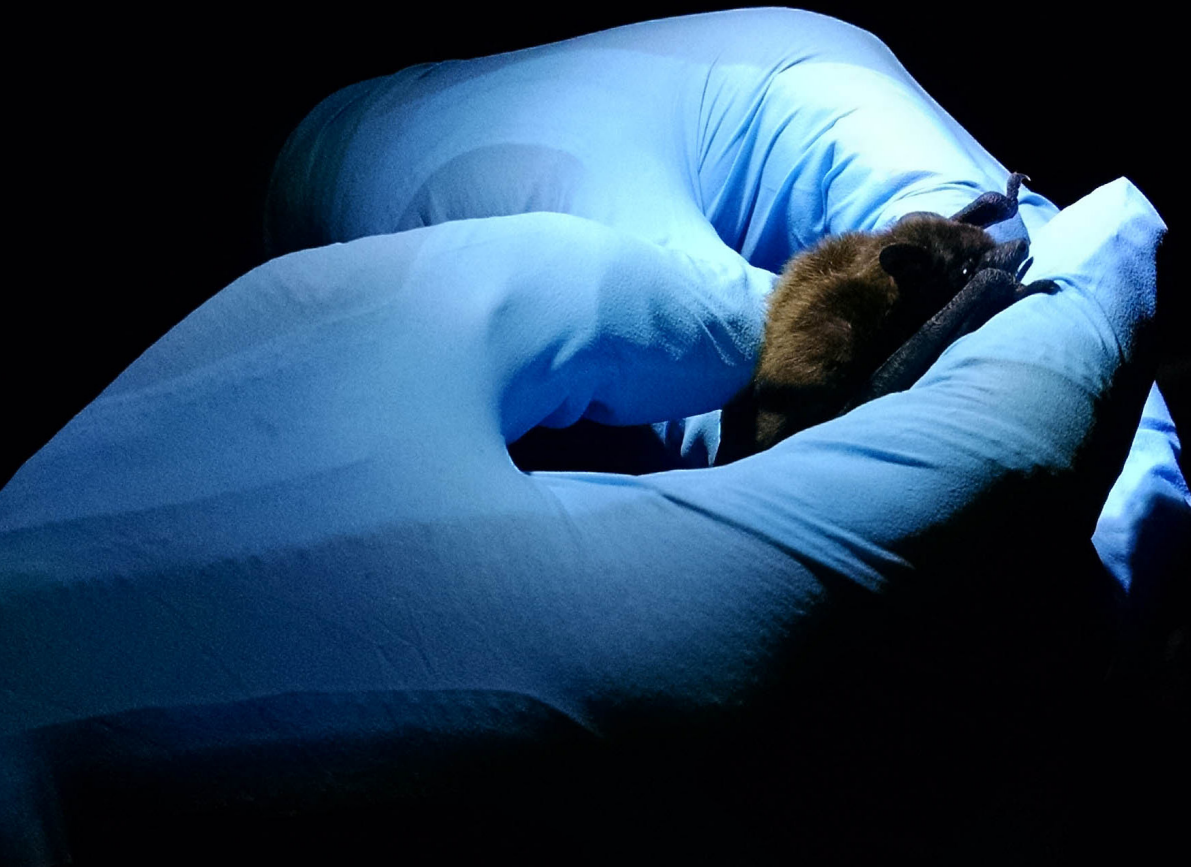




*North Carolina
Wildlife Resources Commission*



Wildlife Diversity Program Quarterly Update

Second Quarter 2016



Brandon Sherrill holding a little brown bat at Pee Dee NWR (Allison Medford)



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Waterbird Surveys Completed Along North Carolina Coast

Waterbirds Project personnel completed spring surveys of breeding populations of American oystercatchers, Wilson's plovers, piping plovers and least terns. Surveys were conducted in coordination with coastal partners in North Carolina, as well as partners within the breeding range of these species along the western Atlantic coast. Survey protocol is standardized and statistically based so all data within the birds' breeding range are compatible.

Personnel surveyed all barrier, marsh, shell and dredged-material island habitat in North Carolina's

coastal region. They collected all data by late June and currently are entering the data in the Wildlife Commission's database system.

Preliminary estimate of piping plover pairs detected from the June 1-9 census window (n=44) was lower than in 2015 (n=55). Weather and predators seem to have had the greatest impacts on beach-nesting birds this season.

Outreach to the public by Waterbirds Project personnel and volunteer stewards during Memorial Day and July 4th holiday weekends reduced disturbance to many beach-nesting birds.



Piping plover detected on a northern, undeveloped barrier island (Photo by Annika Andersson)



Wilson's plover detected on a southern, developed barrier island (Photo by Annika Andersson)

April - June 2016

N.C. Wildlife Resources Commission



Kemp's Ridley Tag from 1998 Recently Submitted

Wildlife Commission sea turtle biologists received information recently that a Kemp's ridley sea turtle PIT-tagged along a North Carolina beach in 1998 was recently seen nesting in Rancho Nuevo in Tamaulipas, Mexico.

Researchers with the Rancho Nuevo monitoring project were monitoring nesting Kemp's ridleys on the beach when they found a turtle with a PIT tag that was placed intramuscularly in the upper left front flipper. They didn't recognize the tag so they consulted the Cooperative Marine Turtle Tagging Program at the University of Florida, which is a global clearinghouse of sea turtle tag information. The tag number was from a juvenile Kemp's ridley that was captured incidentally by



Juvenile Kemp's ridley just before release to the ocean at Holden Beach, after having a fishing hook removed from its mouth.

a recreational angler at the Holden Beach Fishing Pier in early August 1998. Two local veterinarians helped remove the hook and inserted the tag. The turtle was released back into the ocean with the help of Holden Beach sea turtle volunteers. At the time the turtle was released, its carapace measured 30 cm in length. When the turtle was seen in Rancho Nuevo earlier this spring, its carapace measured 64 cm in length.

This tag return is one of the longest periods recorded between time of first tagging and last observation in the wild for North Carolina turtles —17 years. While Kemp's ridley sea turtles are occasional nesters on North Carolina beaches, they nest primarily along beaches spanning the Mexico-Texas border in the Gulf of Mexico.

Beaver Management for the Conservation of Dwarf Wedgemussel Habitat

Over the past few months, Wildlife Diversity Program staff has been working with game land management staff and USDA APHIS staff to coordinate and conduct beaver management activities in the Tar River basin. These efforts represent a focused effort to return flowing conditions to waterways known to harbor dwarf wedgemussel and protect timber stands.

Staff will continue to monitor mussel populations in habitat restoration areas to assess the feasibility of controlling beaver populations in sensitive areas.



Aquatic Wildlife Diversity Biologist Tyler Black next to a sizeable beaver dam on Shocco Creek Game Land. (Photo by Tom Fox)

Using Frogloggers to Detect River Frogs

During the spring, Wildlife Commission biologists deployed automated recorders, called frogloggers, along the Lumber River to detect



River frog (Todd Pierson, 2009)

river frog populations. River frogs were last seen in North Carolina in 1975. This species once inhabited rivers and ponds in the southeastern portion of the state although few historical records exist. Reasons for the loss of this frog species are unknown, but may have included disease, overharvesting or changes in water quality or riverine habitat.

Over the last five years, biologists have searched historical sites and nearby appropriate habitat by canoeing rivers and looking for adult frogs

and tadpoles. This year, they began using frogloggers to try to detect river frogs calling in remote places where monitoring using other methods would be impossible. They placed 12 loggers along the Lumber River in backwaters, oxbows, and borrow pits where river frogs were last seen over 40 years ago. Loggers record on a set interval every night, all night, and biologists will retrieve and analyze the sound files later this summer.

In the future, biologists will deploy more frogloggers in locations of suitable habitat in the hopes of re-discovering river frogs in North Carolina.



Deploying a frog logger to detect river frogs on a typical backwater of the Lumber River.

Assessing Migratory Bird Habitat Using Weather Surveillance Radar

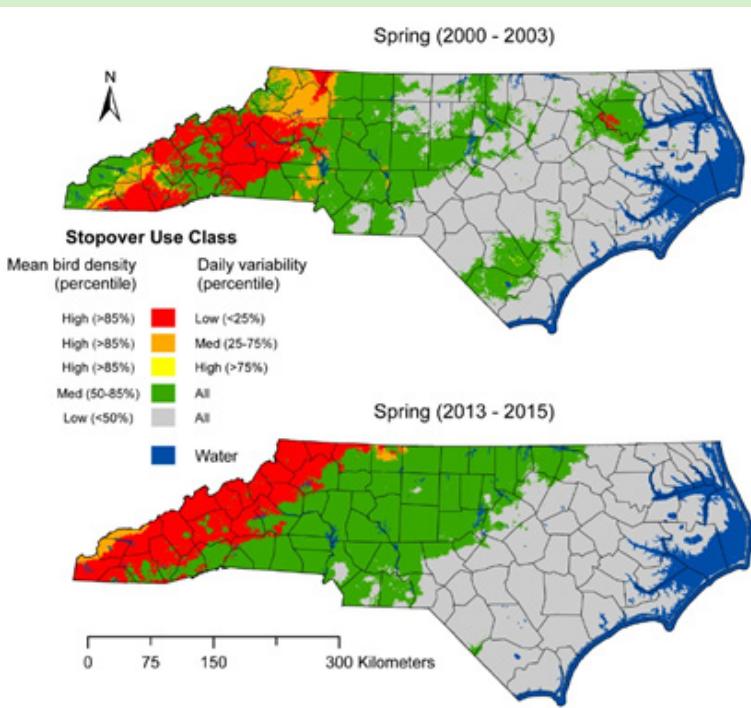
Through a Wildlife Commission cooperative grant, researchers from the University of Delaware recently used a national network of weather surveillance radars to assess migratory bird habitat use in North Carolina. This unique tool detects nocturnally migrating landbirds as they depart en masse from stopover areas, which are sections of woods, wetlands, and other habitats that provide food and shelter for migrating birds. Modeling analysis revealed that more birds consistently used landscapes that had greater forest cover (pine and hardwoods), greater canopy heights, less agriculture and were located closer to the coast. Surprisingly, these night migrating bird species also used stopovers in urban areas and underlines the importance of city parks.

From 2001-2011, migrant bird densities increased at both the extreme western portion of the state and in areas close to the coast; however, these densities declined in the spring and fall

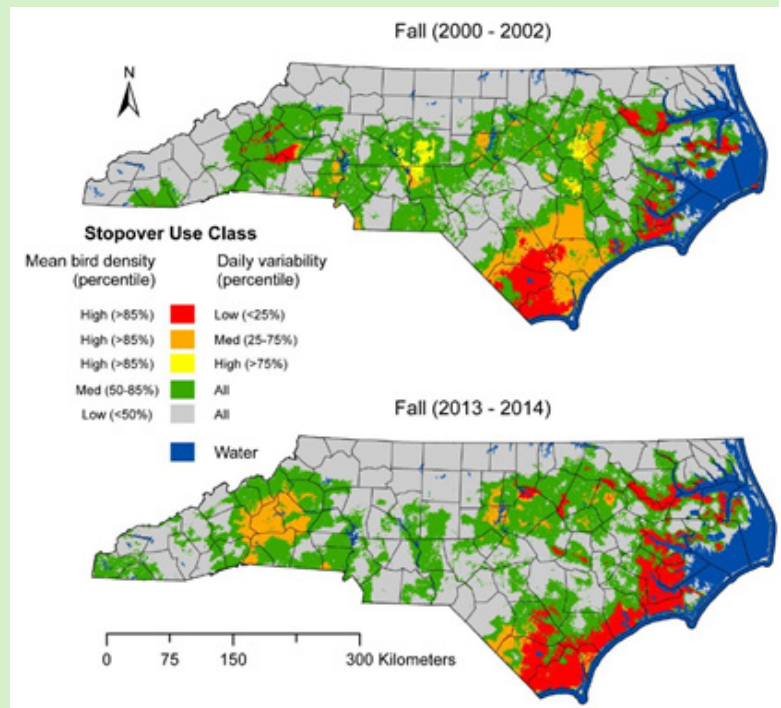
in the southern portion of the state. Biologists attribute these declines primarily to the loss of suitable habitats.

Observations made using these weather surveillance radars can serve as a baseline of the status and aggregate distribution of migratory landbird species – many of which are of conservation concern – and may facilitate long-term monitoring and fill critical data gaps.

Collaborators recommend that future research focus on exploring migrant distributions over longer time scales (e.g., beginning in 1995) and with greater frequency, such as annually. Research also should focus on landscapes with high turnover, for example regions with active timber industry and development. Through this research, biologists hope to address questions about behavioral shifts in habitat use and population regulation patterns in response to landscape change, weather and climate drivers.



Predicted density and variability of use by migrating birds during the spring in North Carolina.



Predicted density and variability of use by migrating birds during the fall in North Carolina.

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

Surveys and research

Wildlife Diversity Program staff surveyed a privately owned tract of land in Pender County for priority species. Staff discussed management activities benefiting reptiles and amphibians at the site, with a focus on pond-breeding amphibians.

Staff conducted bog turtle surveys in May and June. Many sites were covered during these days and in-

cluded many partners helping with the effort. Additionally, during one of the bog turtle survey weeks, Wildlife Commission staff assisted with a bio-blitz effort at Mount Mitchell State Park.

Head-starting efforts for three populations of the gopher frog continued with Wildlife Commission staff, staff at the Fort Fish Aquarium, and staff at the NC Zoo. This effort is intended to



augment wild populations, which are dwindling at all of these locations. Staff continued upland snake surveys, as well as monitoring coverboard transects at several Coastal Plain sites including Croatan, Holly Shelter, Stone's Creek, Camp Lejeune and Sutton Lake.



Blue Ridge two-lined Salamander found during mountain survey work (Photo by Jeff Hall)



Oak toad found during surveys in the Coastal Plain (Photo by Jeff Hall)



Ringneck snake found during bio-blitz at Mount Mitchell State Park (Photo by Jeff Hall)



Coachwhip found during upland snake surveys in the Coastal Plain (Photo by Jeff Hall)

North Carolina Partners in Amphibian and Reptile Conservation (NCPARC) News Workshops, training and meetings

NCPARC held its annual meeting in April at the Eastern 4-H Center in Columbia, N.C. Approximately 60 participants attended the two-day meeting. The meeting included two guided field tours of Pocosin Lakes National Wildlife Refuge, workshops,

diverse talks, and a poster session.

Presentations also were given on Wildlife Commission reptile and amphibian projects at the agency’s Wildlife Management Division Meeting, UNC-W Herpetology class, Onslow Bight Conservation Forum, Harris

Lake County Park Longleaf Festival, and for the NCSU wildlife students.

In June, staff participated in training 50 educators through the HERP (Herpetological Education through Rural Places and spaces) project at Haw River State Park.



Several workshops were conducted during the two-day meeting, including this workshop which focused on understanding the variety of sampling methods used for surveying reptiles and amphibians (Photo by Jeff Beane)



NCPARC attendees participated in two optional field trips as part of the annual meeting (left photo); Spotted turtles spotted during one of the field trips. (Photos by Jeff Beane)



Wildlife Commission staff conducted workshops on reptiles and amphibians at Carolina Beach State Park and Goose Creek State Park. Participants found this scarlet snake during the workshop at Goose Creek. (Photo by Jeff Hall)



Wildlife Diversity Program staff also assisted LE staff with a herp training day for new law enforcement recruits. (Photo by Jeff Hall)

Eno River Fish and Crayfish Community Surveys

In May and June, fisheries biologists with the Wildlife Commission completed the fourth year of hydrilla treatment surveys for fish and crayfish in the Eno River. The aquatic community surveys will be used to examine the response of the community to chemical treatment of hydrilla, an aquatic invasive weed. Staff conducted surveys at five sites along the Eno River and staff collected over 10,000 fish (35 species) and over 550 crayfish (3 species). This survey marks the first posttreatment survey.



Bull chub captured during Eno River electro-fishing survey (Photo by Tom Fox)



Eno River fish community survey and workup station (Photo by Tom Fox)

Yellow Lance Surveys and Augmentation Monitoring in the Tar River Basin

In May and June, Wildlife Diversity Program staff surveyed rivers and streams throughout the Tar River basin, searching for the yellow lance — an elongated freshwater mussel. Staff is updating historical records, as well as discovering new locations that expand the known range of the yellow lance. In June, biologists surveyed a new location and discovered 50 yellow lances ranging across multiple size classes, which indicates a healthy population with natural recruitment. Surveys for the yellow lance will continue throughout this year and will also include sites in the Neuse River basin.

In 2015, the Wildlife Commission released propagated mussels into Sandy Creek to bolster the existing, dwindling yellow lance population. In June, one year after the initial release, biologists conducted the second survey of these sites to assess survival and growth. During the survey, they recaptured 34 mussels; almost half of these mussels were new recaptures and not found during the first survey 10 months ago.

The recaptured yellow lances looked healthy, exhibited growth since the stocking event, and approximately half of the mussels were gravid, which bodes well for any future augmentation efforts in the area. These augmentation sites will continue to be monitored on a yearly basis.



Yellow lance and Atlantic pigtoe (center 4 mussels) collected during a yellow lance survey in the Tar River basin. (Photo by Tom Fox)



Aquatic Wildlife Diversity Biologist Tyler Black (far) and Intern Anderson Tran (near) conduct a survey for yellow lance. (Photo by Tom Fox)

Robust Redhorse Sampling Effort Continues on Pee Dee River

The collaborative sampling effort for Robust Redhorse continued on the Pee Dee River this spring. Wildlife Diversity Program biologists captured 17 robust redhorse downstream of Blewett Falls Dam during the spawning season.

Four robust redhorse were previously untagged and 13 were among year recaptures, which means the among year recapture rate continues to be very high at 76.4 percent. Multiple age classes were present, including a juvenile, and the total length ranged from 13 inches to 30 inches (334 to 768 mm) total length.

Biologists were unable to spawn robust redhorse for the augmentation program this spring. They still have 1,500 “phase II” fingerlings at both the Wildlife Commission and S.C. Department of Natural Resources (SCDNR) hatcheries for release this fall.

In addition, two juvenile robust redhorse were collected in South Carolina. The first was collected in April by the SCDNR staff in Winyah Bay at the mouth of the Sampit River. The fish, which measured 6 ½ inches (165mm) in total length was collected using boat electrofishing and is the right size for the robust redhorse fingerlings that were stocked last fall.

The field crew did not get a fin clip so Wildlife Commission biologists do not know if it was one of the fish they stocked, but they will get tissue samples in the future. In June, the second juvenile, which measured 12 inches (307mm) in total length was also captured by SCDNR while electrofishing in the Pee Dee River. It was collected about 24 rkm downstream from the SC Hwy 41/US 378 crossing, near the Florence/Williamsburg/Marion county



Ryan Heise, aquatic biologist with the Wildlife Commission, with a robust redhorse (Photo by Melissa McGaw)

lines. This is the third juvenile collected in the Pee Dee River system this year.

Genetic analysis, to be completed this summer, will determine if the two robust redhorse that were fin clipped were stocked individuals.

Biologists Collect 10 Species during Mussel Surveys on Little River

Wildlife Diversity Program staff completed mussel surveys at 12 sites on the mainstem of the Little River (Yadkin-Pee Dee Basin) this spring. The Little River is a priority river due to the number of rare species that are located in this system.

Biologists collected 10 species during surveys—five of them are state listed (endangered or threatened), one special concern, and one significantly rare, as determined by the Natural Heritage Program. Biologists were disappointed to note that most of the rare species were represented by single individuals at a site, and excessive amounts of sediment was noted at many sample areas.

Roanoke Logperch Population Genetics Study Enters Second Year

This spring, Wildlife Diversity Program biologists began the second year of a Roanoke logperch population genetics study by collecting 75 of the federally endangered fish from the Mayo, Smith and Dan rivers in the Piedmont, as well as Big Beaver Island Creek in Rockingham County. With the assistance of Dr. Jamie Roberts from Georgia Southern University, Wildlife Commission staff began the study in 2015 to understand the Roanoke logperch population better, with the goal of recovering the species. In spring 2015, staff collected 23 individuals from the Dan River Basin.

Duke Power biologists first discovered the Roanoke logperch in North Carolina in the Dan River near Eden

in 2007. From 2007 to 2012, through various surveys, biologists captured 22 fish from four additional streams in the state, including the Smith and Mayo rivers.

Recovery of the species in North Carolina likely will necessitate a combination of habitat restoration, barrier removal and population augmentation to improve demographic and genetic viability. Prerequisite for any of these activities is a good understanding of 1) how many different populations of Roanoke logperch occur in North Carolina (i.e., the population structure of the species), 2) evolutionary relationships among North Carolina populations and between North Carolina and Virginia populations,

and 3) the current size, status and viability of populations. Dr. Roberts has developed a suite of microsatellite DNA markers that will provide high resolution for defining population structure, mapping genetic relationships between populations, and measuring genetic diversity and effective population size in Roanoke logperch. These population genetics tools will provide valuable information toward these three key information gaps.

Combined with 2015 collection of 23 fish, the 75 collected during spring 2016 put the Wildlife Commission well on its way of reaching a goal of 200 Roanoke logperch collected from North Carolina.



Roanoke Logperch collected from the Smith River, June 2016

Golden Eagle Update

Golden eagles left North Carolina for their breeding grounds in Canada in early spring, but GPS-transmitted eagles left Wildlife Diversity Program staff with a lot of telemetry data to examine. Using GIS, staff began to examine and delineate roost sites deemed to be important to wintering eagles. Important roosts were those used repeatedly by an individual eagle or used by more than one of the transmitted eagles. Staff is sharing findings with partners in the conservation community who can help protect important winter roost sites.

Crayfish Study Begins on Central Regions Drainages

Wildlife Diversity Program biologists began a multi-year distribution and status study of crayfishes encompassing all four drainages in the central region – Cape Fear, lower Yadkin-Pee Dee, Lumber and White Oak – with a focus on the Piedmont and Sandhills portions of the Cape Fear basin.

Approximately half of North America’s known crayfish species are considered imperiled, but few are protected by federal or state regulations when compared with other aquatics such as freshwater fish or mussels. North Carolina has 40 described native species, several awaiting description, and three exotics (red swamp crayfish, rusty crayfish, virile crayfish). Currently, only the red swamp is known to inhabit the central region. In addition to competition from exotics, native mussels are threatened by anthropogenic factors degrading many aquatic habitats including development- and agriculture-related impacts.

Of 11 species potentially occurring in this year’s study area, two are NC endemics (Carolina ladle crayfish, Sandhills spiny crayfish) and are listed by the N.C. Natural Heritage Program as State Rare. Prior to instream work, a comprehensive mapping and gap assessment of known records in North Carolina was completed for each species (Figure 1 below).

From April through June, 24 sites were surveyed, primarily in the Piedmont; no exotic crayfishes were collected. Five species have been collected, including the Carolina ladle crayfish, variable crayfish, sickle crayfish, Rocky River crayfish, and White River crayfish.

Sampling is ongoing through end of year, along with verification and curation of vouchered specimens at the N.C. Museum of Natural Sciences. Length-frequency, sex, reproductive condition and habitat data are concurrently collected and analyzed for all individuals and sites.

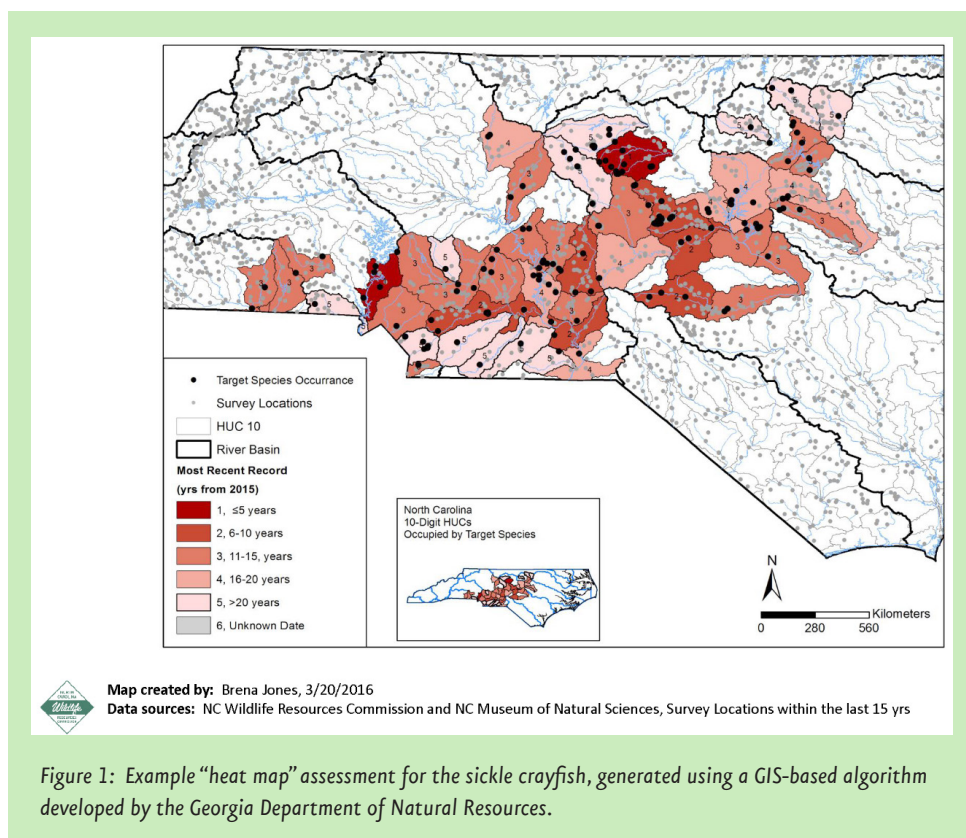
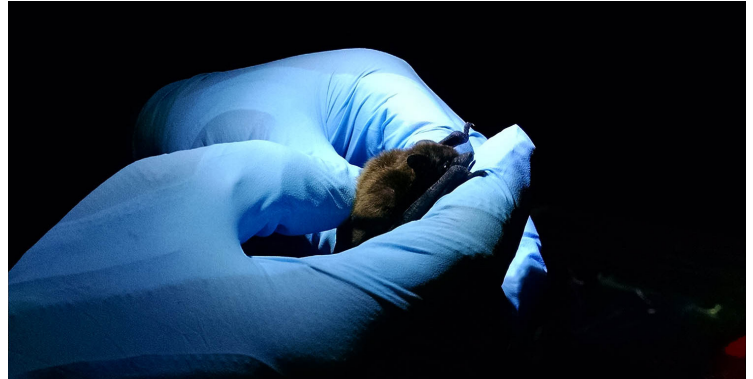


Figure 1: Example “heat map” assessment for the sickle crayfish, generated using a GIS-based algorithm developed by the Georgia Department of Natural Resources.

Piedmont Bat Mistnetting Conducted this Spring

Wildlife Diversity Program biologists from around the state netted bats at the Pee Dee National Wildlife Refuge in Anson County this spring.

Though the overwhelming bulk of the bats captured were Eastern red bats, they did catch one evening bat and one little brown bat, which looked healthy and free of any signs on white-nose syndrome.



Brandon Sherrill holding a little brown bat at Pee Dee National Wildlife Refuge (Photo by Allison Medford)

Riparian Breeding Bird Surveys Conducted this Spring

Wildlife Diversity Program biologists on the Coastal Plain and Piedmont surveyed stretches of multiple rivers throughout the state to count particular riparian species. Using canoes and kayaks and the basic Breeding Bird Survey protocol, biologists conducted surveys that focused on cerulean warbler, Swainson's warbler, and Kentucky warbler.

Although no focal species were heard during all surveys, many of the secondary species were abundant. Some of those species included northern parulas, Acadian flycatchers and prothonotary warblers.



Prothonotary warbler



Red-winged blackbird (Photo by Walter Siegmund)

Grassland Bird Surveys Conducted this Spring

In order to assess presence and relative abundance of grassland bird species in the Piedmont, Wildlife Commission biologists conducted road survey point counts in many of the rural Piedmont counties.

Surveys consisted of 3-minute point counts at predetermined points at least a half mile apart. Common species seen and heard were blue grosbeak, Eastern meadowlark and red-winged blackbird.

Eastern Hellbender Research Project Begins in Western North Carolina

Western region staff began a new research project on the state special concern Eastern hellbender. The goal is to study population and habitat ecology in the French Broad River drainage and is a collaborative effort with researchers from Wingate University and the curator emeritus of the North Carolina Zoological Park.

The project focuses on some of the most vulnerable and challenging to find of all hellbender age classes—gilled larvae, specifically yearlings to two-year-olds. Through repeated,

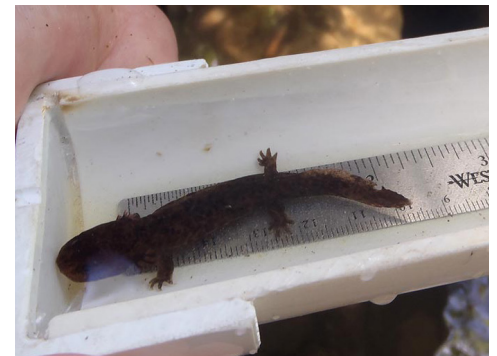
standardized snorkel surveys of stream cobble beds, staff will be able to analyze occupancy rate and detection probability of larval hellbenders as well as examine their habitat use, spatial distribution, and habitat covariates such as substrate composition and water chemistry. As part of the study, staff also are collecting skin swabs of hellbender larvae for disease surveillance and tissue samples for future genetic analysis.

This summer's work serves as a pilot study with seven individual

streams and 14 sites surveyed three times each over the course of the season. North Carolina is one of very few states where hellbender nests and larvae can still be found, although typically with much effort in all but the densest populations. Most hellbender survey methods target larger, adult animals. However, young animals can tell biologists more about the status of local populations and whether successful reproduction is occurring—valuable information to have for species conservation.



Staff collects a skin swab from state special concern Eastern hellbender yearling as part of statewide amphibian disease surveillance efforts. (Photo by John Groves)



State special concern Eastern hellbender yearling found during snorkel surveys to study population occupancy and habitat ecology for this vulnerable age class. (Photo by John Groves)

Peregrine Falcon Nest Season Breaks Record

Peregrine falcons had a record-breaking nest season, producing 20 offspring. Wildlife Diversity Program staff also confirmed a report of a new nest in Transylvania County.

Staff compiled peregrine nesting data from the U.S. Fish and Wildlife Service 2003-2015 post-delisting monitoring period and prepared a manuscript. North Carolina's peregrine falcons made 139 nesting attempts and produced 171 young during this 13-year time period. While productivity rates are acceptable, nest success remains low, averaging 56%.



Peregrine falcons attempted nesting on the ledge nestled beneath this large overhanging roof at a newly discovered nest site in Transylvania County. (Photo by Chris Kelly)



Peregrine falcon

Staff Continue Golden-winged Warbler Monitoring in the Mountains

Wildlife Diversity Program staff continued efforts to monitor return rates of golden-winged warblers and their hybrids in western North Carolina. As part of the Golden-winged Warbler Working Group, staff delineated focal areas for conservation of these slim, grayish birds with golden marks on their heads and wings.

The golden-winged warbler is listed as a species of special concern in North Carolina, as well as a Species of Greatest Conservation Need as identified in the N.C. Wildlife Action Plan. Four of these focal areas are in western North Carolina. For a few years, staff with Audubon North Carolina and Appalachian State University has been

monitoring the return rates of these birds in Focal Areas SA3 and SA4, which include the Roan Highlands and High Country in northwestern North Carolina mountains. Members of the working group were interested in such metrics for warblers using timber harvest units in Focal Areas SA1 and SA2, which include the southwestern North Carolina mountains.

This past spring, Wildlife Commission staff fitted six golden-winged warblers with color bands. Staff captured the birds in mist nets using an audio-lure and a decoy. They banded four "after second year" males, one "sec-

ond year" male and one "second year" female. Staff fitted each bird with a U.S. Fish and Wildlife Service aluminum band and orange band on the right leg to mark the 2016 cohort, plus one color band on the left leg. In spring 2017, staff will return to survey these areas.



Golden-winged warbler (Photo by Chris Kelly)

Summer Bat Surveys Kick Off Across the State

As bat populations in Western North Carolina continue to decline due to white-nose syndrome (WNS), a deadly fungal disease, Wildlife Diversity Program biologists are expanding survey efforts across the state. For the first time in recent years, biologists added bat mistnetting surveys on the Coastal Plain and Piedmont. Though a Stanly County mine tested positive for the fungus that causes WNS in 2015, these areas are not known to harbor the disease and may serve as critical refuges for WNS-affected species.

Biologists surveyed sites in Gates, Beaufort, Craven, Anson and Rich-

mond counties, catching over 80 bats of eight species. Notable captures included a northern long-eared bat in Gates County, tri-colored bats in Beaufort and Anson counties, and a little brown bat in Richmond County. These three species have experienced the steepest population declines from WNS. Staff will survey an additional 20 sites in Western NC as part of a long-term effort aimed at evaluating population trends in the wake of WNS. Bat mistnetting surveys will continue to occur across the state in the future.

In addition to mistnetting surveys, several other bat surveys kicked

off in May, including the N.C. Bat Acoustic Monitoring Project. This program relies on citizen scientists to record bat echolocation calls by driving routes throughout Western and entered its sixth season this summer. Another citizen science project launched its pilot year this season and will be critical in locating and monitoring bat roosts across the state.

Biologists continue to discover more about the distribution and abundance of bats across North Carolina in the hopes that some areas harboring WNS-affected species remain WNS-free.



Above photo: Wildlife Diversity Technician Joey Weber, evaluates the wing of a southeastern bat. Top right photo: Little brown bat caught during a summer mistnetting survey at Pee Dee National Wildlife Refuge. Bottom right photo: Northern long-eared bat caught during a summer bat mistnetting survey. (All photos by Katherine Caldwell)

