



NORTH CAROLINA WILDLIFE RESOURCES COMMISSION

# WILDLIFE DIVERSITY PROGRAM QUARTERLY REPORT

July - September 2019



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Cover photos (clockwise from top): Peregrine falcon (Christine Kelly); Timber rattlesnake (Jeff Hall); Carolina madtom (Michael Fisk); and Yellow lampmussel (Brena Jones)

## Research on Coastal Sparrow Species Begins this Winter

The N.C. Wildlife Resources Commission (NCWRC) recently entered into a cooperative agreement with UNC-Wilmington to conduct research on winter survivorship and population density and abundance of saltmarsh and seaside sparrows in southeastern North Carolina. Staff also will attempt to determine migratory status and timing of local breeding seaside sparrows. Both these coastal-dwelling sparrows are listed as Species of Greatest Conservation Need (SGCN) in the [N.C. Wildlife Action Plan](#), and saltmarsh sparrows are currently being considered for federal listing under the Endangered Species Act. Throughout their life cycles, these birds rely on tidal marshes that are being lost or degraded at accelerating rates.

From January through April 2019, 168 sparrows were banded in the marshes of Masonboro Island. Radio transmitters were attached to 20 birds (15

on seaside sparrows; five on saltmarsh sparrows) to quantify winter home range size and habitat use. Preliminary results support the prediction that the sparrows' movements track with the tide. At high tide, the birds cluster in patches of black rush, also known as needlerush, while at low tide, they move into lower elevations to forage among cordgrass. Both sparrow species have high site fidelity throughout the winter. In particular, the sparrows remained in the same general areas for the life span of their radio tags.

Currently, biologists are acquiring the necessary permits to begin construction and deployment of Motus towers, which will allow them to remotely track digitally coded VHF radio tags attached to breeding seaside sparrows from June to January. This will allow biologists to describe each tagged bird's movements during the migratory season.



*Saltmarsh sparrow* (Photo: Dr. Ray Danner)



*Seaside sparrow* (Photo: Wikimedia)

## Gopher Frogs Using Newly Created Habitat on Sandhills Game Land

In third quarter 2019, NCWRC staff documented gopher frogs using new summer habitat near the few breeding ponds remaining on the Sandhills Game Land in Scotland County. Gopher frogs are one of the rarest amphibians in North Carolina, now only existing at about seven sites in the state. They use fishless, isolated wetlands to breed in the fall and winter, then move to upland longleaf pine habitat in the spring and summer. During the summer, they mainly use holes in old pine stumps to escape predators and periodic fires until returning to their breeding pond each year.

These frogs travel at least 2 miles from their breeding pond to a stump where they stay for the summer, based on telemetry work conducted by NCWRC biologists. This year, biologists conducted surveys to search

for gopher frogs in an area near their breeding pond that was part of a timber thinning in 2008. Timber operations around gopher frog ponds are often thought to be detrimental to frog populations. However, they found four gopher frogs this year using stump holes created from trees that were cut during the timber thinning. This indicates that a one-time harvesting of trees to enhance habitat, though it may have short-term negative effects on some wildlife populations, can create refuges for species such as gopher frogs within 10 years.

Staff will continue to do surveys for this elusive and rare species to try to preserve more habitat in hopes that gopher frogs will persist in North Carolina.



*Gopher frog found next to a stump created by a timber thinning operation. Photo is from 2019; the area was thinned by a timber harvest in 2008. (Photo: NCWRC)*

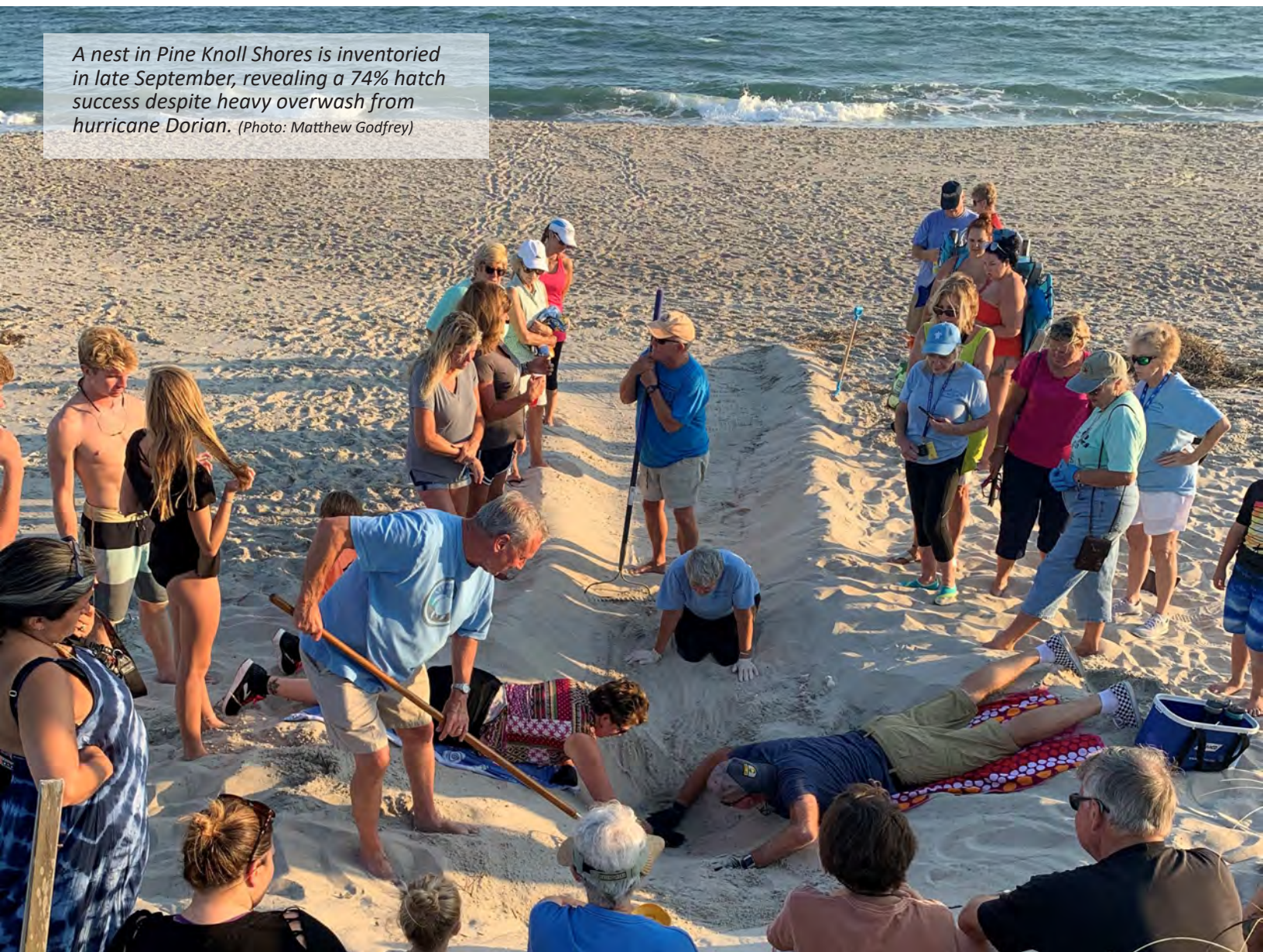
## Despite Dorian, Sea Turtle Nesting Sets Record for 2019

The 2019 sea turtle nesting season was record-breaking with over 2,300 nests laid on North Carolina beaches between May and September. The previous record was in 2016 with 1,650 nests. Nests laid late in the season are at risk of loss from impacts due to tropical storms and hurricanes, which

bring the potential for heavy overwash events and erosion. Hurricane Dorian visited the North Carolina coast Sept. 5-6, bringing storm surge that caused flooding and beach erosion in some areas. Other areas reported sand accretion. Prior to Dorian's arrival in North Carolina, 1,358 of the 2,357 known nests had already emerged (57.6%). Fewer

than 100 nests were reported as completely washed away due to Dorian (most were along Cape Lookout and the Outer Banks). Inventories were performed on nests that emerged after the storm and revealed that many nests still managed to produce some hatchlings, despite being washed over by Dorian.

*A nest in Pine Knoll Shores is inventoried in late September, revealing a 74% hatch success despite heavy overwash from hurricane Dorian. (Photo: Matthew Godfrey)*



## Oregon Inlet Island Cleanup Nets 1,200 Pounds of Trash

This year, Wildlife Diversity Program staff held their third annual Oregon Inlet Island Cleanup. This two-day event, conducted in partnership with the Wildlife Education Division's Citizen Science Program, removed an estimated 1,200 pounds of trash from seven state-owned islands near Oregon Inlet. The islands provide nesting, foraging and roosting habitat for more than 40 species of waterbirds. During summer, brown pelicans, terns, American oystercatchers, black skimmers, herons and egrets build nests on these islands and raise their young. The islands also provide needed stopover habitat for migrating shorebirds in spring and fall. Marine debris, particularly plastics, can be directly or indirectly ingested by birds that mistake the trash for prey items. Birds can also be harmed by consuming fish and other marine organisms that have eaten plastic. Fishing line, nets and balloon ribbons also pose the risk of entanglement.

Removing trash has become an annual part of managing the islands, along with posting closure signs ahead of the nesting season and working with the U.S. Army Corps of Engineers to minimize disturbance to the birds and achieve beneficial placement of dredge material.

Since cleanups began in 2017, volunteers and staff have cleared 102 bags of trash, plus larger items from the islands. Each piece of trash is recorded, and the information is shared with The Ocean Conservancy's Trash Information and Data for Education and Solutions (TIDES) Project. This year small pieces of plastic and plastic bottles were the most common types of trash found, while the most interesting items were a frame from a bee hive and a message in a bottle.

A dead sandwich tern was also found entangled in fishing line on one of the islands. By continuing to remove trash from the islands staff hope to reduce these mortalities and maintain trash free islands that benefit both nongame and game species.



*Citizen Science Coordinator Marissa Liverman and volunteer, Debbie Spillman, remove plastic trash from an island near Oregon Inlet. (Photo: NCVRC)*

## Tar River Spiny mussel Propagation and Augmentation Continue

This summer Wildlife Diversity Program staff continued Tar River spiny mussel augmentation efforts within the Tar River basin. The Tar River spiny mussel occupies a fraction of its historical range, and it's thought that remnant populations are at levels too low to be self-sustaining. This project's goal is to reestablish populations by releasing hatchery-reared individuals to bolster Tar River spiny mussel populations. Broodstock from the Tar

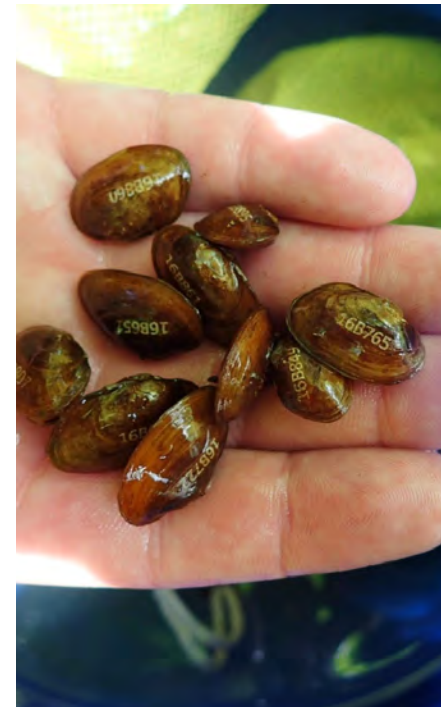
drainage has been collected to be used to propagate hatchery-reared individuals. Each mussel is tagged to help track when the recaptured individuals were stocked. To date, over 35,000 mussels have been released at 12 reaches within Fishing, Little Fishing and Swift creeks, as well as the mainstem Tar River.

Post-stocking monitoring is conducted to document survivorship, growth, and ultimately recruitment within each reach where releases have occurred. Staff recaptured 648 individuals from 10 sites this

summer from multiple cohorts dating back to 2015. Within augmented reaches, recaptured individuals exhibited adequate growth, and gravidity (reproductive activity) has been observed. While released populations appear to be persisting, the true indicator of success is to document recruitment within these reaches. At sites where gravidity has been documented, future surveys will integrate sampling techniques to assist in detecting recruitment.



*Recaptured Tar River spiny mussels with Hallprint, Laser and Black Dot tagging techniques to differentiate between cohorts (Photo: Michael Fisk)*



*Laser tagged Tar River spiny mussels ready to be released (Photo: Loretta Luttackas)*

## Training Conducted for New Law Enforcement Officers

Wildlife Diversity Program staff assisted with several meetings and workshops focused on conservation, management, and identification of reptiles and amphibians during this quarter. In July, staff participated in a law enforcement training session for in-coming new officers at the North Carolina Justice Academy in Salemburg. Eighteen participants were instructed in the laws and regulations regarding reptiles and amphibians, heard case studies involving these species, and experienced first-

hand training on handling snakes. These trainings have been incredibly well-received by officers.



*Officer training at the North Carolina Justice Academy (Photo: Jeff Hall)*

## First Statewide Meeting Conducted on Gopher Frog Head-Starting Efforts

In August, staff held the first statewide meeting on head-starting work with gopher frogs. Participants came from North and South Carolina and included staff from NCWRC, N.C. Aquariums, N.C. Zoo, N.C. Natural Heritage Program, N.C. Museum of Natural Sciences, S.C. DNR, U.S. Fish and Wildlife Service and U.S. Forest Service. The meeting was held to share results of recent head-starting efforts, to collaborate on future head-starting, and to offer suggestions from each of the different locations to help with future successes. Due to the success of this first meeting, participants suggested this become an annual meeting of partners.



*Gopher frog headstarting tanks (Photo: Carol Price)*



## Weymouth Woods Wetlands Workshop Focuses on At-Risk Species

In September, staff organized a regional workshop on management of isolated wetlands with a focus on at-risk species, especially amphibians. Forty-nine participants came from four states, and included numerous federal and state agencies, as well as NGOs.

The three-day workshop included presentations on the value of wetlands at Weymouth Woods State Nature Preserve, field tours to sites undergoing different levels of management, and suggestions for how to be successful with wetland restoration efforts. Field tours included sites on NCWRC-managed



Sandhills Game Land, as well as two properties owned by N.C. Department of Agriculture.

## Timber Rattlesnake Gestational Sites Visited

Wildlife Diversity Program staff visited several timber rattlesnake gestational sites to assess issues with human intrusion. They saw several timber rattle-

snakes at each site along with evidence of disturbance from human visitors, such as broken rocks and campfire rings. Staff will continue to work with partners to try to mini-

mize disturbance of these sites, as they are extremely important for female rattlesnakes needing birthing sites.



*Timber rattlesnake gestational site (left); timber rattlesnake (top)*  
(Photos: Jeff Hall)

## Staff Collect Eight Carolina Madtom Broodstock for Propagation

The Carolina madtom is endemic to the Tar and Neuse drainages in North Carolina, and staff have documented significant declines throughout its range due to urbanization and invasive species.

The species is currently a candidate to be federally listed as endangered this year. Wildlife Diversity Program staff have partnered with Conservation Fisheries Inc. (CFI), located in Knoxville, Tenn., to propagate and ultimately attempt to restore populations of Carolina madtoms into suitable habitats. Survey efforts continued this summer throughout the Carolina madtom's historic range to collect broodstock to transfer to CFI.

Eight individuals from the Tar Basin were transferred to CFI while no Carolina madtoms were collected within the Neuse Basin. As a result of several years of collections, CFI is currently holding around 50 individuals to be used for propagation efforts. Populations in the Tar drainage appear to be persisting although there is great concern over populations within the Neuse drainage. A considerable amount of effort has been allocated throughout the drainage resulting in no individuals, and these populations may be extirpated.

Sampling for additional broodstock will continue next summer in attempts to collect more individuals and increase the genetic diversity of broodstock.



*Carolina madtom collected in Fishing Creek, in Tar River Basin*  
(Photo: Michael Fisk)

## Cape Fear Crayfish Surveys Continue

As part of ongoing efforts to update distribution records for both native and exotic invasive crayfish species, Wildlife Diversity Program staff visited four sites in the Coastal Plain region of the middle Cape Fear basin

in late July 2019. Individuals of the native *Cambarus* species *C. acuminatus* complex were observed at two localities, and voucher specimens were provided to partners at the N.C. Museum of Natural Sciences, where morphologic and

genetic work toward taxonomic clarification is taking place. No Species of Greatest Conservation Need or exotic crayfish species were collected.

## Mussel Population Monitoring in the Pee Dee River Continues

Beginning in 2009, three long-term mussel population monitoring sites were established in the lower Pee Dee River, near the state border in south-central North Carolina. In 2019, with help from partners including Duke Energy/Progress, NCWRC staff conducted the sixth biennial survey for priority mussel species downstream of Blewett Falls and Tillery dams. Monitoring at the third site, below Falls Dam, has been turned over to Cube Hydro as part of its Federal Energy Regulatory Commission (FERC) license requirements. These data provide an opportunity to document the potential changes in mussel diversity and abundance due to the improved dissolved oxygen levels and minimum flows downstream of these dams

implemented under new FERC licenses for Duke Energy/Progress. In addition, this long-term dataset may provide insights into population responses to other events such as extreme floods from large hurricanes.

The mean density across years (2009-2019) of all mussels remains the highest below Blewett Falls Dam ( $26/m^2$ ), the furthest downstream dam in the Pee Dee River, while the Tillery site has a mean density of  $11/m^2$ . There were 10 species found at both sites in 2019. This year saw a decrease in density at the Tillery site, down to  $6/m^2$ . Density at the Blewett Falls site remained relatively stable at  $29/m^2$  in 2019, as compared to  $31/m^2$  in 2017. A possible hypothesis for this effect is that the Tillery site may have seen more impacts from the record-breaking flooding from Hurricane Florence in fall 2018, as this site is in the main channel and there is a higher proportion of bedrock substrate, which could reduce the ability of mussels to burrow for shelter. The Blewett Falls site, near Jones Creek, is located in a side channel and offers more gravel and softer substrates as potential refugia. Staff collected several species of mussels listed as Species of Greatest Conservation Need, including the yellow lampmussel, eastern lampmussel, Carolina creekshell and eastern creekshell.



Mussel Monitoring Area Map – Pee Dee River



Female yellow lampmussel (Photo: Brena Jones)

## Lake Waccamaw Surveys Show Increase in Mean Density of Mussels

NCWRC staff, in partnership with N.C. State Parks, have conducted annual standardized surveys since 2009 for three fish 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 2.1 fish/minute (fpm) of seining in 2019. 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 33° C), which causes fish to move out into deeper habitats and cannot be seined. The highest catch rate at a single site in 2019 was 4.7 fpm. Waccamaw killifish and Waccamaw darters were also collected with minimal effort,

suggesting that healthy populations persist within Lake Waccamaw.

Staff also conducted quantitative mussel surveys in Lake Waccamaw, which have been completed biennially since 2009. The mean density of mussels across all three sites increased to 41/m<sup>2</sup> in 2019 (previous range 23-28/m<sup>2</sup>). Local density remained stable at both the southern site by the State Park (13/m<sup>2</sup>) and the northern site (48/m<sup>2</sup>), but doubled at the northwestern site (64/m<sup>2</sup>, up from 29/m<sup>2</sup> in 2017) in the area treated for the invasive exotic weed hydrilla.

The Waccamaw spike and Tidewater mucket remain the most abundant mollusk species, composing 92-96% of the individuals at each study site. Two species of micro-snail endemic to the lake, the Waccamaw siltsnail and the Waccamaw snail, sampled using a petite ponar substrate grab, showed a similar combined mean density across sampling sites of 336/m<sup>2</sup> in 2019 (315/m<sup>2</sup> in 2017). Densities of some larger snail species, such as the buffalo pebblesnail, observed

during visual surveys have declined, nearing the lower limit of detection. However, higher densities of these same snails were detected in the ponar samples in 2017 and 2019. Reasons for these differences remain unclear.



*Presence of juvenile mussels shows evidence of successful reproduction; Below: Mussel surveying at Lake Waccamaw (photos by Brena Jones)*



## Priority Mussel Surveys Conducted in the Cape Fear and Pee Dee River Basins

Wildlife Diversity Program staff continued survey efforts for the state endangered brook floater and Atlantic pigtoe mussels at 26 sites in the Pee Dee and Cape Fear river basins in Union, Anson, Stanley, Moore and Randolph counties. Although neither target species was detected, native mussels were found at 16 of the sites, including the following SGCN species:

- Yellow lampmussel (Federal Species of Concern, State Endangered)
- Notched rainbow (State Threatened)
- Creeper (State Threatened)

Additional species found included eastern creekshell, Florida pondhorn, eastern elliptio, and variable spike. Furthermore, five individuals of an unknown species from the Little River of the Pee Dee drainage were collected and sent to the N.C. Conservation Aquacul-

ture Center for further study. The NCWRC will continue working with partners, including the U.S. Fish and Wildlife Service to research additional details of their taxonomy, life history and distribution.



*One of the Little River mussels at the N.C. Conservation Aquaculture Center in Marion (Photo: Brena Jones)*

## Biologists Locate New population of Federally Endangered Appalachian Elktoe

A tip from biologists Lori Williams and Morgan Harris, who spotted a mussel while searching for hell-benders, led to the discovery of a previously unknown population of federally endangered Appalachian elktoe. Late this summer, Wildlife Diversity Program biologists completed a short survey in Burningtown Creek, a small tributary to the Little Tennessee River,

and located 19 Appalachian elktoe ranging in size from juveniles to large adults. The size range and overall healthy appearance of the mussels indicated that this is a thriving, self-sustaining population. This find is especially significant because it represents the only known healthy population of the species in the main-stem Little Tennessee River Basin.



This species was once abundant in the Little Tennessee River between Franklin and Fontana Lake, but that population has been nearly wiped out over the last 15 years. Biologists first noted the decline in this population following the torrential floods that occurred during 2004. Staff will continue to monitor the distribution, abundance and overall health of the Burningtown Creek population in the coming months.

*Appalachian elktoe (Photo: Dylan Owensby)*

## More Spruce Pine Restoration Projects Underway

After last fall's workshop, partners of the Southern Appalachian Spruce Restoration Initiative (SASRI) embarked on their own spruce forest restoration adventures in other massifs. Appalachian Trail Conservancy (ATC) proposed a restoration project at Roan Mountain that will thin a spruce plantation and develop additional age classes by plant-

ing seedlings and preparing the site for seed germination in anticipation of the next big cone crop.

NCWRC biologists helped Southern Appalachian Highlands Conservancy prepare a proposal for The Cornell Land Trust Small Grants Program to restore conifer forest for birds. SAHC was awarded the grant, and the Commission is collaborating with them, ATC, and Virginia Tech on a second spruce

restoration project at Roan Mountain.

Meanwhile, the next phase of the Flat Laurel Collaborative Spruce project was implemented in September in the Great Balsams. Hiking clubs and horses hauled 300 seedlings down the trail, and silviculture students from Haywood Community College planted them in one afternoon.



SASRI partners met at Roan Mountain to discuss a spruce restoration project. (Photo: Chris Kelly)



Silviculture students prepare to underplant red spruce seedlings in a hardwood forest in the Great Balsams (Photo: Alex Storm)



Red spruce seedling (Photo: Chris Kelly)

## Peregrine Falcon Eyerie Checks Completed with Partner Assistance

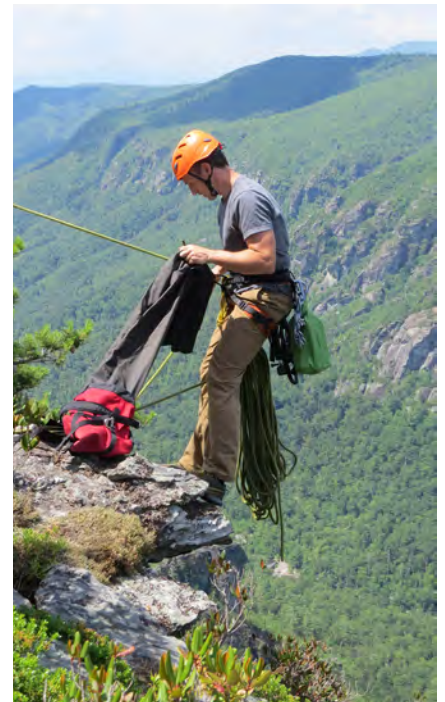
Rock climbers from the Carolina Climbers Coalition (CCC) assisted Wildlife Diversity Program staff with two peregrine falcon eyrie checks after the breeding season. In July, the CCC's Executive Director Mike Reardon and Northern Piedmont Representative Bryan Payst rappelled in to a ledge in Linville Gorge to look for nesting evidence. In August, Tom and Mary Caldwell, checked a new nest ledge discovered by climbers this year at the CCC-owned Laurel Knob in Jackson County. The Laurel Knob falcons reared one fledgling on a former raven stick nest.



*An old raven stick nest used by a pair of peregrine falcons in 2019 on Laurel Knob (Photo: Tom Caldwell)*



*Peregrine falcon (Photo: Chris Kelly)*



*Mike Reardon rappels to a peregrine ledge in Linville Gorge (Photo: Chris Kelly)*

## Progress and Challenges in Conservation of Bog Turtles

Conservation of bog turtles is a complicated undertaking. Bog turtles are federally threatened (Similarity of Appearance) and state listed as threatened in North Carolina. Unfortunately, the threats this species and their habitat — bogs — face are numerous. At one bog in the Piedmont (photo below), the threats have loomed large — development impacts, changes in hydrology, invasive species issues, encroachment from woody vegetation, effects of busy roads

and habitat fragmentation, problems with mesopredators, and more. Efforts to “save” this bog and the resident bog turtles have been numerous over the years. A recent visit in late September gave the NCWRC and partners, including Catawba Lands Conservancy and Project Bog Turtle, some new hope for this particular bog turtle population. Work done in fall 2015 to address problems with hydrology has improved the habitat quality. Despite the drought in late summer and early fall 2019 in the Piedmont, the wetland had satu-

rated soils with groundwater at the surface, a condition that was rarely seen before the restoration project in 2015. Before the restoration project, the bog had been drying up in late summer most years, and telemetry showed that the bog turtles would cope by leaving their bog habitat and move into the streambanks, even overwintering in the streams. During the restoration work, a deep and continually worsening head-cut was stabilized and a vertical liner was placed at the lower

*(continued on next page)*



## Progress and Challenges in Conservation of Bog Turtles

end of the bog to help hold and raise the groundwater level in the bog. In the recent visit, even the lower end of the bog had groundwater near the surface in some areas.

Although it was encouraging to see that the wetland hydrology was improved, the best part of the day was finding two healthy 3-year old bog turtles (Figure 2). Bog turtles had not been found at this site since 2014, despite several surveys. It was especially hopeful to find two young turtles, because this proves there are adult turtles present and that there has been recent reproductive success. These young turtles hatched in late summer 2016, after the hydrologic restoration efforts, and have survived since then in the bog. Usually hatchlings and young turtles stay fairly close to their nest in the bog the first few years. Therefore, it is likely the bog has provided suitable habitat for them since they hatched, giving further proof that the restoration project improved the hydrology.

The other piece of hope in this story is that Catawba Lands Conservancy recently protected the headwaters of the bog. They used crowd-funding to raise funds to purchase 18 acres of land immediately adjacent to the bog. This land directly drains into the bog habitat, so protecting it was a major step in the right direction. This land provides a forested buffer that reduces the impacts of threats from development on this bog turtle population.

Despite these recent successes and a bit more optimism among the involved partners, there is still much to be done to help give this population a chance at recovering from the steep decline it has experienced in the last 20 years. Protecting the turtles from getting hit on the busy road, reducing predation on nests and turtles, finding



*Catawba Lands Conservancy Land Stewardship Director Sharon Wilson is elated that we found two healthy juvenile bog turtles at this site. (Photos: NCWRC)*

ways to increase survivorship, and continuing to improve habitat quality are all high priorities. This will require staff to put all the conservation tools on the table. They will need help from many partners and finding sufficient funding and resources may be challenging, but by working closely with partners, prioritizing efforts, and taking effective on-the-ground action, there is still hope for this bog turtle population and others.

## Record Number of At-risk Little Brown Bats Caught in Avery County

In the years since White-nose Syndrome (WNS) appeared in western North Carolina, bat species that were once common have undergone severe population declines. One such species, the little brown bat, has declined by 93%. Declines are uniformly steep among states where WNS is established leading the U.S. Fish and Wildlife Service to review this at-risk species for potential listing. This species has all but disappeared from the NCWRC's long-term survey results save

for one anomaly in Avery County. A mistnet survey in this county recently resulted in little brown bat capture for the fourth consecutive year at the site. Eight little brown bats were captured during the 2019 survey, which is a record high for the years following WNS arrival. Of these eight, one bat was a juvenile and another was a female with signs of recent lactation. These indications of recent reproduction offer a beacon of hope since reproduction is often reduced or bypassed during WNS recovery. Plans are being made to conduct

radio-telemetry efforts on this survivor population in 2020 to better understand the colony.



*Little brown bat caught in Avery County (Photo: Katherine Etchison)*



*Little brown bats caught in Avery County (Photo: Katherine Etchison)*



*Wildlife Diversity Program Intern, Trevor Walker, and N.C. State Parks Inventory Biologist, Ed Corey, measure a little brown bat (Photo: Katherine Etchison)*

## Biologists Find Fewer Hellbenders during 2019 Breeding Season Surveys

Over 14 consecutive days in late August through early September 2019, Wildlife Diversity Program staff conducted breeding season surveys for eastern hellbender, a state special concern species and a Species of Greatest Conservation Need as listed in the [N.C. Wildlife Action Plan](#). Staff completed 39 passive snorkel surveys, and partners contributed three additional surveys. Passive snorkel methods entail biologists looking for animals engaging in breeding behaviors but not disturbing them or their habitats. In total, biologists sampled 25 streams across 10 western counties and documented 116 animals; they occasionally found eggs dislodged from nest shelters. This total is less than 2018's surveys from just 10 streams. While they often saw males, called "denmasters," in defensive posture at the entrance of nest rocks and sometimes individuals active on the stream bottom, they rarely saw multiple animals congregating and fighting as is typical during the breeding season. They found loose eggs, approximately 1-2

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*Kevin Parker, Wildlife Diversity technician, conducting breeding season passive snorkel survey for Eastern Hellbender  
(Photo: Lori Williams)*

*"Denmaster" male Eastern Hellbender  
defending nest rock. (Photo: Lori Williams)*



## Biologists Find Fewer Hellbenders during 2019 Breeding Season Surveys

days old, as early as Aug. 30, which indicated some populations may have bred several days earlier than expected, perhaps due to the late-summer drought and low water levels in western North Carolina. The early onset of breeding activities meant that

counts of animals were lower than expected at several sites because fewer were visible compared to previous years. Still, staff gained valuable knowledge and experience searching for denmaster males that were often tucked far underneath large boulders. They also learned

more about the variety of nest shelters males may choose including bedrock ledges and clay/cobble aggregates, and that openings for these shelters often face upstream or laterally rather than downstream, as published literature indicates.



*Adult Eastern Hellbender on stream substrate during breeding season (Photo: Lori Williams)*