



Wildlife Diversity Program Quarterly Update

Second Quarter 2018



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This spring, Wildlife Diversity Program biologists continued annual Henslow's sparrow point count surveys on the Voice of America Game Land, located in Beaufort County. They conducted these surveys to provide measures of abundance, trends, and distribution for this state-endangered species. Biologists counted more singing males at their sampling locations this year than any since they began surveys in 2011.

Although sparrows are continuing to concentrate in certain areas, primarily in the eastern half of the game land, there were additional places with more birds than have been heard in previous years. They hope these results are in response to recent habitat management, specifically the prescribed burning

efforts of the Wildlife Commission's fire crews.

As a pilot study for future work that will examine how this species responds to the use of prescribed fire, they also captured and color-banded eight males to estimate territory size and reproductive behavior. Half of the banded sparrows were in an area last burned in August 2016, while the remaining birds were captured in a unit burned in April 2017. The average territory size using available data from seven males was 0.3 ha (0.8 acres). At least three males were paired with a female and two were observed carrying food, an indication of an active nest with young.

This information is being used to help develop a species management plan for breeding populations of Henslow's sparrow in North Carolina.



Color-banded male Henslow's sparrow captured at the Voice of America Game Land in April 2018
 (Photo: John P. Carpenter)



April-June 2018

N.C. Wildlife Resources Commission



Spring Heralds the Start of a Busy Waterbird Season along the Coast

Spring is an extremely busy time of year for birds and ornithologists. By early April, the Wildlife Commission's Waterbirds Investigations and Management Project biologist and technicians ensure all Commission-managed islands are posted with signs that inform the public about nesting waterbirds and the need to stay out of nesting areas.

Shorebirds such as American oystercatchers, Wilson's plovers, and piping plovers begin nesting in May, as do many colonial-nesting waterbirds. The waterbird biologist coordinates with conservation partners along the North Carolina coast to conduct standardized surveys of federally- and state-listed species. Biologists along the Atlantic Coast

from Maine to North Carolina concurrently conduct standardized surveys for piping plover and least tern. Data are summarized by the U.S. Fish and Wildlife Service. In June, North Carolina biologists detected a piping plover nest at a new site farther south than the stronghold of nesting piping plovers — Cape Lookout National Seashore. The female of this pair was banded, and biologists learned that she hatched in New Jersey in 2017 and was named "Sauerkraut." Biologists found four piping plover pairs with nests on southern beaches, an encouraging increase in the distribution of plovers in North Carolina.

Simultaneous with the plover surveys, biologists surveyed nesting least terns on barrier island beaches,

dredged-material islands, natural marsh islands and roofs. Flat roofs with small stones are alternative nesting habitat for persistent terns that have lost much of their favored beach habitat to development and intensive human activity. The Pine Knoll Shores Aquarium partnered with the Wildlife Commission to attract least terns with decoys, then monitor nesting pairs with cameras.

This project is ongoing and reported in Wildlife Commission and Aquarium blogs. Severe thunderstorms during June resulted in washed-out nests and adults abandoning colonies. Continued monitoring will determine if June re-nesting attempts are successful by this tenacious tern species.



Female Piping Plover on eggs at a southerly beach site during early June (Photo: N.C. Wildlife Resources Commission)



Least Tern incubating eggs on a natural beach site protected by Wildlife Commission waterbird biologist and technicians. Natural beaches are optimum nesting habitat for terns, but Least Terns will nest on dredged-material islands and flat roofs covered with small stones. (Photo: N.C. Wildlife Resources Commission)



Kemp's Ridley Sea Turtle Nests Increasing along North Carolina Beaches

In June 1992, a Kemp's ridley sea turtle was observed nesting during the day on Oak Island beach in Brunswick county. This was the first time this species was observed nesting in North Carolina, and was so distant from the normal nesting area in Tamaulipas, Mexico that it was interpreted as a biological anomaly. This species was not observed nesting again in North Carolina until June 2003, when one Kemp's ridley was observed nesting during the day at Cape Lookout National Seashore. Five more years would pass until any Kemp's ridley turtles were observed nesting —on two occasions in 2010. Following this, at least one Kemp's ridley nest has been laid in North Carolina each summer, except in 2013.

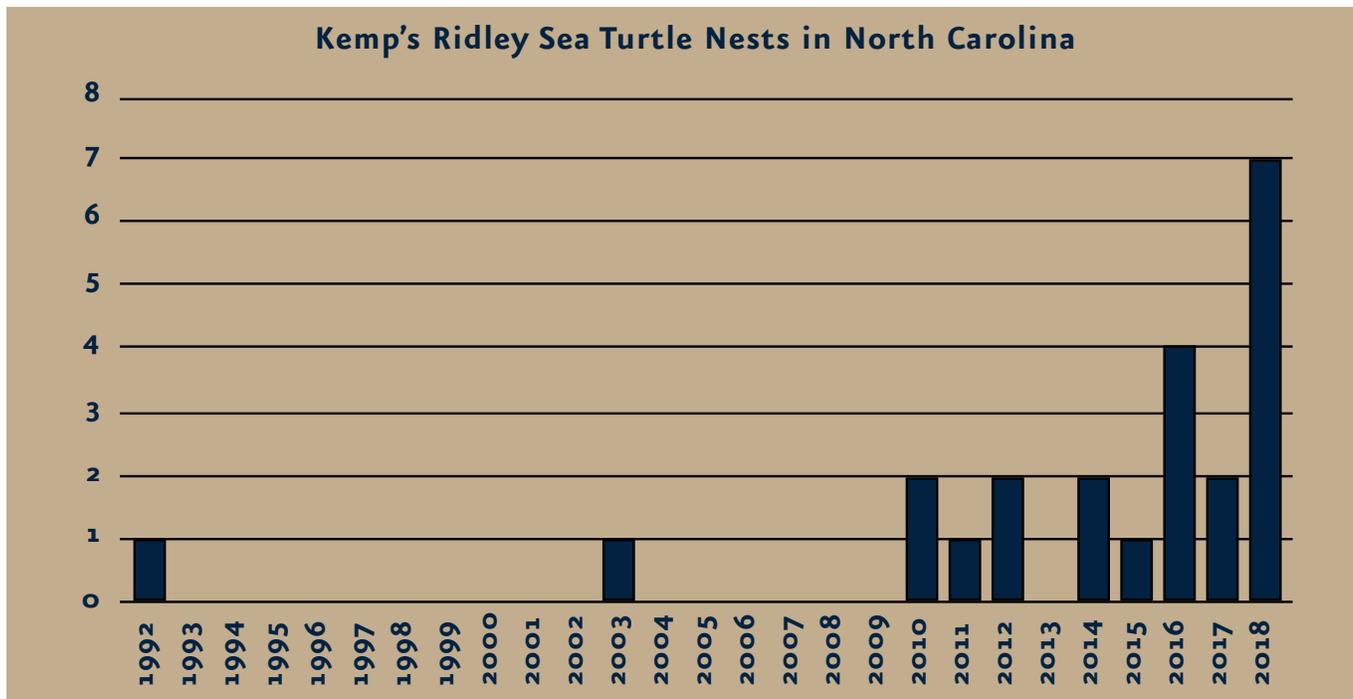
This summer, seven Kemp's ridley nests were documented in North Carolina, where the nesting females were

observed laying eggs during the daytime. Two more possible Kemp's ridley nests may have been laid, but the nesting female was not observed, meaning species will be confirmed after egg incubation is complete and the hatchlings emerge.

Based on the increasing number of nests observed in the past several years, the Kemp's ridley can be considered a regular (albeit rare) nesting sea turtle species in North Carolina.



Kemp's ridley sea turtle nesting on beach in Corolla, NC in June 2016 (Photo: N.C. Wildlife Resources Commission)



Headstarting Program for Ornate Chorus Frogs Continues

In the second quarter of 2018, Wildlife Commission biologists and partners at the N.C. Zoo continued a headstarting program for ornate chorus frogs, an extremely rare species in the state. This species has been extirpated from most historical locations in the state, and Sandhills populations now only occur on Ft. Bragg. This year, staff and partners successfully raised juvenile frogs that originated from eggs collected from Ft. Bragg. They released approximately 200 juvenile ornate chorus frogs on a re-

cently restored pond on the Sandhills Game Land. They released frogs at dusk on wet days to give them the best chance for survival at this new site. Monitoring of the pond using automated recorders will begin in late 2018 and through 2019 to determine whether this translocation project was successful. If successful, headstarting of this species could be a very useful tool for increasing the number of populations, especially in areas where habitat is being restored.



Staff from the North Carolina Zoo were instrumental in raising and helping to release Ornate Chorus Frogs at a restored wetland on Sandhills Game Land. (Photo: Dustin Smith)

Tar River Spiny mussel Augmentation Monitoring Surveys Conducted in the Tar River Basin

From April through June, Wildlife Diversity Program staff and collaborators conducted Tar River spiny mussel augmentation monitoring surveys within the Tar River basin. To date, over 14,000 Tar River spiny mussels have been released at seven reaches within Fishing and Little Fishing creeks. Monitoring efforts resulted in the recapture of over 1,300 Tar



River spiny mussels. Mussel gravidity, an indicator of active spawning, was checked and observed at all reaches. This marks the first time that released Tar River spiny mussels have been documented to spawn in the wild.

Furthermore, this finding indicates that staff may observe wild recruitment within the next 3-5 years—a substantial milestone in the effort to bolster Tar River spiny mussel populations.



From April through June, Wildlife Commission staff surveyed for Tar River spiny mussels on Fishing and Little Fishing creeks in the Piedmont (Photos: N.C. Wildlife Resources Commission)



Wildlife Commission staff recaptured more than 1,300 Tar River spiny mussels during surveys this spring. (Photo: N.C. Wildlife Resources Commission)

Biologists continue Sicklefin Redhorse study in the Valley and Tuckasegee Rivers

A Candidate Conservation Agreement (CCA) was finalized in 2015 for the sicklefin redhorse and was signed by primary partners: U.S. Fish & Wildlife Service (USFWS), N.C. Wildlife Resources Commission, Duke Energy, Tennessee Valley Authority,

Eastern Band Cherokee Indians and Georgia Dept. of Natural Resources. The CCA is a formal agreement to cooperate on actions that conserve, manage, and improve sicklefin redhorse populations range-wide with the goal of working to preclude the

need to list the species under the Endangered Species Act. The agreement formalizes and expands upon conservation efforts previously established by the NCWRC and partners.

As part of this agreement, biologists have been involved in annual sampling efforts in the Hiwassee and Little Tennessee River basins. In 2018, NCWRC biologists targeted Sicklefin Redhorse in the Valley River, Oconaluftee River, and Tuckasegee River to collect gametes for future stocking efforts and collect information about movement, reproduction and survival.

In the Valley River sampling efforts, biologists collected tissue samples from 25 sicklefin redhorse that will be used for genetic analysis. They collected 66 fish from the Oconaluftee and Tuckasegee rivers, 16 of which were recaptures from previous years sampling efforts.

Biologists collected ~8,000 eggs from two females during the sampling effort. The eggs were fertilized using milt collected from male sicklefin redhorse during the sampling effort and transferred to Conservation Fisheries Inc., and USFWS at Warm Springs, GA to be grown out for future stocking efforts.



Sicklefin Redhorse collected during a fyke net survey in the Valley River (Photo by Luke Etchison/NCWRC)



Biologists David Matthews (Tennessee Valley Authority) and Carlos Echevarria (US Fish and Wildlife Service) measure a Sicklefin Redhorse collected in the Tuckasegee River. r (Photo by Luke Etchison/NCWRC)



Staff Continue Brook Floater Surveys in the Uwharrie and Little Rivers

Wildlife Diversity Program staff resumed survey efforts for the state endangered brook floater mussel at four sites totaling 20 person-hours in the Uwharrie and Little rivers (Pee Dee River basin). Biologists collected two brook floaters in the Little River near Uwharrie National Forest. They swabbed the mussels to obtain DNA for a population genetics study, which is conducted by the U.S. Fish and Wildlife Service. Staff also collected two additional state endan-

gered species, the Atlantic pigtoe and the Carolina creekshell in the Little River in Montgomery County. The Atlantic Pigtoe record is the first live individual found in the main-stem in Montgomery County since 1993, a gap of 25 years. Shells were found during these surveys in 2017 nearby in the West Fork Little River and one live individual was detected in 2016 through agency efforts farther upstream in the Little River in Randolph County.

Wildlife Commission staff will continue survey work throughout the summer.



Atlantic pigtoe collected and tagged in the Little River (Photo by N.C. Wildlife Resources Commission)



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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 donate online with credit card.



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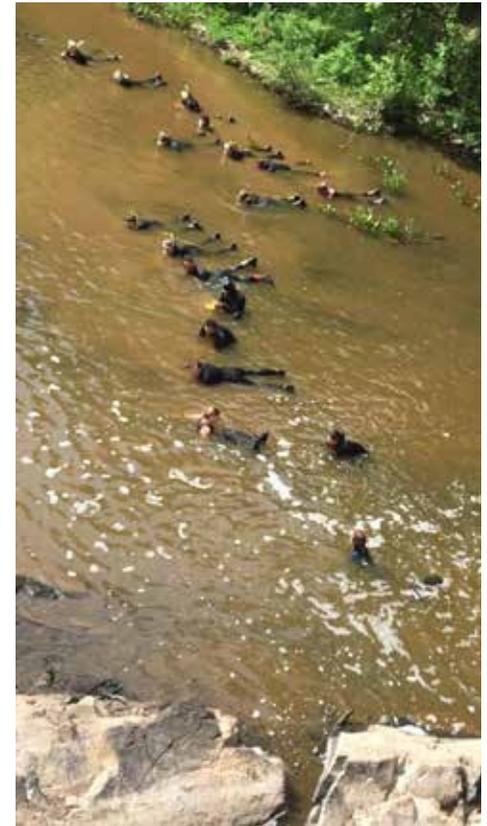
Staff Conduct Rocky River/Hoosier Dam Removal Mussel Surveys

Wildlife Diversity Program staff completed priority mussel relocation surveys in the tailrace of Hoosier Dam prior to planned structure demolition in 2018. Volunteers from partners including N.C. State University, the Greensboro Science Center, Piedmont Land Conservancy, and Appalachian State University, as well as agency staff from other regions, contributed to a total of 128 person-hours (p-h) searching 6,388 m² (~1.6 acres) of the Rocky River in Chatham County. The tailrace was divided into four reaches, each of which was surveyed two to three times. Staff re-located mussel species designated as Species of Greatest Conservation Need to sites upstream of the former impoundment and relocated more common Eastern

elliptio farther downstream, out of the immediate impact area. Staff collected over 1,800 individuals in three days (see chart), including:

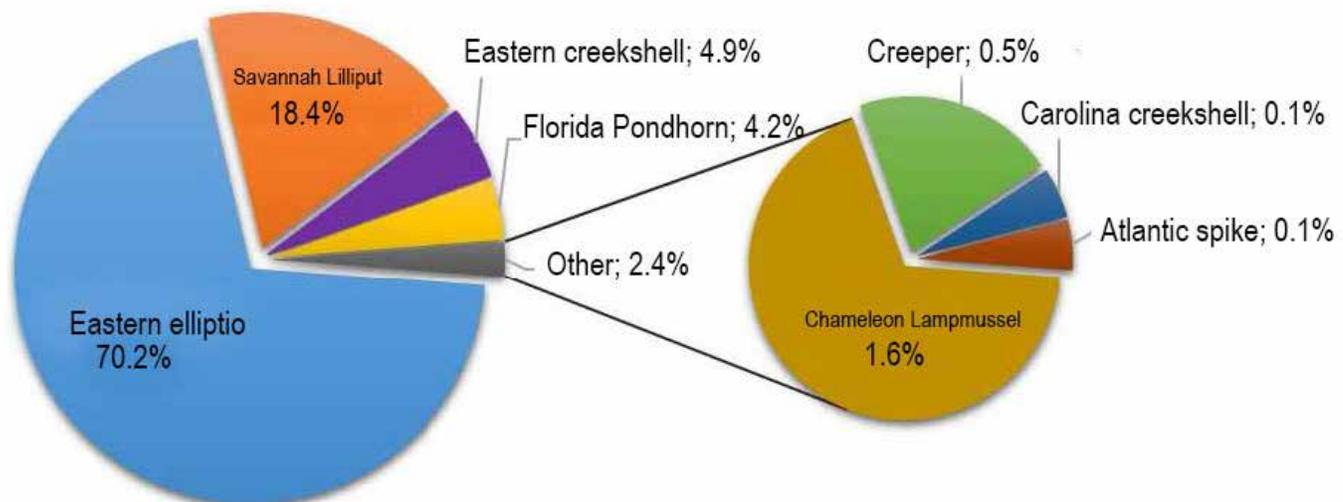
- 294 Savannah Lilliput-Federal Species of Concern, State Endangered
- 8 Creeper; State Threatened
- 26 Chameleon Lampmussel
- 78 Eastern Creekshell

Additional species relocated included Carolina creekshell, which is state listed as endangered. Florida pondhorn, and Atlantic spike, Eastern floater and paper pondhorn were also common in this reach. Catch per unit effort (CPUE) in each transect ranged from 3.6 to 32.2 mussels per p-h and approximate density of targeted mussel species ranged from 0.07 to 0.53 mussels/m²



Survey crew in Hoosier Dam tailrace (Photo by private landowner)

Relative Abundance of Targeted Species



Volunteer Program initiated for Western Reptile Inventory Project

Although range maps often show a species being present across large swaths of a region, sometimes this is based on very few records and little is actually known about the distribution and relative abundance of a species in an area. This is the case for many of North Carolina's rare and listed reptile species in western North Carolina. There are 12 snake and lizard species in western North Carolina considered to be Species of Greatest Conservation Need (SGCN) in the 2015 North Carolina Wildlife Action Plan and three of those are also state listed as Special Concern.

To learn more about these species, Wildlife Commission staff have worked over the past few years to set up a large inventory project across multiple game lands and other state-owned properties in western North Carolina. At each site, staff have set up an array of artificial cover that can be checked periodically for reptiles, with a focus on snakes and lizards. Artificial cover is a sheet of wood or metal laid on the ground that reptiles will use for shelter and to thermoregulate.

Reptiles are ectotherms, meaning that they maintain their body temperature through their environment. This cover, especially if it is metal, such as pieces of old roofing tin, will frequently be warmer than the sur-

rounding environment, so reptiles will go under the tin to warm up. When placing the tin, staff considered how much sunlight a location receives, the direction it faces, and the surrounding habitat. To survey, we carefully lift the piece of tin to see if anything is underneath.

In 2016, staff began setting up study sites and now have a total of nine. Tin pieces were placed at Johns River Game Land, South Mountains Game Land, Sandy Mush Game Land, Nantahala Game Land, Table Rock Fish Hatchery, Talla bog, Chimney Rock State Park, Needmore Game Land and Thur-

mond Chatham Game Land. Each site has 40 tin coverboards. Staff visited each site as often as possible to begin developing a list of species found on each property. Unfortunately, given the geographic spread of these sites and other responsibilities, staff were only able to survey each site once or twice a year. It would be ideal to visit once a month during the active season for reptiles.

This need helped formulate the idea of recruiting dedicated volunteers to adopt a site and check the tin monthly. Volunteers are required to be experienced with identification of and enthusiastic about reptiles,



Artificial cover, in this case a piece of tin, set up at a NCWRC Game Land to attract reptiles and aid in an effort to inventory for snake and lizard species (Photo: Gabrielle Graeter)

follow specific safety and data collection protocols, and commit to checking the artificial cover at their adopted site regularly. In the first year, staff have had great success with getting volunteers signed up to adopt a site. All study sites have been adopted and two volunteers have even adopted more than one site. It is encouraging to know that so many people are interested in reptiles, especially snakes, and helping with this important inventory work. The Wildlife Commission needs to better understand species status, habitat associations, and what the conservation needs are.

Species documented thus far this year include black racer, northern watersnake, eastern milk snake, timber rattlesnake, ring-necked snake, copperhead, eastern hognose snake, common wormsnake, black ratsnake, eastern kingsnake, common five-lined skink, ground skink, six-lined racerunner and eastern box turtle.



An eastern milk snake found under a piece of tin at Thurmond Chatham Gameland in Wilkes County (Photo: Gabrielle Graeter)



Worm snake (Photo: Jeff Hall)



Eastern box turtle (Photo: NCWRC)



Eastern kingsnake (Photo: Jeff Hall)

Bat Surveys Yield Higher Capture Numbers and Increased Species Diversity

Each spring, Wildlife Commission biologists begin a series of bat survey projects, the results of which inform long-term population trends and provide insight into the distribution of rare species. This year, early season mistnetting surveys encountered rainy weather and few bats, but capture numbers and species diversity increased as the survey season progressed. Two notable mistnetting captures occurred during mountain surveys in June: a northern long-eared bat caught in Buncombe County and a juvenile little brown bat caught in Transylvania County. The northern long-eared bat capture was the first in the county since 2011. This bat was outfitted with a radio-transmitter and tracked to its roost under the loose bark of a red maple snag. The capture of a juvenile little brown bat presented the first sign of reproduction seen in this species in the mountains since 2012. Populations of both species have been greatly reduced in this region due to white-nose syndrome, so these captures are important for shedding light on survivor occurrence and condition. The field season marks its halfway point with bat surveys continuing until mid-summer.



A northern long-eared bat captured in Buncombe County as part of the Wildlife Commission's long-term bat monitoring efforts. (Photo: Katherine Caldwell)



The first juvenile little brown bat caught in the NC Mountains since 2012. (Photo: Katherine Caldwell)



Western Wildlife Diversity Technician, Kristi Confortin, tracks a radio-tagged northern long-eared bat. (Photo: Katherine Caldwell)

Robust Redhorse Sampling and Population Monitoring Continue on 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 partners in the Yadkin-Pee Dee Technical Working Group, including Duke Energy, S.C. Department of Natural Resources (SCDNR), and S.C. Aquarium.

During targeted spring surveys, they captured 41 robust redhorse in 48.8 hrs of electrofishing. This catch rate (0.84 fish per hour) is more than double that of any previous year (0.36 fish/hr was the previous record in 2014). These captures represent:

- 32 unique individuals of which 19 were previously untagged fish
- 12 females, 18 males, 2 unsexed juveniles
- 9 recaptures from previous years, a recapture rate of 32.1%, the lowest rate since 2008 (31.8%)
- 4 Phase II juveniles, spawned in spring 2015, stocked in November 2016

Two recaptured females were previously tagged with radio transmitters, tracked during movement studies conducted by the Wildlife Commission and N.C. State University in 2006-2008. One of those had not been seen since she was first tagged 12 years ago in 2006. Aging data indicate these fish are now at least 17-18 years old; the oldest recorded robust redhorse was around 27 years old.

Fish ranged in size from 15 to 30 inches (385 to 760 mm) in total length (TL), representing multiple age classes. Eggs from two females were crossed with six males for captive propagation this year, the first such success since 2015. The resulting fry will be grown out in ponds at the Wildlife Commission's McKinney Lake Fish Hatchery in Hoffman, and SCDNR's Dennis Center for population augmentation stocking.

Duke Energy biologists captured two more individuals near Blewett Falls dam, both males (503 to 518 mm TL). This brought the total number of robust redhorse captured in North Carolina in 2018 to 34 fish. An angler reported an additional individual in early April in an oxbow near the

confluence of the Little Pee Dee and Great Pee Dee rivers in South Carolina. Entangled in a commercial gill net targeting American shad, the animal was released alive and the angler submitted photos to SCDNR.

Fin clips were collected from all animals in N.C. and genetic analysis conducted by SCDNR this summer will determine whether the new fish are wild-spawned or products of previous augmentation efforts.



Wildlife Commission Biologist Brena Jones PIT-tags a new robust redhorse. (Photo: N.C. Wildlife Resources Commission)



Wildlife Commission Hatchery Superintendent Rick Bradford & SCDNR's Jarrett Gibbons collect eggs from a female Robust Redhorse. (Photo: N.C. Wildlife Resources Commission)

Staff Conduct Spring Bird and Squirrel Surveys in Western North Carolina

This year's golden-winged warbler surveys provided some insight into this declining warbler's use of the landscape. First, abundance of territorial males increased on the Beck tract, located on the Pisgah Game Land in Avery County from one to three. This is the second spring since Wildlife Diversity and Land and Water Access staff from the Burnsville Depot worked together in December 2016 to improve 15 acres for golden-wings.

Clifton Avery spotted two of these individuals within the managed areas and the third within the "historic" territory. In the Cheoah Mountains on the Nantahala National Forest, staff relocated three golden-winged warblers banded in 2017. One male was on the same exact territory as the previous year and even pushed out an earlier-arriving usurper. The other two were less than one-half and seven miles away from their original capture sites, giving biologists a glimpse of how these birds move around the landscape and use available habitat.

This season, staff banded eight new individuals, composed of six Second Year males and two After Hatch Year males, a change from the past two years when most of captures were older, After Hatch Year birds.

During game land surveys, staff documented the presence of noteworthy Species of Greatest Conservation Need (SGCN) and Knowledge Gap priority species. A cerulean warbler was present throughout the breeding season in an open oak woodland managed with silviculture and prescribed fire on Green River Game Land. A second cerulean warbler was present in rich woods adjacent to a woodland management unit at South Mountains Game Land. For the first time, they documented a golden-winged warbler and a Brewster's warbler (hybrid between golden-winged and blue-winged warbler) on Pond Mountain Game Land in a fallow field. In addition, black-billed cuckoos were found using wet shrub-sapling habitat on Pond Mountain.



This golden-winged warbler ground nest was nestled among stems of fleabane and golden-rod. The five nestlings shown here are approximately 7 days old (Photo: Chris Kelly)



For the first time, a golden-winged warbler was documented at Pond Mountain Game Land in June (Photo: Chris Kelly)

In initial surveys of two newer parcels on Pond Mountain (Lofflin and Braun) staff documented hermit thrush and yellow-bellied sapsucker. A nocturnal survey confirmed the presence of northern saw-whet owl on the Beck tract.

The bird team discovered the nests of several SGCN and Knowledge Gap species during the 2018 breeding season. Highlights include nests of red-headed woodpecker, Swainson's warbler, and prairie warbler at Green River Game Land; prairie warbler at Sandy Mush Game Land; black-capped chickadee and brown creeper on and adjacent to William H. Silver Game Land; and golden-winged warbler in the managed section of the Beck tract. Active nests of two newly banded golden-winged warblers were found in the Cheoah Mountains, one in a log landing and another on the edge of a new timber harvest unit. Nests will be placed in the collections at the North Carolina Museum of Natural Sciences in Raleigh.

The Pond Mountain Game Land checklist is complete. Staff and High Country Audubon chapter birders have documented 122 bird species on the game land. Local artist Jan Hayes painted a vesper sparrow for the checklist's cover art. Birders can download and print a PDF of the checklist [here \(ncwildlife.org/outdoor-activities\)](http://ncwildlife.org/outdoor-activities).

Fifteen peregrine falcon pairs attempted nesting this season. Six successful nests produced 15 offspring. Staff worked with land managers to address signage needs and emerging issues, such as disturbance from drones and slacklin-

ing. Six new bald eagle nests were documented in the mountains.

Dr. Cordie Diggins conducted northern flying squirrel acoustic surveys and research in Great Smoky Mountains National Park this spring. Surveys filled in distribution gaps and revisited historic records in the Park.

In June, Wildlife Commission staff joined Dr. Diggins to conduct an experiment to determine optimal microphone height for detecting flying squirrel vocalizations, placing microphones at heights of 1 meter and 5 meters in conifer and hardwood forests.



A black-capped chickadee cavity nest in a yellow birch snag at William H. Silver Game Land (Photo: Chris Kelly)



Red-headed woodpecker (Photo: Clifton Avery)



A prairie warbler incubating eggs on Sandy Mush Game Land (Photo: Clifton Avery)



This Brewster's warbler found at Pond Mountain Game Land in early June was the first individual of the Vermivora genus documented since NCWRC began surveys in 2010. (Photo: Chris Kelly)

Hellbender “Huts” Installed on Five Western North Carolina

In the second quarter of 2018 Wildlife Diversity staff began work on a multi-state grant project for Eastern Hellbender conservation, a Species of Greatest Conservation Concern in the 2015 N.C. Wildlife Action Plan, a state Special Concern species, and a federal Species of Concern petitioned for listing. North Carolina objectives include installing and monitoring up to 50 artificial nesting habitats (“hellbender huts”) on private land in five Western



Wildlife Diversity technician, Charles Lawson, loading hellbender artificial nest huts into canoe for river installation. Top right photo: Close up view of an artificial nest hut. (Photos: Lori Williams)



Hellbender (Photo: Lori Williams)

North Carolina streams. Other states in the species’ range have had success with the structures. A previous attempt in North Carolina by project partners using an earlier prototype of the hellbender hut was largely unsuccessful as most of the huts were destroyed or washed away due to high flows and swift currents that are typical in the mountain region.

Staff, volunteers and partners are now testing an improved design that should better withstand the region’s dynamic, high-gradient systems.

In addition to researching the stability and resiliency of the huts in NC hellbender streams, staff are exam-

ining hellbender use, nesting ecology, nest success, and assessing what kinds of habitats are best for deploying these structures. Overall goals include increasing available hellbender nesting habitat in areas that may be lacking, restoring connectivity between potentially isolated populations, and assessing the feasibility of using hellbender huts as a non-invasive, long-term monitoring tool rather than, or in addition to, regular snorkel survey techniques. Staff, volunteers, landowners and partners will monitor the huts and collect habitat and water quality data throughout the summer, increasing in frequency during the prime hellbender breeding (late August through September) and nesting season (September through mid-November).



Underwater view of artificial nest hut on river bottom. (Photo: Lori Williams)