in the N.C. Wildlife Action Plan and are difficult to survey using traditional diurnal methods. Special surveys and nest box monitoring schemes are the most effective way to determine barn owl distribution and abundance. This sort of work has been done in the mountains for years, but little effort has been devoted to studying barn owls in the Piedmont. Mountain Conservation Technician Joe

Tomcho showed some of the nest boxes on Sandy Mush Game Land to help Piedmont Wildlife Diversity Biologist Allison Medford learn the best way to construct and deploy nest boxes. In the Piedmont, some areas of good habitat have been identified, and the Wildlife Commission is currently reaching out to landowners to get their help with this project. Most of the suitable barn owl habitat in the state is privately owned. With the assistance of cooperating landowners, biologists will be able to better understand the distribution and abundance of barn

owls, and their conservation status. Please report any known or potential nest sites to:
allison.medford@ncwildlife.org
 or 910-975-9393.



Barn owl (Photo: NCWRC)



Flashing is used to deter predators from getting into the nest boxes. This one is posted in an old barn on Sandy Mush Game Land (Photo: Allison Medford)



Joe Tomcho checks a nest box for signs of usage by barn owls. (Photo: Allison Medford)