



NORTH CAROLINA WILDLIFE RESOURCES COMMISSION

# WILDLIFE DIVERSITY PROGRAM QUARTERLY REPORT

January-March 2019



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Cover photos (clockwise): Four-toed salamander (Lori Williams); Tern Turret (NCWRC); Pygmy sunfish (Brena Jones); and Tri-colored bat cluster (Katherine Etchison)

## “Tern Turret” Provides Least Terns with Alternative Nesting Option

In 2017 the North Carolina Aquarium at Pine Knoll Shores discovered a colony of least terns nesting on the gravel rooftop of the aquarium. Wanting the terns to successfully fledge chicks, the aquarium reached out to the Wildlife Diversity Program’s Waterbirds Investigations and Management Project for advice on how to make their roof tern friendly. Since that time, N.C. Wildlife Resources Commission (NCWRC) and aquarium staff have worked together to promote nesting by least terns on the rooftop, which has been dubbed the “tern turret.”

In March, staff from both NCWRC and the aquarium began preparing the tern turret for the upcoming nesting season. They placed least tern decoys on the rooftop to attract nesting birds to the protected breeding grounds of the aquarium roof. They also added 30 concrete blocks to provide cover once the chicks hatch.



*Least tern eggs in the sand*  
(Photo: Annika Anderssen)

During the summer, temperatures on rooftops can be high, and an ordinary roof provides little to no shade. The shadows cast by the blocks will give chicks a place to escape the blazing heat. In 2017 the tern turret had 18 nests, which grew to 24 nests in 2018. This year, staff from the aquarium and the Wildlife Diversity Program will monitor the colony’s success via eight cameras that have been strategically placed around the roof.



*Least tern* (Photo: Annika Anderssen)



*Wildlife Diversity Program technician, Nick Jennings places least tern decoys on the roof of the North Carolina Aquarium at Pine Knoll Shores.* (Photo: NCWRC)

## Beach Renourishment Projects Can Impact Sea Turtle Nesting

Sandy oceanfront beaches of North Carolina are used as nesting habitat by four sea turtle species: loggerhead, green, Kemp's ridley and leatherback. Turtles generally lay their eggs in the flat open sand between the high tide line and the base of the primary dune. The width of this area is affected by various environmental forces, including storms, tidal cycles, and beach inlet dynamics.

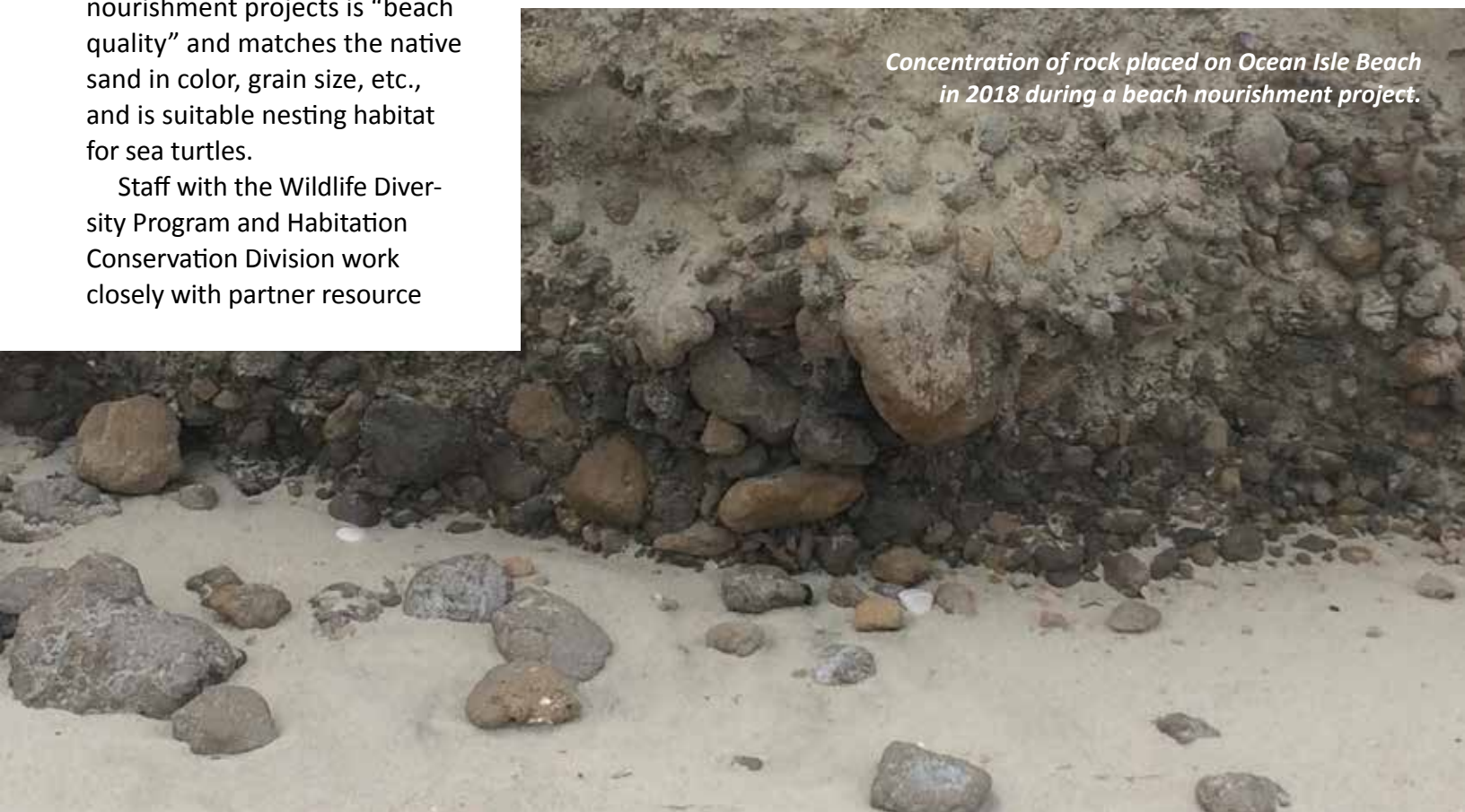
In response to excessive erosion, beach towns undertake beach nourishment projects, where sand is pumped up from the nearby ocean floor and placed below the dunes, to widen the beach strand. Normally, the sand pumped up for nourishment projects is "beach quality" and matches the native sand in color, grain size, etc., and is suitable nesting habitat for sea turtles.

Staff with the Wildlife Diversity Program and Habitation Conservation Division work closely with partner resource

agency personnel from U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and the N.C. Division of Coastal Management to inspect nourishment projects to ensure that the pumped sand is of sufficient quality to foster successful sea turtle egg laying and egg incubation. If these inspections reveal issues with the pumped sand, further cooperation is needed to develop plans to mediate those issues. For example, in 2018, a nourishment project on Ocean Isle Beach resulted in heavy concentrations of rocks placed on a section of the eastern end of the island's beach, which was identified by a Wildlife Diversity Program Biologist during an inspection visit. The presence of the rocks on this area of

beach would impede the ability of reproductive sea turtles to successfully excavate nest cavities in the sand. Subsequent coordination with the various regulatory agencies and the town resulted in two rock removal efforts to help ensure that this area of the beach could be used by nesting sea turtles. Increased erosion of coastal beaches is anticipated to occur in the future, and in response, more nourishment projects are also likely to occur. Wildlife Diversity Program staff will continue to inspect beach nourishment projects to ensure that suitable sea turtle nesting habitat is maintained on the state's coast.

*Concentration of rock placed on Ocean Isle Beach in 2018 during a beach nourishment project.*



## Loggerhead Shrike Monitoring Continues in Southeastern North Carolina

NCWRC Wildlife Diversity Program staff ramped up their monitoring and banding efforts for loggerhead shrikes in early 2019. This species has experienced one of the highest reported regional population losses in the Atlantic Coast from 1970-2014. In response, Wildlife Diversity Program personnel have joined forces with the Loggerhead Shrike Working Group to develop coordinated research and conservation activities across the species' range.

Given the shrike's predatory instincts, the most successful method of capture is a modified potter trap baited with a live mouse, which is itself protected inside a smaller cage.

In March 2019, staff banded 21 shrikes (12 male, seven female, and two of unknown gender) across five southeast

North Carolina counties. They have also located and are actively monitoring 13 active nests.

This on-going project will allow them to model the shrikes' full annual life cycle by providing information about connections between

breeding and wintering populations, genetics, juvenile dispersal, nesting success, and annual survivorship. This effort will help them identify factors that contribute to shrike population declines and their recovery.



*Color banding adult loggerhead shrike near Wilmington. (Photo: Melissa McGaw)*



## NCPARC Joint Annual Meeting was a Huge Success

In February, N.C. Partners in Amphibian and Reptile Conservation (NCPARC) met jointly with Southeast PARC (SEPARC). The meeting was held at the Blue Ridge Assembly in Black Mountain, marking the second time the regional meeting was held in North Carolina. It also marked the 10-year anniversary of the first time the groups met jointly in North Carolina. The meeting was extremely successful, attracting the largest num-

ber of attendees ever at a SEPARC or NCPARC meeting with more than 340 registrants.

Participants were treated to an excellent keynote speaker, Joe Pechmann from Western Carolina University, over 40 oral presentations, over 60 posters, workshops and task teams before and during the meeting. There was also a trivia contest and socials, as well as a range of field tours on the final day of the meeting. To view a full agen-



da of the meeting, as well as abstracts for the presentations and posters, visit the [SEPARC website](http://separc.org/meetings) (<http://separc.org/meetings>)

## Venomous Reptile Training Conducted for Agency Staff

Wildlife Diversity Program staff assisted with three training sessions for Wildlife Management and Law Enforcement Divisions on venomous reptiles. In addition, staff conducted a training for D6 and D7 Law Enforcement Officers, specifically focused on conservation of reptiles and amphibians, and those species of particular concern from a poaching and illegal wildlife trafficking perspective. All of these training sessions were well attended with over 50 staff present at each event.



*Law Enforcement officers in Districts 6 and 7 learned the appropriate techniques to handling venomous snakes. (Photo: Jeff Hall)*

## Field Surveys for Upland Snakes and Amphibians Continue

This quarter was an especially busy field time for Wildlife Diversity Program staff who worked with species identified as Species of Greatest Conservation Need in the N.C. Wildlife Action Plan. Staff set up trail cameras and surveyed for upland snakes, especially eastern diamondback rattlesnakes, as well as surveys on several amphibian species such as the gopher frog, ornate chorus frog and Mabee's salamander. Field sites included Croatan National Forest, Camp Lejeune, Holly Shelter Game Land, Military Ocean Terminal at Sunny Point (MOTSU) and several others. Gopher Frogs were head-started from three coastal locations including Croatan, Holly Shelter and MOTSU.



(All photo: Jeff Hall)



Eastern Diamondback Rattlesnake



Gopher Frog Egg Mass



Eastern Coachwip



Pigmy Rattlesnake

## Tiger Salamander Populations Benefit from Wetland Restoration and Creation

In the first quarter of 2019, NCWRC biologists continued to survey for amphibians and reptiles throughout the eastern part of North Carolina. One priority for the past decade has been to document focal amphibian species on the Sandhills Game Land, located in Richmond and Scotland counties, with a specific focus on eastern tiger salamanders.

In 2007, tiger salamanders were only known from four wetlands on the game land. Through wetland restoration and creation efforts that started in 2010, biologists hoped to improve habitat for these salamanders and other associated amphibians and reptiles.

As of 2019, they have now documented tiger salamanders breeding in 12 wetlands on the game



*Tiger salamander* (Photo: Kevin Stohlgren)

land, mainly at sites that have undergone restoration by NCWRC staff. Five of the newly occupied sites are the result of wetland restoration; one occupied site

is a newly created wetland; and the other two sites are ponds that were only recently discovered. Many of these newly occupied wetlands appear to have very robust populations of tiger salamanders, based on egg mass counts, demonstrating the effectiveness of restoration efforts.

This effort also brings up questions about how these salamanders are able to find and repatriate sites where they have been absent for many decades. Staff plan to continue monitoring these sites and to continue restoration efforts to increase populations and meta-populations of tiger salamanders and other imperiled species.

## Robust Redhorse Population Augmentation and Captive Propagation Continues

In November 2018, 2,024 Phase I (6 months old) robust redhorse fingerlings raised at the SC DNR Dennis Center were stocked into the Pee Dee River, half at Cheraw, SC and half at Jones Creek Shoal, NC. These fish were the products of adults collected in the Pee Dee River spawning shoals in North Carolina. Another 2,000 were held back at Dennis Center to grow out to Phase II (18 months old), which will be stocked in the winter 2019, along with individuals from the same year-class reared at NCWRC's McKinney Lake Hatchery.

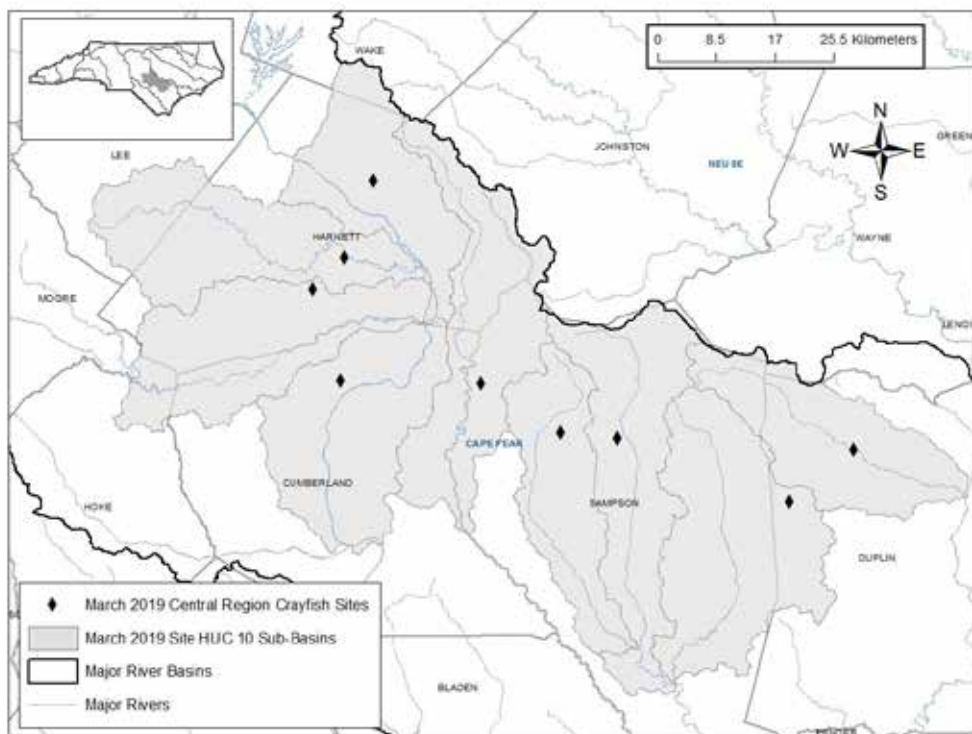
Phase III fish, held back from the 2015 year-class in ponds at both hatcheries, were also weighed, measured, and fin-clipped in November and December of 2018. Forty-four individuals remain at McKinney Lake Hatchery, averaging 18.62 inches in total length and 3.4 pounds in weight. The Dennis Center held 34 individuals, averaging 18.8 inches and 3.3 pounds. Results of fin clip genetic analysis will allow biologists to determine whether these animals may be used as future broodstock.



## Crayfish Surveys Conducted in the Sandhills and Upper Coastal Plain

Wildlife Diversity Program staff conducted crayfish surveys in the Sandhills and upper Coastal Plain of the Cape Fear River drainage in March 2019 as part of a bigger project to update distribution records for both native and exotic invasive species. Staff surveyed nine sites, each in a unique 10-digit HUC, at locations where crayfish data were not previously recorded or had dated records (>15 years old). Staff collected no species identified as Species of Greatest Conservation Need in the N.C. Wildlife Action Plan.

They found variable crayfish (at four sites and in one new HUC — Great Coharie Creek, located in Sampson County. While the survey included sites within the historical range of the Sandhills crayfish, endemic to the Carolinas, staff did not locate any. However, they did find the exotic red swamp crayfish at two localities, representing newly documented occurrences in the Upper South River and Little Coharie Creek sub-basins in Sampson County. Surveys will continue through 2019.



Map of crayfish surveys conducted by staff in March



Variable Crayfish (Photo: Katharine DeVilbiss)

## Carolina Pygmy Sunfish Monitoring Continues

Staff continued annual monitoring surveys for the Carolina Pygmy Sunfish, a state listed threatened species endemic to Columbus and Brunswick counties in North Carolina and small portions of the coastal plain in South Carolina. Of the ten localities sampled in November, staff collected Carolina pygmy sunfish at three, including a tributary population outside of the core range of Juniper Creek, newly discovered in early 2018.

Hurricane Florence brought catastrophic flooding to the Coastal Plain in fall 2018 and much of the cover vegetation preferred by this species was killed by prolonged inundation or stripped away. This would have altered the local distributions, contributing to the reduced detection during these surveys. Access to some sites also was restricted due to poor road conditions.

Carolina Pygmy Sunfish are still present and catch per unit effort ranged from 0.5 to 5 individuals per

person hour. Surveys this year will provide more information regarding the ability to recolonize these areas when vegetation has returned. Staff collected additional fishes identified as Species of Greatest Conservation Need in the N.C. Wildlife Action Plan, including the Everglades pygmy sunfish (at four localities) and the banded sunfish (at six localities). Overall fish abundance was observed to be markedly reduced as compared to previous years, likely due to hurricane effects.

*Carolina Pygmy Sunfish (Photo: Brena Jones)*



## Staff Launch Project to Test for Mercury in Carolina Northern Flying Squirrels

This winter Wildlife Diversity Program staff launched a pilot project to test for mercury accumulation in Endangered Carolina northern flying squirrels. The 1990 U.S. Fish and Wildlife Service Recovery Plan for Appalachian Northern Flying Squirrels recommends research on heavy metal accumulation in fungi and lichens eaten by northern flying squirrels and bioaccumulation of metals in the flying squirrels themselves.

Dr. Joe Poston and a student at Catawba College will be testing mercury levels in flying squirrel hair samples. Wildlife Diversity staff developed field protocols and snipped hair samples from 18 northern flying squirrels captured in the Black Mountains, Great Balsams and Unicois for mercury testing. The results will help better determine the current threat level of heavy metal pollution to Carolina northern flying squirrels after a decade or more of improved air quality in western North Carolina.



*A biologist snips hair from the side of a northern flying squirrel's tail (Photo: Clifton Avery)*



*Carolina northern flying squirrel (Photo: Clifton Avery)*



*Wildlife Diversity technician Kristi Confortin holds bags of flying squirrels to keep them warm as they await processing on a cold day (Photo: Christine Kelly)*



*Pisgah National Forest silviculturist, Rachael Dickson, helped check flying squirrel boxes (Photo: Christine Kelly)*

## Inactive Gold Mines Hold a Different Treasure — Tri-colored Bats

The tri-colored bat is a hibernating species with a statewide distribution in North Carolina. This species has experienced extensive population declines in western North Carolina, where White-nose Syndrome (WNS) and the caves that harbor it are widespread. Few caves exist east of the Southern Appalachian Mountains in North Carolina to accommodate bat hibernation, but recent efforts by NCWRC biologists have uncovered a link between the nation's first Gold Rush and hibernating tri-colored bats. The first documented discovery of gold in the United States occurred in Cabarrus County in 1799 and kicked off 50 years of gold mining in the

state, drawing miners from across the globe. The N.C. Gold Rush was eclipsed by the more familiar California Gold Rush in 1848, but gold mining continued to a lesser degree in the Tar Heel state for another century. Though not as productive as its California counterpart, the

N.C. Gold Rush left hundreds of underground portals throughout the Piedmont Region, providing critical hibernation habitat for the tri-colored bat in a region where caves are scarce.

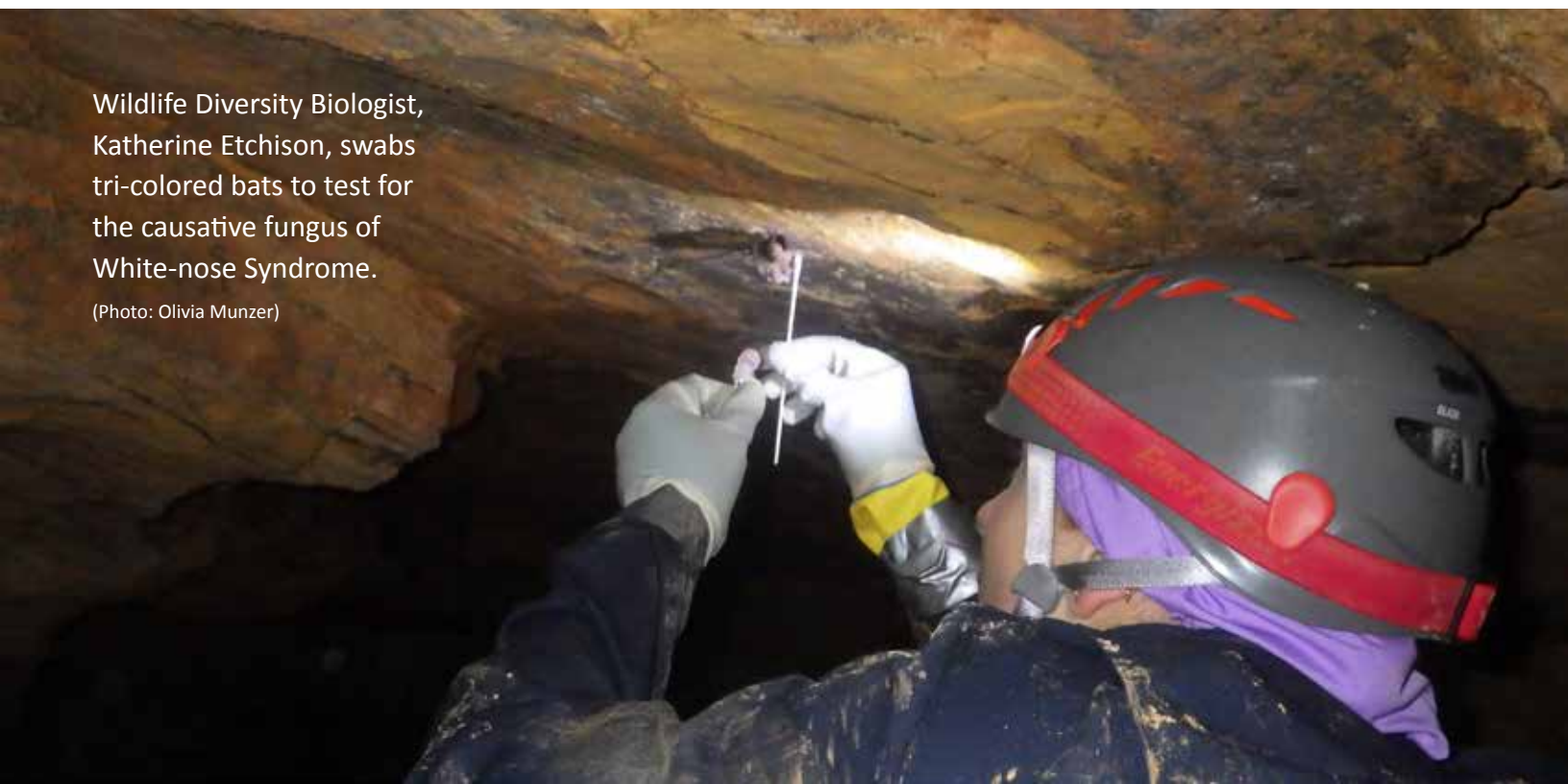
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*A hibernating tri-colored bat in an inactive gold mine (Photo: Katherine Etchison)*

Wildlife Diversity Biologist, Katherine Etchison, swabs tri-colored bats to test for the causative fungus of White-nose Syndrome.

(Photo: Olivia Munzer)



## Inactive Gold Mines Hold a Different Treasure — Tri-colored Bats

Nine of these mines were surveyed in winter 2019 yielding a total of 86 tri-colored bats, 30 of which hibernated in a single site. This count is slightly greater than the highest counts in Mountain hibernacula, some of which formerly held thousands of tri-colored before the arrival of WNS. Fungal swabs were collected from each Piedmont site to test for the causative pathogen of WNS and results are pending; however, sites that tested positive for this pathogen in the past continue to show stable counts and visibly healthy bats. This could be an indication that WNS is unable to grab a foothold in the Piedmont Region, perhaps due to the warmer, shorter winters that provide small amounts of insect activity for bats to re-build their fat reserves. The explanation for continued health among these tri-colored bats remains unclear, but one thing is for sure, NCWRC biologists are finding inactive gold mines now hold a different kind of treasure.



*The entrance to an inactive gold mine in which 18 hibernating tri-colored bats were counted (Photo: Katherine Etchison)*



*Wildlife Diversity Biologist, Allison Medford, measures the entrance to an inactive gold mine. (Photo: Katherine Etchison)*

## Staff Build and Install Nest Boxes for Barn Owls in Piedmont

The Piedmont Barn Owl Project is moving forward with four boxes deployed on private land in Anson and Randolph counties. Biologists built the boxes based on plans from the [Barn Owl Trust](http://www.barnowl-trust.org.uk) (www.barnowl-trust.org.uk) and installed them during this quarter. The boxes have not been checked yet, but biologists are hopeful the boxes are occupied with nesting owls.

In 2012, the New Hope chapter of the Audubon Society started installing Barn Owl nest boxes in areas with appropriate habitat, but none of the 27 boxes have been occupied. The chapter has been helpful with the continuing expansion of the project through word-of-mouth with landowners and equipment loans of nest cameras and nest boxes. The chapter also has been publicizing the project on its [website](#).



*Barn Owl* (Photo: Peter K. Burian)

**Wildlife Diversity Program biologists are seeking barn owl information. Contact Allison Medford to report any known or potential nest sites:**

**[allison.medford@ncwildlife.org](mailto:allison.medford@ncwildlife.org)**

**910-975-9393**



*Technical Assistance Biologist, John Isehour, builds a nest box.*  
(Photo: Allison Medford)



*Barn Owl box installed in a disused rendering plant.* (Photo: Allison Medford)

## Surveys for Four-Toed Salamanders Document Six New Populations

In the first quarter of 2019 Wildlife Diversity Program staff, collaborators and volunteers began a project to survey potential sites for four-toed salamander, a state-listed species of Special Concern, federally listed species of concern and a species identified in the N.C. Wildlife Action Plan as a Species of Greatest Conservation Need. The primary purpose was to find new sites in the greater French Broad River valley and collect tissue samples to see if more populations exist for the unique, highly divergent species group known currently only as “Clade E” (based on

previous research by Tim Herman, an expert on the species).

Over a span of three weeks, the team surveyed 24 wetland habitats to look for nesting females. They succeeded in documenting six new populations of four-toed salamanders in Buncombe, Henderson, and Transylvania counties, where they previously only knew of three sites. Further, staff updated records at a historical site in Henderson County where the species had not been seen since 1976.

Pending lab analysis of samples collected will help determine the distribution of the rare “Clade E” four-toed Salamander in the area.



*A female four-toed salamander*  
(Photo: Lori Williams)



*A female four-toed salamander with eggs on nest* (Photo: Jim Petranka)



*Four-toed salamander nesting habitat* (Photo: Jim Petranka)



*Project collaborator, Tim Herman, finds a four-toed salamander nest.* (Photo: Lori Williams)