



Wildlife Diversity Program Quarterly Update

Third Quarter 2018



Sam McCoy holds an Eastern spiny softshell turtle
(Photo: Gabrielle Graeter)

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N.C. Wildlife Resources Commission

**121 Sea Turtle Nests Lost after Hurricane Florence**

Hurricane Florence made landfall in New Hanover County on Sept. 14, causing extensive damage along nearly the entire coast of North Carolina. The storm surge and high wave energy along the beaches eroded sand from ocean-front beaches, and in some places completely washed away the primary dunes. This is the beach zone used by sea turtles to lay their eggs during summer months. Although nesting had ended by the time Hurricane Florence struck the coast, many sea turtle eggs that were laid in late July and August continued to incubate on nearly all beaches in North Carolina.

Following the hurricane, volunteers and cooperators inspected areas where nests were located before the storm, and they reported that 121 nests were completely lost due to the hurricane, which amounts to approximately 15 percent of all sea turtle nests laid in 2018 in North Carolina.

Nevertheless, several dozen nests were still in place after the storm,

and at least five nests in Brunswick, New Hanover and Carteret counties have produced hatchlings after the passage of Florence. The resiliency of some of these impacted eggs and the fact that individual reproductive females produce multiple clutches during a single season show that sea turtles have evolved to withstand the hazards associated with tropical storms and hurricanes that affect the southeast United States coast.



Loss of primary dune in a section of North Topsail Beach, NC, after Hurricane Florence. (Photo: NCWRC)

Staff Inspect Damage to Red-Cockaded Woodpecker Clusters Following Hurricane Florence

An often-overlooked consequence of hurricanes is their impact on wildlife species. Several weeks after Hurricane Florence made landfall in southeastern North Carolina, Wildlife Commission staff were finally able to access flooded areas in Bladen and Pender counties and assess damage to a federally endangered species, the red-cockaded woodpecker (RCW).

The RCW is unique in that it is the only woodpecker species that roosts and nests in living pine trees. A group of these cavity trees used by a RCW family is called a cluster and defended throughout the year. Excavating a chamber in a living pine is a lengthy process that can take up to 13 years to complete. Without a cavity to roost or nest to raise young in, individual birds are

more susceptible to predators and populations begin to suffer from lowered productivity.

In the Bladen Lakes Region, staff documented only four lost cavity trees from three of 12 clusters; however, one of these clusters only had two active cavity trees pre-storm. Available data from a limited number of clusters in Holly Shelter Game Land (HSGL) revealed that of seven groups inspected, four did not sustain any losses while the remaining three lost at least one cavity tree. At HSGL, Commission staff found a deceased RCW trapped inside its cavity after it snapped from exposure to extreme winds.

As soon as all information is evaluated, staff will provision new cavities where needed using artificial inserts. This technique is a valuable



Artificial red-cockaded cavity tree insert (Photo: John Carpenter)

tool for wildlife managers who need to quickly find RCWs a new home in a short period of time.



Base of snapped cavity tree (left), fallen section with exposed chamber (middle), and deceased red-cockaded woodpecker (right). (Photo: NCWRC)

Piping Plovers Successfully Nest on Onslow County Beach

With nesting season in full swing, coastal birds were hard at work during the summer months incubating and raising their chicks. The Waterbirds Investigations & Management Project biologist and technicians recorded a rare success for nesting piping plovers—a pair successfully fledged four chicks.

During the annual piping plover breeding season census the Waterbirds Investigations & Management Project team detected a piping plover nest on an Onslow County beach where nesting pairs had not previously been recorded. The nest contained four eggs—a full clutch. The Atlantic Coast population of piping plovers are federally and state listed as threatened due to the numerous challenges

faced by the species.

Piping plover productivity in North Carolina is low (averaging 0.53 ± 0.05 since statewide monitoring began in 1989) due to the predation of eggs and chicks by mammalian and avian predators, as well as ghost crabs, and wash over from storm events. Due to these challenges the team was surprised to observe that all four eggs hatched, and the chicks were thriving. The female left approximately one week after the chicks hatched, a not uncommon behavior for piping plovers, leaving all care to the male.

Staff monitored the chicks daily, observing the male lead the chicks down the beach to forage in the moist soil habitat and guide them to

higher ground when humans or other potential predators approached.

Since the piping plovers nested on a beach not owned by the Wildlife Commission, the Waterbirds Investigations & Management Project team relied on outreach to the public and local police department to protect the chicks. Staff spent time educating beachgoers about the birds, while the North Topsail Beach Police Department patrolled the area for vehicles and off-leash dogs.

As the chicks aged, staff watched them fly up and down the beach testing their new flight capability. The birds were last observed on July 27 when the chicks were approximately 4 weeks old, likely having left to begin their migration.



The adult male piping plover stands along the wrack line with two of the four chicks on July 23. (Photo: NCWRC)

Fall-Breeding Gopher Frogs Follow in Wake of Hurricane Florence

In the third quarter 2018, Wildlife Commission biologists continued to survey for amphibians and reptiles throughout the eastern part of North Carolina. They focused surveys specifically on priority snake species and Pine Barrens treefrogs in the Sandhills and adjacent inner Coastal Plain.

Most notable this quarter was the discovery of fall breeding of Carolina gopher frogs following Hurricane Florence in September. The hurricane

brought over 15 inches of rain to the Sandhills region, filling all known isolated ephemeral wetlands, which were all completely dry before the storm. Gopher frogs bred at one of the wetlands, depositing 22 egg masses. This marks only the third time gopher frogs are known to have bred in the fall instead of their usual late winter breeding habit.

To continue the gopher frog headstarting program, staff collected

portions of each egg mass and transferred them to the North Carolina Zoo in Asheboro for rearing. Staff also deployed automated frog call recorders at four wetlands throughout the region prior to the hurricane but have not analyzed the data yet.

The discovery of gopher frog breeding and numerous egg mass output is encouraging.



Drone photo of isolated wetland on Sandhills Game Land where gopher frogs bred following Hurricane Florence in September, 2018. (Photo: Brady Beck)



Gopher frog egg mass (Photo: Jeff Hall)



Gopher frog metamorph from previous headstarting effort (Photo: Jeff Hall)

Fish and Mussel Surveys Conducted in Waccamaw River

Wildlife Commission staff, in partnership with N.C. State Parks, have conducted annual standardized surveys since 2009 for three fish species, listed as 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 3.7 fish/minute (fpm) of seining in 2018. This value has ranged from 1.82 fpm in 2017 to 23.5 fpm in 2009. Variability is expected due to the fish's schooling behavior, preference for open waters of the lake, and varied sampling conditions, such as very warm water (exceeding 91° Fahrenheit), which causes fish to move out into

deeper habitats that cannot be seined. The highest catch rate at a single site in 2018 was 10.7 fpm. Waccamaw killifish and Waccamaw darters were also collected with minimal effort, suggesting that healthy populations continue within Lake Waccamaw.

Staff also conducted qualitative surveys of native freshwater mussel communities at the southwestern end of the lake, above and below the dam where the Waccamaw River begins. SGCN species documented included:

- Yellow lampmussel; federal Species of Concern, state Endangered)
- Waccamaw snail; state Special Concern)
- Waccamaw siltsnail; state Special Concern)
- Eastern creekshell



Staff from the Wildlife Commission & NC State Parks seine for SGCN fishes in Lake Waccamaw (Photo: NCWRC)



Waccamaw silversides (Photo: NCWRC)

Biologists Continue Brook Floater Surveys in the Pee Dee, Cape Fear River Basins

Staff continued survey efforts for the state-endangered brook floater mussel at 31 sites in the Pee Dee and Cape Fear river basins. Staff collected five brook floaters at three sites in the Rocky River and Brush Creek, a tributary to the Deep River, both in the upper Cape Fear basin. They swabbed individual mussels to obtain DNA for population genetics. Additional SGCN species they collected were:

- Atlantic pigtoe (proposed federal Threatened, state Endangered)
- Carolina creekshell (federal Species of Concern, state Endangered)
- Savannah lilliput (federal Species of Concern, state Endangered)
- Triangle floater (state Threatened)
- Notched rainbow (state Special Concern)
- Chameleon lampmussel

This project will continue into 2019.



Young brook floaters (Photo: NCWRC)

Biologists Conduct Savannah Lilliput Mussel Surveys in Rocky River

Staff continued monitoring survival of tagged Savannah lilliput mussels in the Rocky River. The mussels, which are listed as a federal Species of Concern and state endangered, were relocated from the former impoundment and tailrace of Hoosier Dam in Chatham County to avoid impacts of dam removal.

Wildlife Commission staff moved more than 500 individuals in 2017 and 2018. Staff PIT tagged a subset of 49 and marked several hundred others with colored paint. In two days, nine PIT-tagged animals were detected, of which one was a mortality. Three additional paint-marked animals were found alive, along with two untagged animals.

Overall, confirmed mortalities remain relatively low at 10 percent ($n = 5$) and have been temporally scattered. While causes are unknown, based on field observations, this is likely similar to conditions in the

tailrace. Repeated high-water events, including Hurricane Florence in September, have altered habitat structure and made sampling conditions more difficult, reducing detection rates. Future monitoring efforts will provide more data about survival, but current results still suggest that translocated animals are persisting.



Mussel tagged with paint (Photo: NCWRC)

Staff Continue Long-Term Monitoring of the Spotfin Chub in the Cheoah River

In 2005, minimum flows were established on the Cheoah River, which enabled the subsequent recovery of several state and federally listed species, including spotfin chub. Reintroduction began in July 2009 and has included juvenile fish spawned and reared in captivity and adults translocated from the Little Tennessee River.

Stockings began at the upstream end of the 9-mile reach between Santeetlah Dam and Calderwood Reservoir, with subsequent releases in the lower reach beginning in 2015. The Cheoah River now supports the most successful reintroduction of a restored population the spotfin chub

— a federal and state threatened fish. Restoration efforts in Tennessee, Alabama and the Cheoah River in North Carolina have been successful in re-establishing populations of this species and may be successful enough in the near future to remove the species from the federal list of threatened species.

In 2015, Western Aquatic Wildlife Diversity staff initiated a long-term monitoring effort to document the status and abundance of spotfin chub in the Cheoah River. With assistance from cooperators from the U.S. Fish and Wildlife Service, Conservation Fisheries, Inc., and others, staff conducted visual surveys

by mask and snorkels using area defined searches. Three years of data indicate the spotfin chub population occupies the entire Cheoah River below Santeetlah Lake and remains a strong and viable population.



A feeding spotfin chub in the Cheoah River (Photo: Luke Etchison)

Staff Attempt Restoration of Lake Sturgeon in the French Broad River

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



One of ~6,000 lake sturgeon that was stocked in the French Broad River (Photo: Luke Etchison)

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 Geor-

gia. After hatching and initial growth to the late fry stage, fish were sent to the USFWS National Fish Hatchery at Edenton and the Wildlife Commission's State Fish Hatchery at Table Rock for several months of grow-out before release. About 6,000 juvenile Lake Sturgeon were produced from both hatcheries and stocked in the French Broad River in Madison County in September and October 2018.

Snorkle Surveys for Eastern Hellbender Yield Record-Setting Results

In the third quarter 2018, Wildlife Diversity Program staff and partners conducted monitoring and inventory surveys for the Eastern hellbender, a Species of Greatest Conservation Need in the N.C. Wildlife Action Plan (2015), a state Special Concern species, and a federal Species of Concern petitioned for listing.

Snorkel surveys during a two-week period overlapping hellbender breeding season yielded record-setting results. Over a nine-day span in 10 different streams, staff and partners documented at least 118 active adult hellbenders engaged in breeding activities including fighting, congregat-

ing around nesting habitats, and adult males defending nests (“denmasters”).

Staff used underwater cameras to video behaviors and photograph animals, furthering their knowledge of what natural nesting habitats hellbenders select, while making sure not to disturb hellbenders or nest sites. Although it was an intense and condensed window of time, the value of conducting breeding season surveys is well worth staff efforts because of what they can learn, the ease of updating site occurrence records, and the verification of reproductive activity in sites or streams where population status may be currently



“Denmaster” Eastern hellbender in defensive posture at nest rock. (Photo: Lori Williams)

unknown. Future potential directions for these survey efforts include monitoring nests for success and causes of failure, such as predation, sedimentation or high-water events.



Adult Eastern hellbender active during the breeding season (Photo: Lori Williams)



Adult Eastern hellbender active during the breeding season (Photo: Lori Williams)

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



NCPARC met jointly with the N.C. Herpetological Society for the third North Carolina Congress of Herpetology in April 2018. Over 100 participants attended the three-day meeting, which included two plenary speakers, poster sessions, presentations and field trips. Held at the NC Zoo, the meeting was a great opportunity for networking and discussions surrounding the conserva-

tion of North Carolina's varied and diverse herpetofauna.

As in most quarters, this last quarter of 2018 included numerous workshops on the conservation of reptiles and amphibians given to natural resource managers, law enforcement personnel, and the general public.

Especially important is a day-long herp training held annually for new recruits into the N.C. Wildlife Re-

sources Commission Law Enforcement Division. More than 20 new officers received this training into identification, conservation, regulation and safe handling of reptiles and amphibians.



Group field trip during the NC Congress of Herpetology (Photo: Jeff Hall)



Day-long training for new recruits at the Salemburg Justice Academy in July, 2018. Participants were required to remove a snake from a bag and then return the snake to a bag without using their hands, as if the snake were venomous. (Photo: Jeff Hall)



Scarlet snake found on a field trip during the NC Congress of Herpetology (Photo: Jeff Hall)



New recruits also familiarize themselves with some non-venomous snakes, such as this albino rat snake (Photo: Jodie Owen)

North Carolina Partners in Amphibian and Reptile Conservation (NCPARC) News Surveys & Research

Gopher Frog Headstarting Efforts Continue

Wildlife Diversity Program staff continued work with head-starting of Gopher Frogs, along with partners at the Fort Fisher Aquarium and the North Carolina Zoo. Hundreds of newly metamorphosed frogs were released to Sandhills and Holly Shelter

game lands. sources Commission Law Enforcement Division. More than 20 new officers received this training into identification, conservation, regulation and safe handling of reptiles and amphibians.



Juvenile gopher frog after release at Holly Shelter game land (Photo: Jeff Hall)

Fall Bog Turtle Surveys Continue

Fall Bog Turtle surveys and monitoring are often just as productive as those in the spring, and staff worked in several sites in September. Bog turtles were detected at several sites, including some recaptures.



Bog turtle found during surveys/monitoring (Photo: Jeff Hall)



Project Bog Turtle and NCWRC staff excited about a recent bog conservation purchase (Photo: Jeff Hall)

Upland Snake Surveys Include Trail Cameras This Year

Upland snake surveys this year have included the use of trail cameras for detection. Primarily used on Camp Lejeune, these cameras were extremely helpful in capturing records of Eastern diamondback rattlesnakes. At least four different individuals were depicted on cameras, with a potential of seven snakes captured. This effort will be increased in future years due to this year's success.



One of two Eastern diamondback rattlesnakes caught on a trail camera on Camp Lejeune

Wildlife Commission and Partners Continue Spruce Restoration Program

With the momentum of last autumn’s Flat Laurel spruce restoration project, partners with the Southern Appalachian Spruce Restoration Initiative (SASRI) proceeded with several related projects.

In September, Wildlife Commission staff met with the U.S. Forest Service and Southern Highlands Reserve to develop a plan for releasing planted and wild spruce seedlings in the Flat Laurel project area. Releasing the seedlings will result in faster growth, increased vigor, and shortening the time the trees reach the canopy.

The Pisgah Conservancy (TPC), a nonprofit dedicated to the well-being and betterment of the Pisgah Ranger District, assisted with last year’s planting project and is back for more. TPC invited Wildlife Commission staff to weigh in on a proposal to incorporate spruce restoration

into a trail rehabilitation project in Graveyard Fields, a popular high elevation valley for recreation in the Great Balsam Mountains.

In July, Wildlife Commission staff attended a tour with TPC to discuss the needs and approach. In September, staff began mapping spruce restoration needs in the project area. Restoration there would provide important linkage between isolated patches of Carolina northern flying squirrel habitat. While assessing restoration needs in this area, Wildlife Commission staff tested a new mobile app developed by the U.S. Fish and Wildlife Service to ground-

truth the “Current Spruce Units” map developed for SASRI.



A red spruce seedling (Photo: Chris Kelly)



U.S. Forest Service, NCWRC, and Southern Highlands Reserve staff visited the Flat Laurel project area to plan seedling release. (Photos: Jason Herron)



Field trip attendees toured eroded trails in Graveyard Fields and discussed spruce restoration needs in the forested areas west of the fields. (Photo: Chris Kelly)

Staff Conduct Priority Mollusk and Fish Species Monitoring in the Western Region

This summer, Aquatic Wildlife Diversity Program biologists surveyed the Little Tennessee River basin for smoky dace and have found several new populations.

Smoky dace are an undescribed Southern Appalachian endemic fish species, found in western North Carolina. Historically, smoky dace abundance and distribution have been poorly understood. Previous smoky dace records occurred during surveys where they were not being specifically targeted.

General surveys for priority species were conducted at approximately 61 sites in the French Broad, Little Tennessee and New River basins. Target priority fish species included smoky dace, mountain blotched chub, spotfin chub, sharphead darter, Kanawha darter, wounded darter, sicklefin redhorse, blotchside logperch, sharpnose darter, olive darter, among many others. Fishes were sampled with backpack electrofishing gear following a modified IBI methodology. A few sites were sam-

pled by visual snorkeling surveys, including those in the South Fork New River for sharpnose darters.

Staff surveyed sites targeting priority mollusks in the French Broad and Little Tennessee River basins, primarily by visual snorkeling surveys. Target species included Appalachian elktoe, slippershell, spike, longsolid, wavy-rayed lampmussel, green floater, Tennessee clubshell and creeper.



Wavy-rayed lampmussel displaying its lure to attract a host fish in the Cheoah River (Photo: Luke Etchison)



Smoky dace collected in a tributary of the Little Tennessee River (Photo: Dylan Owensby)

Summer Bat Surveys Yield Surprising — and Pleasant — Findings

Long-term bat surveys continue to produce low numbers compared to surveys occurring before the impact of white-nose syndrome; however, the second half of this summer's bat mistnetting season held several surprising survey nights. Wildlife Commission staff chose three new sites based on acoustic recordings of rare bat species. Staff captured one a gray bat, which is endangered, at a new site in Buncombe County.

Though staff caught no rare bats at the other new sites, they did capture 40 big brown bats during one survey, which was an astounding number of bats!

Another remarkable survey night occurred during a routine long-term survey in Haywood County that typically yields less than 10 bats total, but to the surveyors' surprise, 27 gray bats were caught at once! At another long-term site in Haywood County, a Rafinesque's



Sixteen big brown bats in holding bags await processing at a mistnet site in Buncombe County. (Photo: Katherine Etchison)

big-eared bat was caught wearing a forearm band that indicated it was originally captured in 2010. This bat was first banded as an adult, making the individual at least 9 years old. Rafinesque's big-eared bats are adept at avoiding nets, so capturing an individual twice is rare.

Finally, at a mistnet site in Avery County, staff caught a little brown bat for the third consecutive

year. This is the only mistnet site where this species is consistently encountered. Little brown bats have been heavily affected by white-nose syndrome and are now very rare in the Mountain Region. Staff applied a radio-transmitter to this bat to better understand the local surviving population of little brown bats, but the bat was never located after release, perhaps due to technical difficulties.



One of 27 gray bats captured during a mistnet survey in Haywood County. (Photo: Katherine Etchison)



Wildlife Diversity Technician, Kristi Confortin, extracts an eastern red bat from a mistnet at a new site in Caldwell County. (Photo: Katherine Etchison)

Eastern Spiny Softshell Turtle Confirmed in Hiwassee River Basin

Wildlife Commission staff recently captured a large female eastern spiny softshell turtle during aquatic turtle trapping surveys in the Hiwassee River Basin. This is the first time a softshell turtle has been captured in Cherokee County and in the Hiwassee River Basin in North Carolina. Although some range maps for this species include the Hiwassee River Basin, these maps were based upon supposition rather than actual confirmed records.

The eastern spiny softshell turtle is state listed as special concern and has been identified in the North Carolina Wildlife Action Plan as a Species of Greatest Conservation Need (SGCN). Biologists still have much to learn about the distribution and status of this species in western North Carolina.

The purpose of these trapping surveys is to find out which species are present in a river basin, including

the common species, but especially the SGCN species. To do this, staff set hoop traps designed for catching aquatic turtles along the bank of the river or lake in multiple locations.

Hoop traps typically have three large metal rings with netting around them and a trap opening on one end. Each trap is baited with a can of sardines, cracked open just enough for the liquid to come out, but so that the contents remain. Baiting the trap this way will attract turtles for several days. Traps are secured to the bank and positioned so that they are two-thirds to three-quarters submerged in the water; this ensures the net opening is below the surface but that there is air for captured turtles to breathe at the top. Staff check the traps daily, capture the turtles and document weight, size, sex and any other distinguishing characteristics. Documenting the presence of this species is an important first step towards understand-

ing the distribution of this priority species in this watershed, but much remains to be done to gain a full picture of the distribution and status of eastern spiny softshell turtles in this watershed and others. Efforts to expand knowledge of this species' distribution and other SGCN aquatic turtle species will continue next year when the weather warms and the turtles are active again. This work will continue in the Hiwassee River Basin and expand into other river basins in western North Carolina.



Example of hoop traps used for capturing aquatic turtles (Photo: Sam McCoy)



Wildlife Commission Technician Sam McCoy holds a female spiny softshell turtle. (Photo: Gabrielle Graeter)



Eastern spiny softshell turtle (Photo: Gabrielle Graeter)