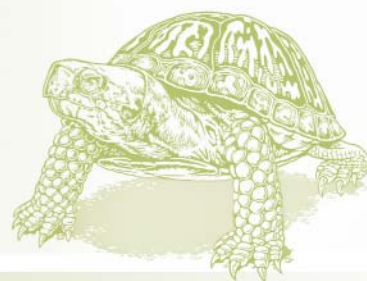


The Thread that Runs so True

WILDLIFE ACTION PLAN KEEP COMMON ANIMALS COMMON



Partnerships help make Wildlife Action Plan conservation activities possible in North Carolina's mountains.

This is the second of a five-part series about North Carolina's Wildlife Action Plan. Each successive story will discuss how the plan is being implemented in a different region, culminating with a final piece about statewide initiatives.

MARCH	INTRODUCTION TO THE PLAN
MAY	MOUNTAIN REGION
JULY	PIEDMONT REGION
SEPTEMBER	COASTAL PLAIN REGION
NOVEMBER	STATEWIDE PROJECTS AND PARTNERSHIPS

Jesse Stuart would understand what life is like for people involved in the conservation of nongame wildlife. Stuart's experiences as a teacher in the mountains of Kentucky, detailed in his 1950 book "The Thread That Runs So True," mirror those of the biologists who were involved in the N.C. Wildlife Resources Commission's initial foray into nongame conservation. For a salary of \$60 a month, Stuart began teaching a group of more than 30 children ranging in age from 5 years to 20. The Wildlife Commission's nongame program began in 1983 with a handful of biologists responsible for an entire state containing numerous species in need of conservation efforts. Like Stuart, these pioneering

biologists had a paltry budget and little knowledge of the current status of their subjects.

Although young and ill-equipped for his first teaching job, Stuart was no fool. Knowing full well the previous teacher had been beaten up by one of the students, he looked for help. He enlisted the protection of a 20-year-old farmer who had walked away from school long before with no desire to return. Stuart convinced the man of the importance of education and how it could help improve the efficiency and productivity of his farm. In doing this, he formed what government agencies like to call a "collaborative effort"—a partnership that solves a problem and benefits all involved.

COLLABORATIVE RESTORATION: "DO THESE THINGS REALLY EXIST?"

It's a question Lori Williams hears every year. Williams is a Mountain region biologist for the Wildlife Commission's nongame group, now called the Wildlife Diversity Program. Although "the question" is usually asked in jest, many of the dedicated volunteers who help Williams have seen only a few bog turtles at a couple of sites that they help manage. Despite the efforts of Williams, a group of dedicated volunteers and various organizations, these secretive little turtles are quite hard to find in their natural habitat. The 3- to 4-inch turtle weighs just 4 ounces and spends most of the year hidden under the sphagnum and

soil of its swampy home. Even when active, the turtles are adept at hiding.

The turtle is known to occur in more than 20 counties in western North Carolina and is listed as one of many priority species in the commission's Wildlife Action Plan (see "Many Creatures, One Plan," March 2007). Williams has developed collaborative efforts to monitor, manage and protect many of the bogs in these counties. One of the threats facing bogs comes not from development, but rather natural succession. In many cases, agricultural practices provide the management necessary to thwart succession and provide habitat for the bog turtle and other listed species. Left to their own devices, many bogs return to forested communities and valuable habitat for these species is lost.

In 2001, the commission, The Nature Conservancy, Project Bog Turtle and the U.S. Fish and Wildlife Service partnered to restore a bog in Henderson County. Natural succession of woody growth had begun to suffocate the bog. A couple of times each year, Williams, other biologists from the conservancy and the Fish and Wildlife Service, and a group of dedicated volunteers turn out to help. They clear woody growth, survey for bog turtles and monitor endangered plant populations. From a small, 20-meter cut done that first year, biologists and volunteers have created several clearings and a conservation plan for the bog.

Although participants are often covered in mud and thoroughly exhausted at the end of the day, Beth Bockoven of The Nature Conservancy notes that everyone enjoys the

work. Bockoven and Williams say that the collaborative effort taking place at the bog has been beneficial for the habitat, the species and overall conservation efforts of all the partners.

COLLABORATIVE RESEARCH: HEY, ROCKY!

How do you survey for and conduct research on a small, nocturnal animal that is spooked by the sound of approaching footsteps and can glide 30 meters or more in the forest? Simple: You provide more than 900 nest boxes throughout their known North Carolina range and approach them very quietly during daytime surveys in the winter. Of course, driving, hiking and hauling a ladder on treacherous, snow-covered mountain slopes is not an easy job. This is the task of Wildlife Diversity biologist Chris Kelly, other commission biologists

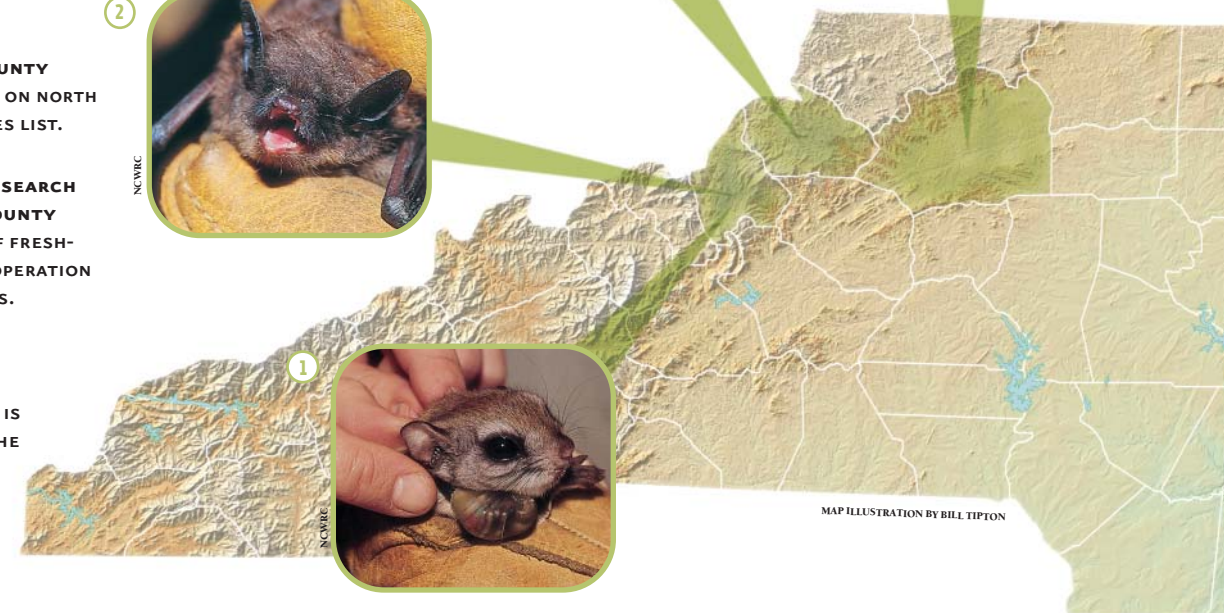
PEAKS OF DIVERSITY This is a sampling of the many Wildlife Diversity projects in North Carolina's mountains. Some of these projects are also occurring in numerous other locations.

1 **NORTHERN FLYING SQUIRREL RESEARCH**
GRANDFATHER MOUNTAIN, AVERY COUNTY
A COLLABORATIVE EFFORT AIMS TO PROVIDE LONG-TERM AND SUSTAINABLE HABITAT.

2 **BAT RESEARCH**
CRANBERRY MINE, AVERY COUNTY
SEVEN BAT SPECIES ARE NAMED ON NORTH CAROLINA'S PROTECTED SPECIES LIST.

3 **MUSSEL (GREEN FLOATER) RESEARCH**
WATAUGA RIVER, WATAUGA COUNTY
ASSESSMENT OF THE STATUS OF FRESH-WATER MUSSELS REQUIRES COOPERATION AND HELP FROM MANY SOURCES.

4 **BOG TURTLE RESEARCH**
WILKES COUNTY
NATURAL HABITAT SUCCESSION IS ONE OF THE THREATS FACING THE TINY BOG TURTLE.



written by JEFF SCHWIERJOHANN and STEVE FRALEY

and many partners trying to learn more about the Carolina Northern flying squirrel. Unlike its more common cousin, the Southern flying squirrel, the endangered Carolina Northern flying squirrel is found at higher elevations in some western North Carolina counties.

Even more difficult than checking all of the nest boxes is trying to determine just how endangered this animal is and how best to manage for its continued existence. Kelly

heads up the Carolina Northern flying squirrel project for the Wildlife Commission and has formed collaborative and data-sharing efforts with several agencies to address this problem. Biologists from the U.S. Forest Service, the National Park Service, various universities, Grandfather Mountain and other organizations are participants in this effort.

One project that may shed some light on the problem deals with an isolated

population of Carolina Northern flying squirrels in the Unicoi Mountains. This population is facing many threats. Loss of conifers due to the woolly hemlock adelgid (see "The Fight to Save Hemlocks," Nov. 2004) may lead to encroachment of the creature's habitat by mast-producing hardwood trees and Southern flying squirrels. This encroachment could lead to added pressures on an already stressed population, and potentially to its ultimate demise. Previous research has also shown that a roadway through the mountains serves as an effective barrier to squirrel dispersal, further isolating the population.

In an effort to alleviate some of these pressures, the Wildlife Commission is collaborating with the U.S. Forest Service, the Fish and Wildlife Service, the Park Service, the N.C. Department of Transportation (NCDOT), the N.C. Division of Forest Resources and N.C. State University (NCSU). The Forest Service is looking into ways to provide long-term, sustainable habitat for Carolina Northern flying squirrels. Conifer seeds to supplement this habitat were collected in the Great Smoky Mountains and are being processed and started by the N.C. Division of Forest Resources. The road issue is being addressed through a collaborative research project with the Wildlife Commission, NCSU and the NCDOT.

Carolina Northern flying squirrels captured during surveys by the commission will be fitted with a radio tracking device. Research conducted by commission and university biologists will help determine what habitats the squirrel is using and where to place potential crossing structures along the road. NCDOT engineers will work to ensure that placement of the structures does not inhibit traffic flow or cause hazards.

No single agency could provide the resources for such a comprehensive study. By forming this collaborative effort, the Wildlife Commission and its partners are taking positive steps in addressing priorities set out in the Wildlife Action Plan in an effective and efficient manner. Data collected from this project will ultimately direct conservation



JONATHAN MAYS



CAROL PRICE

We have accomplished much, but are always aware of, and address the bully at the back of the class — funding. *Without* dependable long-term *funding*, all the planning and *conservation efforts* currently being pursued *are in jeopardy*.

NEEDMORE: A RARE CONSERVATION OPPORTUNITY, A COLLABORATIVE SUCCESS

For tens of thousands of years, long before humans first arrived on this continent, the Little Tennessee River flowed free and clear from what is now north Georgia through western North Carolina and Tennessee to its confluence with the Tennessee River. Modern human needs for hydroelectric power, flood control and economic development drove the building of dams to harness the river. In less time than the average human lifespan, all but relatively short sections of the Little Tennessee and its major tributaries were dammed and the ancient rivers were replaced by large, deep lakes.

Even stretches downstream from dams that weren't impounded (such as the Cheoah, Nantahala and upper Tuckasegee rivers) were altered by cold water releases, low dissolved oxygen or inconsistent releases of water from dams. Pollution from industry and sediment from erosion further degraded habitats in the Tuckasegee and the upper Little Tennessee rivers.

The Needmore tract is a 4,467-acre property surrounding a substantial portion of the remaining free-flowing miles of the Little Tennessee and its tributaries. Needmore contains critical aquatic habitats, but it also holds significant amounts of mixed deciduous and pine forests, riparian and floodplain habitats, and wetlands. Its acquisition by the Wildlife Commission will ensure future protection of that portion of the Little Tennessee between Lake Emory in Macon County and the upper pool levels of Fontana Lake in Swain County.

The river flowing freely through Needmore supports an incredible diversity of life, including four federally listed species and 12 state-listed species.

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JONATHAN MAYS

FOUR-TOED SALAMANDER
(*Hemidactylum scutatum*)



TODD PUSSEY



TODD PUSSEY

Accurate measurement of foot length (above right) helps differentiate between flying squirrel species. The reclusive bog turtle (right) spends much of the time hidden in the soil and sphagnum of its habitat.

efforts for the Carolina Northern flying squirrel in the Unicois and could provide invaluable techniques and partnerships directing conservation efforts throughout the squirrel's range.

COLLABORATIVE CONSERVATION: GOING BATTY

There are seven species of bats on North Carolina's protected species list. Conservation of these species and their habitats are also priorities discussed in the Wildlife Action Plan. Many people have a problem getting past the urban legends and negative press that bats often get. However, once you learn about the animals and see them in action, it's hard not to be impressed by them. The only true flying mammal (flying squirrels glide), bats can be found in just about every habitat around the world except arctic climates. They serve important roles from pest control to pollination everywhere they occur.

Scott Bosworth heads up Mountain region bat projects for the Wildlife Commission. He spends a lot of time in caves and mines, under bridges and in streams at all times of the day and night to learn more about these creatures and how to direct conservation efforts. With so many species and so much ground to cover, the commission has reached out to state and

federal agencies, nonprofit organizations, universities and the general public to create partnerships that will benefit the priority species and their habitats.

The Virginia big-eared bat and its relative, the Rafinesque's big-eared bat, are both listed species of special interest to the Wildlife Commission. Collaborative efforts with the Park Service and private industry have led to the protection of two important roost sites for the Virginia big-eared bat. Both sites are surveyed to monitor population numbers.

Use of abandoned buildings for summer roosts is a common strategy employed by the Rafinesque's big-eared bat. Once found, these sites make monitoring of populations easier as the bats return to the same roosts year after year. However, when such a roost is lost, monitoring is contingent upon finding the new roost. Just such a scenario unfolded for biologists when a building serving as a roost for Rafinesque's big-eared bats in Haywood County was destroyed. Follow-up mist net surveys (catching the bats in nets during nighttime foraging) determined that the colony was still in the area. However, limited resources prevented a thorough survey to find the roost. The commission is working with the Forest Service to provide a new artificial roost for the bats that will allow for effective and efficient long-term monitoring of the colony.

The endangered gray bat is another species targeted for research this year. Gray bats use

targeted for research this year. Gray bats use caves as roosts year-round and spend most of their time foraging long distance over streams and rivers. Gray bats have been captured on the Pigeon River along the Tennessee and North Carolina border, so research and conservation efforts for this species will likely require the collaboration of organizations across political boundaries and must focus on watershed-level conservation strategies.

COLLABORATIVE MONITORING: WET & WILD

Western North Carolina is blessed with an abundance of fresh water. Fed by what is among the highest average annual precipitation in the country, water seems to run from every nook and cranny in the mountains. An abundance and variety of aquatic habitats—from cold mountain headwaters to big, warm rivers—and the relative isolation of these river systems on each side of the Eastern Continental Divide result in a historically rich diversity of aquatic life. The variety of aquatic life in western North Carolina, especially fish and crayfish, is exceptional. Many of the species are found nowhere else in the world. Some have been lost already, others are in serious trouble, some are holding their own, and a few may be making a comeback.

The basis for all conservation action and the measure of its success is the status of the animals: Are populations declining, stable or increasing? The Wildlife Commission determines this the old-fashioned way—by getting out and looking for them repeatedly to assess population trends over time. In the recent Wildlife Action Plan, 85 aquatic species were identified as priorities for conservation in the Mountain region. That means the status of all these animals should be monitored and reassessed about every five years. Even this basic task would be impossible without cooperation and assistance from many partners.

Assisting fish and crayfish monitoring in the region are the N.C. Division of Water Quality, the Tennessee Valley Authority and the Little Tennessee Watershed Association. All three monitor aquatic communities at sites around the region as indicators of water quality (a process called bioassessment). The commission's Habitat Conservation Program biologists plan monitoring surveys around their work to fill spatial gaps or to search for certain species when special techniques or more thorough surveys are required. Colleagues in the commission's Division of Inland Fisheries monitor game fish populations



STONECAT
(*Notrus flavus*)

STEVE FRALEY

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These include the only North Carolina population of the federally threatened minnow, spotfin chub (*Erimonax monachus*), and one of only a handful of populations of the federally endangered mussels Appalachian elktoe (*Alasmidonta raveneliana*) and littlewing pearlymussel (*Pegias fabula*). In all, 24 of the 85 conservation priority species in the region are found there. Its importance to the aquatic fauna of North Carolina is unparalleled.

In addition to numerous aquatic species, the Needmore tract also contains abundant game populations of deer, turkeys, bears, raccoons and ruffed grouse. The wetland and bottomland habitats provide important habitats for woodcocks, and many waterfowl species are found on the river during migration.

Needmore supports habitat for rare or threatened terrestrial creatures such as the bog turtle (*Clemmys muhlenbergii*), the four-toed salamander (*Hemidactylum scutatum*), the hellbender (*Cryptobranchus alleganiensis*), the Eastern small-footed bat (*Myotis leibii*), the pygmy shrew (*Sorex hoyi*) and the southern Appalachian wood rat (*Neotoma floridana haematoreia*). With the help of partners, the commission plans to survey them to determine if they do occur there.

Ironically, a legacy of the dam-building days offered the opportunity to help conserve this precious "egg basket" of biodiversity. Nantahala Power and Light once owned the Needmore tract and planned to build a dam and reservoir there. Duke Energy acquired the land, but with no plans to build a dam considered selling the land for development. This proposal spurred action by a number of parties, culminating in one of the most successful examples in the Mountain region of a partnership to effect conservation.

A diverse group came together to purchase and protect Needmore. The local citizens' groups Land Trust for the Little Tennessee, Friends of Needmore and the Little Tennessee Watershed Association were joined by The Nature Conservancy, N.C. Ecosystem Enhancement Program, Clean Water Management Trust Fund, U.S. Fish and Wildlife Service, N.C. Natural Heritage Trust Fund, Wildlife Commission, National Wild Turkey Federation and other private groups and individuals. Each group contributed funds and worked together to purchase the tract.

In January 2004, the purchase was completed and management of the property was entrusted to the Wildlife Commission as the Needmore Game Land. Shorelines, floodplains and a portion of the watershed along 13 miles of the Little Tennessee River and 37 miles of tributary streams are now protected and serve as a core of watershed and wildlife habitat conservation.

—Steve Fraley

and often share data and work together in the field with Aquatic Wildlife Diversity biologists toward common objectives.

A vital partner in most aquatic habitat conservation work, including monitoring, is the U.S. Fish and Wildlife Service. Major portions of federal funding come through them, but the service also helps monitor federally listed and other rare mussel species. The commission also works frequently with the NCDOT to survey mussels where agency interests overlap, often assessing or avoiding impacts from bridge or other highway construction. Other cooperators providing monitoring assistance and survey data include the U.S. Forest Service, the N.C. Natural Heritage Program, energy companies and colleges and universities.

Managing such monitoring data is also a big job and there is help with that, too. The Natural Heritage Program assembles information from many sources and makes it available to the commission and others. The N.C. Museum of Natural Sciences provides data from their collecting, as well as from all specimens deposited there by others.

Despite having a good partner, Jesse Stuart still had to fight his bully. However, he was successful throughout his career by always keeping the students' education in focus, always advocating the importance of education to the future, and by always leading by example. The Wildlife Commission has partnered with more than 100 organizations and has enlisted the help of hundreds of volunteers.

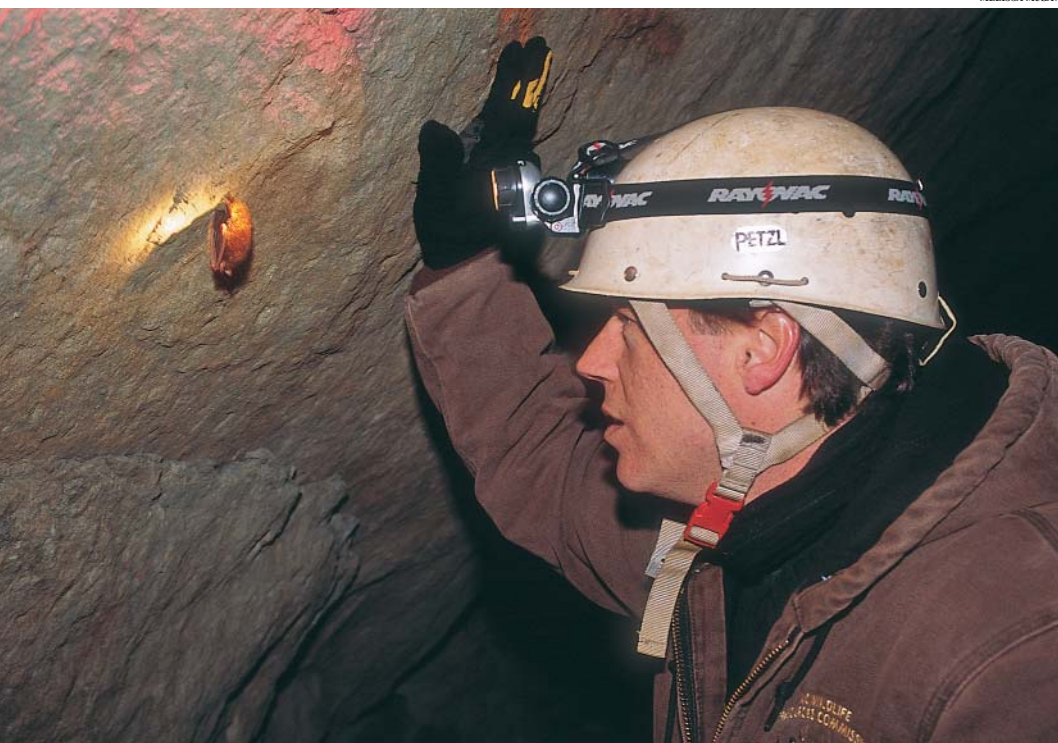
We have accomplished much, but are always aware of, and address the bully at the back of the class—funding. Without dependable long-term funding, all the planning and conservation efforts currently being pursued are in jeopardy. As such, we will continue to keep the conservation of North Carolina's natural heritage in focus, by educating the public, advocating its importance and leading the way with innovative conservation techniques and strategies. For the Wildlife Commission, that is the thread that runs so true. ♦

Jeff Schwierjohann and Steve Fraley lead the Mountain region Wildlife Diversity Program in the NCWRC's divisions of Wildlife Management and Inland Fisheries, respectively.



JONATHAN MAVS

Below, biologist Jeff Schwierjohann examines a common Eastern pipistrelle. Opposite page: The *Cambarus (J.) asperimanus* crayfish is found throughout the Mountains.



MELISSA MCGAW