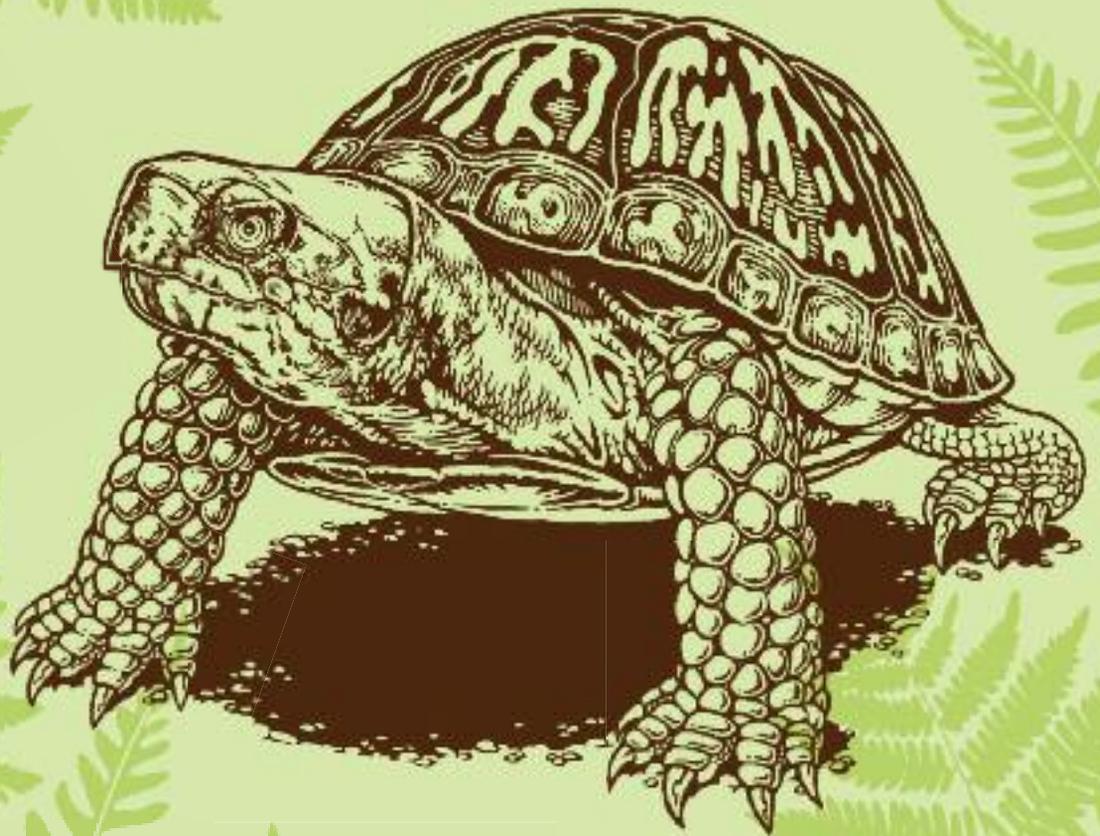


WILDLIFE ACTION PLAN

Wildlife Diversity in North Carolina

A COLLECTION OF ARTICLES FEATURED IN WILDLIFE IN NORTH CAROLINA MAGAZINE





WILDLIFE CONSERVATION IN NORTH CAROLINA HAS COME A LONG WAY.

Just a few years ago, efforts to study and protect nongame wildlife were often limited to small projects focusing on individual federally endangered species. Little funding was available to pursue conservation needs for other animals in the state.

But change has come. In 2005, the N.C. Wildlife Action Plan was introduced as a tool for all citizens to guide conservation efforts. It has ushered in a new approach for implementing collaborative, comprehensive and proactive efforts to promote responsible stewardship of our wildlife resources. Along with this plan came some of the much-needed funding to support the ambitious conservation goals that it lays out. Biologists in North Carolina are expanding their work to include more animals that warrant attention now to help prevent them from ever becoming threatened or endangered.

In 2007, these five articles were published as a series in *Wildlife in North Carolina* magazine to inform people about the Wildlife Action Plan and provide some examples of collaborative projects of the Wildlife Diversity Program. The first article is an introduction to the plan. It describes how the plan was mandated, what kind of information is in the plan, and how it is organized. Each of the next three articles focuses upon one region of the state—Mountains, Piedmont and Coastal Plain. Region-specific conservation needs are presented and examples of ongoing projects reflect how the Wildlife Action Plan is being implemented at the local and regional levels. The final story looks at statewide conservation efforts and programs that target large-scale conservation issues. This series stresses just how vital it is to have a shared understanding of the conservation needs facing our wildlife, and every article highlights the importance of partnerships and collaboration to achieve success.

Wildlife conservation in North Carolina still has a long way to go. By working together, we can achieve the lofty goals set forth in the Wildlife Action Plan. And in doing so, we can attain an even greater measure of success—a North Carolina home to a rich array of wildlife wonders that will enchant and inspire generations to come.

WILDLIFE

IN NORTH CAROLINA

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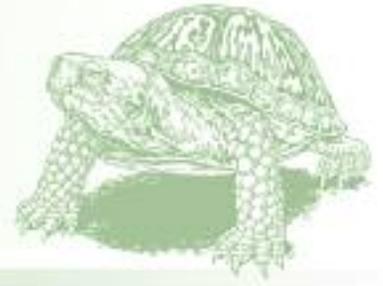
EASTERN BOX TURTLE ILLUSTRATION BY JIM BROWN

KEEP COMMON ANIMALS COMMON

The full N.C. Wildlife Action Plan can be viewed or downloaded by anyone wanting to learn more. A brief summary of the plan is also available. Details about ongoing projects conducted by N.C. Wildlife Resources Commission biologists in North Carolina can also be found online at www.ncwildlife.org.

Many Creatures, One Plan

WILDLIFE ACTION PLAN KEEP COMMON ANIMALS COMMON



The N.C. Wildlife Resources Commission has created a Wildlife Action Plan that addresses many of the state's conservation needs for the next decade.

This is the first 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
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NOVEMBER	STATEWIDE PROJECTS AND PARTNERSHIPS

Perhaps your first encounter with an Eastern box turtle was in your own back yard as a child. Maybe it was on a walk in the woods. You might have bumped into a box turtle in a moist, low-lying area along the trail. If you are a gardener and can't resist growing cantaloupes, it's possible you've been frustrated by box turtles raiding your melon patch. Of course, all of us have seen box turtles on the highway, often in harm's way as they wander about, lovesick, looking for mates. Everyone has seen one of these creatures, often in the most mundane of places.

In contrast, many of us have watched televised wildlife programs portray endangered

species' desperate struggles for continued existence. Perhaps you've seen a documentary on the red wolves that were introduced into the Alligator River National Wildlife Refuge in eastern North Carolina. Those who have been around for a few years may recall following the story of the tiny snail darter in eastern Tennessee. It was big news when the little fish delayed the completion of the Tennessee Valley Authority's Tellico Dam.

These two animals, despite being very rare and found in isolated places, are familiar to us because they became focal points for the federal Endangered Species Act. Unlike the box turtle, few of us have ever seen one of these endangered species in the wild. They

represent an approach to conservation designed to bring wildlife back from the brink of extinction. A few years ago, the federal government took an action that gave the box turtle something in common with red wolves, snail darters and other threatened and endangered species.

If you were thinking this slow, deliberate creature had somehow made it onto the federal endangered species list, you would, of course, be mistaken. However, the box turtle and many other more common animals are now the objects of their own federal conservation effort. The State Wildlife Grants Program is designed to keep animals like the box turtle from ever needing Endangered

written by CAROL PRICE *and* SCOTT VAN HORN

Species Act protection. Each state participating in the State Wildlife Grants Program was required to develop a statewide conservation plan. The result of that requirement in this state is the North Carolina Wildlife Action Plan, a comprehensive management tool developed by the N.C. Wildlife Resources Commission with assistance from many partners. Its aim is to help conserve and enhance the state's biodiversity and most important habitats. A key part of its mission is to make sure that common animals like the box turtle stay common.

ACTING ON A CONGRESSIONAL MANDATE

Recognizing that much of our nation's wildlife is at risk of population decline, the U.S. Congress set up the State Wildlife Grants Program in 2001. Each Wildlife Action Plan

submitted was to evaluate the status of the respective state's wildlife species and the habitats in which they live, identifying threats to each species and its associated habitats. Congress required that gaps in knowledge of species status, habitats and threats be identified in the plans.

Each state was required to develop a list of conservation actions that could be used to restore, improve and monitor the status of priority animals and their habitats. The monitoring component allows agencies to evaluate the performance of conservation initiatives. Finally, Congress wanted broad public participation during the development of these conservation plans and in carrying out each plan.

From 2001 to 2005, the Wildlife Commission partnered with more than 50 state and federal agencies, nonprofit conser-

vation groups, universities, private companies and individuals to develop the N.C. Wildlife Action Plan. The plan builds on a long, productive history of conservation efforts by many individuals and organizations in this state and is strengthened by concurrent conservation strategies being implemented by each of the other 49 states. The plan provides a cost-effective, proactive approach to the conservation of entire wildlife communities, including those fish and wildlife species for which management was traditionally underfunded. It is an ambitious plan whose success will be measured by the cultivation of lasting conservation partnerships and by the promise of fish and wildlife resources for future North Carolinians.

North Carolina proved to be a leader in the national effort to develop the plans, becoming

HABITAT IS WHERE IT'S AT The Wildlife Action Plan strives to protect dozens of species, including the examples on this map, by placing emphasis on habitat conservation. By protecting the areas in which animals live, the N.C. Wildlife Resources Commission hopes to increase populations of rare and endangered animals and keep numbers of common animals strong.



MAP AND ILLUSTRATIONS BY BILL TIPTON

the first state to submit a completed Wildlife Action Plan in the fall of 2005. The plan was ranked in the top 12 nationally by a panel sponsored by a national conservation organization. With continued support and cooperation from the broader conservation community and a commitment from its citizenry, the Wildlife Commission hopes North Carolina will maintain its leadership role as the Wildlife Action Plan is implemented.

The team assembling North Carolina's Wildlife Action Plan had several key

understanding among the state's citizens. Finally, the plan advocates sustaining and improving existing regulations and programs that conserve habitats and their associated plant and animal communities.

SERVING THE GREATEST NEED—AT HOME

The State Wildlife Grants Program mandated that the focus of the Wildlife Action Plan be the state's priority species of highest conservation need. The commission worked with expert biologists statewide to identify 371 priority species. These are the birds, mammals, reptiles, amphibians, fish, mollusks and crustaceans that are currently targeted for conservation action. The plan does not directly address marine species, but references the Coastal Habitat Protection Plan developed by the N.C. Division of Environment and Natural Resources. The Wildlife Action Plan identifies the federally listed threatened and endangered wildlife in North Carolina, but because the focus of the State Wildlife Grants program is more common species such as whip-poor-wills, alligators, hognose snakes and American oystercatchers, these types of animals comprise the majority of the plan's priority species.

There are more than 58 species of freshwater mussels in North Carolina, and 43 are on the priority list. Better stewardship of our state's waterways is the primary remedy for conservation of all these species. The Wildlife Action Plan describes all 17 river basins and 23 types of habitats that can be found across the state. The plan matches each priority species to the habitat type or river basin where it is found, identifies the most important challenges facing each habitat, and details the critical actions required to protect and conserve these habitats. This is the basic framework underlying the Wildlife Action Plan. Priority wildlife can now be specifically targeted by carefully considering conservation or management options within essential habitats.

Much of the conservation vision of the Wildlife Action Plan was integrated into the

The plan aims to protect animals such as rare Eastern diamondbacks, common Eastern box turtles and relatively common loggerhead shrikes, as well as habitats such as mysterious Carolina bays.

THE PLAN: A NOT-SO-EXTREME MAKEOVER

Since its humble beginnings in the 1940s, the N.C. Wildlife Resources Commission has practiced habitat conservation in ways that benefited box turtles, songbirds, nongame mammals, freshwater mussels and other animals found in the Wildlife Action Plan's list of priority conservation species. The commission created a nongame program in the mid-1980s to focus directly on many of these priority conservation species.

The plan was put together with the input of many other individuals and groups with a long history of doing conservation in North Carolina. Not surprisingly, much of the work that has been done and is ongoing is

identified in the plan. It is the hope of the Wildlife

Commission that the plan will

better prioritize its future efforts,

better coordinate its conservation programs and

better leverage the work done by the commission and the broader

conservation community. In every sense, the plan represents an impor-

tant refinement of an existing program.

To read the plan, visit www.ncwildlife.org and click on "N.C. Wildlife Action Plan" under the Features header on the front page.

principles in mind. Because conservationists have long known that the way to conserve species most efficiently is to conserve habitats, the team wanted the plan to encourage thinking and acting on the habitat scale, affecting multiple species simultaneously. They also recognized that to be effective, conservation must be everybody's job—the more people that know about wildlife conservation, the more likely they are to care. Consequently, the plan emphasizes support for conservation education efforts aimed at fostering that



The State Wildlife Grants Program mandated that the focus of the *Wildlife Action Plan* be the state's *priority species of highest conservation need*. The commission worked with expert biologists statewide to identify *371 priority species*.



MELISSA MCGAW



TODD PUSSER



MELISSA MCGAW



MELISSA MCGAW



NCWRC

Piedmont streams will benefit from conservation efforts detailed in the plan, as will the Brimley's chorus frog and the marsh rabbit.



TODD PUSSER



MELISSA MCGAW

TEAMING WITH WILDLIFE

Teaming With Wildlife is a coalition of more than 4,500 organizations working to prevent wildlife from becoming endangered by supporting increased state and federal funding for wildlife conservation. This coalition includes wildlife managers, conservationists, hunters and anglers, businesses and many others who support the goal of restoring and conserving our nation's wildlife.

Historically, state fish and wildlife agencies have been on the front lines of conservation as stewards of wildlife. Effective state and local conservation work requires creative problem solving, including public and private partnerships, community will, ample funding, research, and dogged determination to work out practical management strategies. Teaming With Wildlife is committed to helping this happen.

With the leadership of state fish and wildlife agencies, wildlife action plans will bring together a diverse group of conservation partners including conservation organizations, hunter and angler groups, and state and federal agencies. The Teaming With Wildlife coalition supports these efforts, which will ultimately benefit both wildlife and people.

To find out how you can get involved with Teaming With Wildlife or supporting North Carolina's wildlife conservation efforts, visit www.teaming.com and click on "State Wildlife Action Plans."

habitat/river basin framework, but there were exceptions. North Carolina is being developed at a rapid rate. A section on urban wildlife management was included to emphasize that with a little proactive cooperation and planning, urban areas can be wildlife friendly. Since most of the state's wildlife resources are not found on public lands, a section pertaining to private-lands management was included to provide guidance for landowners wishing to engage in conservation on their property.

Land acquisition by direct purchase is another important conservation tool. The plan includes a section on land conservation strategies to review the uses of land acquisition, identify the players in North Carolina and discuss opportunity areas and planning. This section provides two excellent case histories



from the Sandhills and the Onslow Bight. A final section on education, outreach and recreational strategies addresses the plan's aggressive education priorities and goals.

Together, the habitat / rivers sections and these four statewide conservation strategies provide the Wildlife Commission with a tangible conservation vision that can be shared with other agencies and citizen groups that are also committed to conservation of wildlife resources. The Wildlife Action Plan can serve as a consistent, statewide blueprint for building long-term partnerships to carry out conservation actions in North Carolina.

THE PLAN AND NORTH CAROLINA'S FUTURE

North Carolina is home to a rich diversity of wildlife. As more people move to the state, we must be prepared to meet the challenges of balancing human and wildlife needs. The biggest threats to wildlife are the loss and degradation of their habitat. Animals need safe places to live, gather food and raise their young. Through the proactive strategies in the Wildlife Action Plan, we can keep animals from becoming endangered or extinct. While conservation efforts directly benefit wildlife, protecting land for animals doesn't just help creatures—it is good for people, too.

Clean air and water for wildlife also means a healthier place for us to live. Pollutants pose a threat to all living things. Our drinking water comes from rivers and underground wells. A clean environment gives humans and animals safe and beautiful places to live, play and grow. Natural landscapes where animals live can also provide important protection for people. Marshes, barrier islands and vegetation along stream banks can lessen the damaging impacts of hurricanes and floods. Wetlands are natural filters for drinking water that we pump from underground.

Protecting animals and their homes now will ensure that we leave a rich natural heritage to enchant and inspire generations to come. The shared memories of family camping trips, hikes to waterfalls and discovering box turtles in the backyard are a legacy we owe our children. ♦

Carol Price is the Wildlife Action Plan coordinator for the N.C. Wildlife Resources Commission. Scott Van Horn is research and survey supervisor for the commission's Habitat Conservation Program.

STATE WILDLIFE GRANTS: MATCH OR MISS OUT

The State Wildlife Grants Program that required the development of the Wildlife Action Plan in order to receive funds also has another very important catch to it: money. The federal grants available through the program are matching grants—that is, state agencies must raise an equal amount of money to the amount requested in order to receive the grant for a given year.

In the past, the grant has been a three-to-one match—if North Carolina comes up with \$100, the feds will chip in \$300. That match ratio changes in 2007 to one-to-one: For every \$100 a state raises, the State Wildlife Grants Program will add \$100. So the \$100 that resulted in a \$400 budget last year now only amounts to \$200. States now must raise twice as much money to keep their budget the same.

The Wildlife Diversity Program, which handles nongame and endangered animals for the N.C. Wildlife Resources Commission, has only two sources to raise matching funds: a tax check-off and license plate sales. The tax check-off is located at block 26 of your North Carolina income tax form. It reads "Contribution to the N.C. Nongame and Endangered Wildlife Fund" and is a straight donation that the N.C. Department of Revenue forwards to the Wildlife Commission. The license plate features the Endangered Wildlife Fund's logo of a cardinal on a dogwood flower and is available through the state Division of Motor Vehicles. Each plate purchase results in a \$10 donation to the fund each year.

Currently, the Wildlife Diversity Program does not have enough funds on hand to match the federal dollars available at the new match ratio. Furthermore, those federal dollars are subject to federal budget constraints and are not guaranteed. Finally, full implementation of North Carolina's Wildlife Action Plan will require much more funding than is currently available through the State Wildlife Grants Program, so Teaming With Wildlife continues to work toward long-term wildlife funding. It is critical for conservation-minded citizens to continue to donate through the tax check-off.

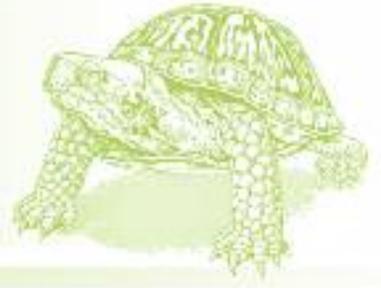
"We absolutely cannot afford for people to get the perception that now that we have State Wildlife Grants that we're financially set," said Chris McGrath, statewide coordinator of the Wildlife Diversity Program. "The check-off dollars are declining. That perception could lead to further declines which could mean that we aren't able to match all of the federal dollars available, but more importantly, we are not able to implement the priority actions identified in our Wildlife Action Plan."



While *conservation* efforts directly *benefit wildlife*,
protecting land for animals doesn't just benefit the
creatures—*it is good for people, too.*

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.

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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

written by JEFF SCHWIERJOHANN *and* STEVE FRALEY

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

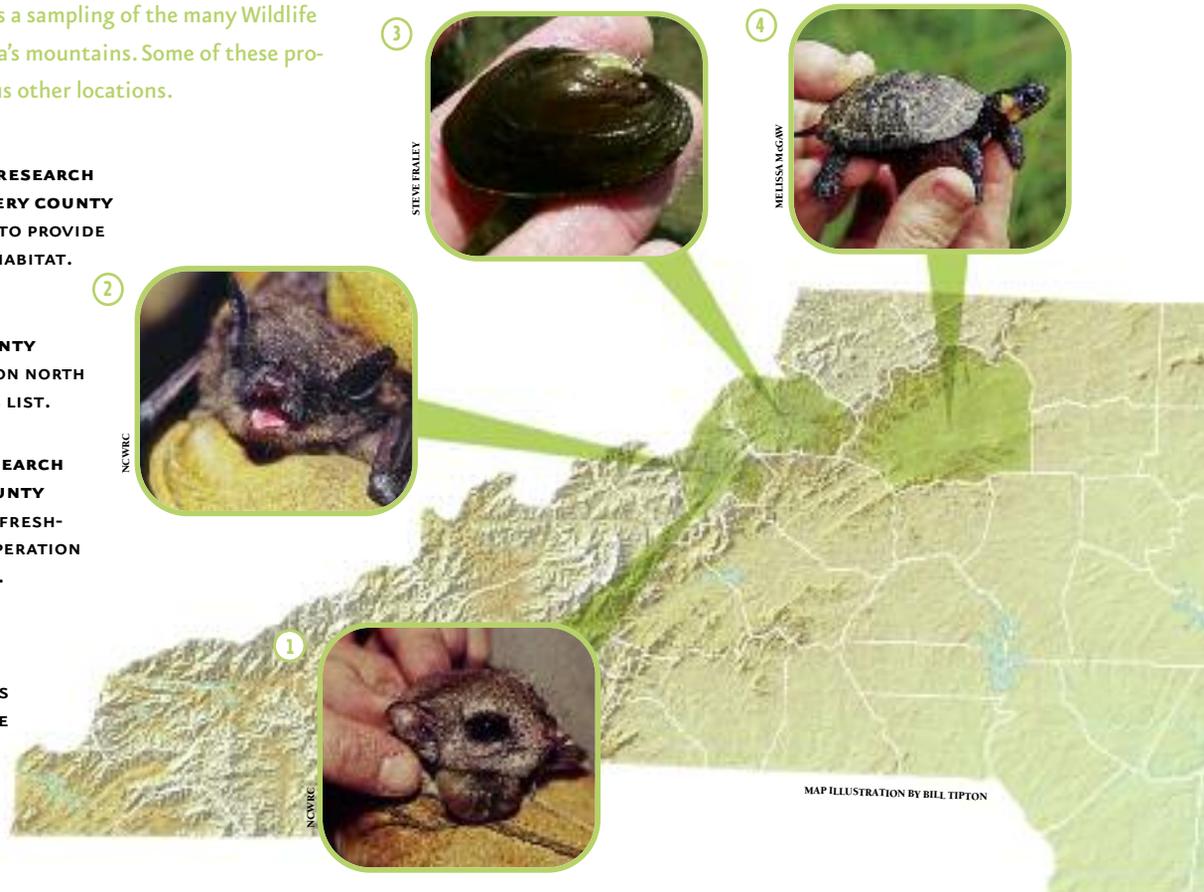
PEAKS OF DIVERSITY This is a sampling of the many Wildlife Diversity projects in North Carolina’s mountains. Some of these projects are also occurring in numerous other locations.

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.



3



STEVE FRALEY

4



MELISSA MCGOWAN

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NCWRC

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MAP ILLUSTRATION BY BILL TIPTON

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

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.

continued on page 15



FOUR-TOED SALAMANDER
(*Hemidactylum scutatum*)

JONATHAN MAYS

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.



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*.

TODD PUSSEY



TODD PUSSEY



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

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



MELISSA MCGAW



STONECAT
(*Notrus flavus*)

STEVE FRALEY

continued from page 12

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 pearl mussel (*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 haematoria*). 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. ♦

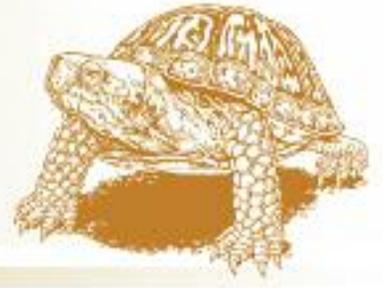
Jeff Schwierjohann and Steve Fraley lead the Mountain region Wildlife Diversity Program in the NCWRC’s divisions of Wildlife Management and Inland Fisheries, respectively.



JONATHAN MAYS

Diversity and Development

WILDLIFE ACTION PLAN KEEP COMMON ANIMALS COMMON



North Carolina's Piedmont, located in the heart of the state, contains a vast array of wildlife habitat that must be protected from haphazard development.

This is the third 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
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Sunlight dapples the ground with molten gold beneath a canopy of oak and hickory trees. A sweet, soft breeze tickles the leaves into a twisting dance, lifting their edges to reveal the brilliant colors of an Eastern bluebird who sings with the unrestrained joy of newfound love. Skittering around the base of the tree is a brown Carolina anole, snapping up ants on the bark. He pauses, startled by the sudden reflection of light off the surface of a clear stream running nearby. Beneath its cool waters plays a rainbow of brightly colored native minnows gathering over clean gravel patches in search of this year's spawning mate. They are ever watchful, though, for the shadow of a hungry

Roanoke bass that lurks behind larger rocks, waiting for the perfect moment of minnow inattention.

Is this idyllic scene in one of North Carolina's state parks or a nature preserve? No, this could be in your own back yard or across the street from where you live. Not only are these treasures of the Piedmont region a recreational and scenic amenity to your community, their presence near you is vital to your quality of life and the health of your family.

The Piedmont includes roughly two-fifths of our state. It stretches from the foothills of the southern Appalachian mountains to the fall line demarking the beginning of the Coastal Plain. Its incredible diversity of

habitats includes elevations ranging from 150 to 1,000 feet above sea level. These include rolling slopes draped with rich oak-hickory forests like the one described above, low floodplain forests rippling with the calls of gray treefrogs, large rivers hiding secretive fish of unguessable size, and wetlands stalked by bright-eyed night herons.

Within North Carolina's Wildlife Action Plan, each of the eight terrestrial habitat types and eight river basins that exist wholly or in part in the Piedmont is described, along with its associated species, problems and necessary conservation actions. While the species composition and unique efforts required varies for each habitat, a theme begins to

written by **BRENA JONES**

emerge. It is a picture of a single, overarching threat that hovers over the entire region: the insatiable monster that is poorly planned, sprawling development.

But this is not an unavoidable cost of doing business in our rapidly growing state. Organized, carefully planned, thoughtful development can coexist with a healthy environment and functional wildlife habitat. These habitats and creatures cannot be allowed to fade quietly into extinction for one simple reason—we can't live without them.

ESSENTIAL ELEMENTS FOR LIFE

It all boils down to if you'd like to have clean water and clean air. Water supports populations of humans and wildlife, and it feeds the

plants that make our oxygen. Healthy streams and intact forests are the most efficient, least expensive, most feasible way to ensure that people continue to have access to clean water to drink, healthy air to breathe, rivers to fish and boat on, and a myriad of beautiful fish, wildlife and plants to enjoy and sustain us. Humanity has known throughout history that clean water is essential to survival because it is needed for drinking, washing, irrigation and a host of other necessities.

Think of your natural surroundings like a living body with waterways as the circulatory system. Headwaters and small streams are the capillaries, indispensable passageways for water, energy and organisms such as fish and aquatic insects. They connect to the larger

veins and arteries of rivers. These vessels connect and nourish forests and other upland habitats, which in turn serve as the kidneys and liver for the streams, trapping toxins such as sediment and other pollutants before they enter water supplies. Without your circulatory system to carry energy and oxygen, your organs will quickly fail, and your entire body will suffocate and perish. So too would the natural world without its analogous circulatory system.

We often think of things like wildlife and habitat as disconnected from our daily lives, but the reality is quite the opposite. The evidence comes right out of your kitchen faucet—that water we take for granted comes directly from North Carolina streams, rivers and

CENTER OF CONSERVATION This is a sampling of the many Wildlife Diversity projects occurring in North Carolina's Piedmont. Some are N.C. Wildlife Resources Commission projects, while others are cooperative ventures.

1 **SPOTTED TURTLE RESEARCH**
CARY, WAKE COUNTY
BIOLOGISTS ARE STUDYING HOW THIS AQUATIC REPTILE USES UPLAND HABITAT.

2 **CAPE FEAR SHINER RESEARCH**
DEEP RIVER, MOORE COUNTY
HAS THIS IMPERILED FISH RETURNED TO ITS HISTORIC RANGE FOLLOWING REMOVAL OF A DAM?

3 **EASTERN HOGNOSE SNAKE RESEARCH**
SANDHILLS REGION, MOORE COUNTY
WHAT EFFECT HAS PRESSURE FROM URBAN DEVELOPMENT HAD ON NATIVE SNAKES?

4 **BACHMAN'S SPARROW RESEARCH**
SANDHILLS GAME LAND,
RICHMOND COUNTY
INTENSIVE LONGLEAF PINE MANAGEMENT MAY HAVE INCREASED POPULATIONS OF THIS BIRD.



MAP ILLUSTRATION BY BILL TIPTON

NOT ALL OPEN SPACE IS CREATED EQUAL

Many people in the rapidly developing Piedmont are recognizing the importance of protecting undeveloped areas that provide wildlife habitat, scenic vistas and opportunities for outdoor recreation. This wide range of unpaved areas, often called “open space” or “green space,” can be private or public and may be managed in different ways. Many counties and municipalities protect open space as working farms, public parks and greenways, or as undeveloped portions of private lands. Some local governments require developers to help buy open space or set aside an undeveloped portion of new subdivisions.

However, not all undeveloped land will contribute equally to wildlife conservation or wildlife-related recreation. Some entities define open space to include golf courses and soccer fields. The Wildlife Action Plan provides guidance to help maximize the conservation bang for the open space buck.

LOCATION MATTERS

- Open-space protection should be steered toward intact natural habitats of significant size. With the guidance of the Wildlife Action Plan and the aid of many partners, Wildlife Commission biologists are consolidating maps of priority species and habitats in the Piedmont to assist natural-area protection.
- Placement of protected open space along streams and rivers often helps achieve multiple conservation benefits for terrestrial and aquatic habitats.
- Open space should be clustered. It is often better for wildlife to have one large block of natural habitat than several smaller, fragmented blocks. Likewise, wider greenways are better than narrow ones. However, even small protected areas provide some value.
- Open space should be connected. Wildlife needs to be able to travel between habitat patches. Linking protected areas with corridors also creates an opportunity for a greenway or recreation path. This often requires planning across jurisdictional boundaries.

MANAGEMENT MATTERS

- Within open space, managers should maximize the amount of natural vegetation and minimize the amount of frequently mowed area.
- Many municipalities think that parks should include ball fields and recreation centers. Outdoor recreation opportunities such as hiking, bird watching and canoeing are important, too.
- Management should be appropriate to the natural habitats present. Managers and landowners should look for habitat-restoration opportunities.

Just as it is important to plan housing, roads and businesses so people can function well, it is equally important to plan for green infrastructure to ensure that wildlife species and natural systems will continue to function well. The Wildlife Action Plan helps to promote this proper planning for wildlife.

—Jeff Marcus

reservoirs. Under the surface of these waters, freshwater mussel populations filter enormous amounts of water, feeding on algae and bacteria and keeping streams clear. These mussels have their limits, though. Continuous inputs of sediment, ammonia, pesticides and other chemicals can strain these sensitive organisms to the breaking point, making mussels an excellent barometer of our waterways' conditions. Current declines in our native mussel populations are a red flag signaling to us that all is not well in our waters.

Sport fish such as bass, bluegills and crappies depend on the presence of abundant aquatic insects and smaller forage fish in order to survive. These insects in turn depend on pollutant-free water. Are you beginning to see a pattern? Let's look at those forests surrounding the streams.

Creatures underwater depend on leaves and woody debris dropping from nearby trees, providing food and places to hide. But why should it matter to us if a stream bank is forested or not? For one thing, wide buffers on streams dramatically abate flooding problems in several ways. Tree roots and vegetation stabilize the stream channel, preventing the erosion that creates tall, cliff-like banks and cuts off a stream from its floodplain. When a stable channel with low banks fills with water, it quickly spills over into the floodplain, where water spreads out and slows down. This slow water can be much more easily absorbed into the soil. Slow water also readily drops what it is carrying: sediment and debris that can be deposited in the riparian forest before it reaches a river or reservoir.

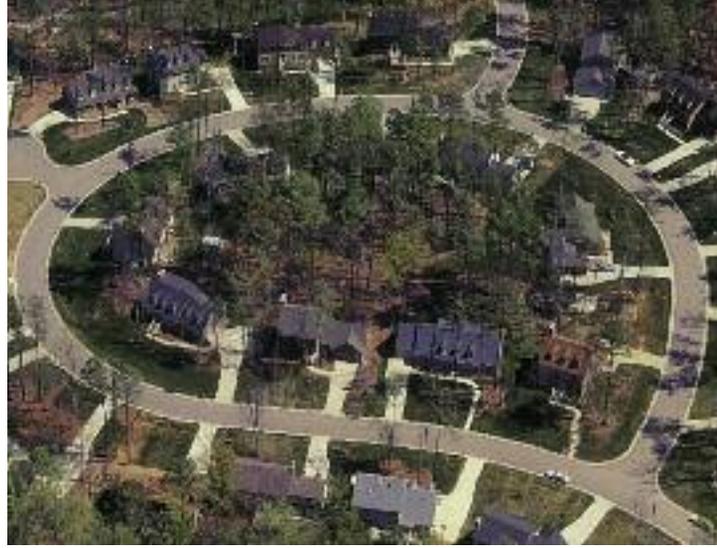
A flooding stream trapped in a deep, eroded channel has no way to slow down, and as we know, fast water is powerful. It will simply cut away at its own banks even further, and when it reaches the end of its mad race, it will dump all of its dirt and debris into a reservoir. In addition, this fast-moving water will have no chance to filter back into the soil and replenish the groundwater, the consequence of which will be clear to anyone who relies on a well for water.

Counterclockwise from top right: Rapid residential development threatens water-loving creatures such as the wood frog (shown in mid-transformation) and the Carolina heelsplitter. This clear-cut around a creek makes it more difficult for birds such as the yellow-crowned night heron to live in the Piedmont.



NCWRC

JONATHON MAYS/NCWRC



KEN TAYLOR/NCWRC

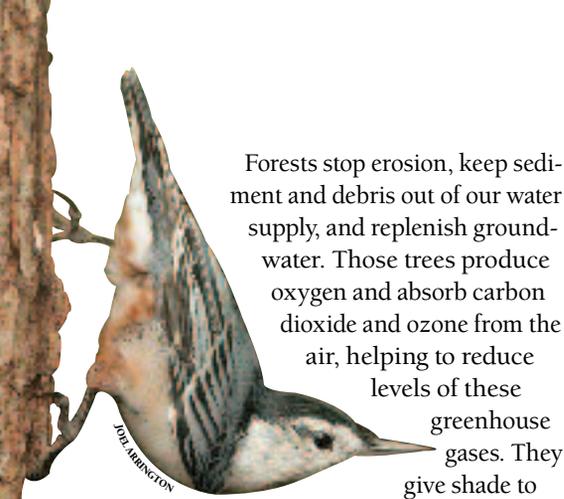


KEN TAYLOR/NCWRC

These habitats and creatures cannot be allowed to fade quietly into extinction for one simple reason— we can't live without them.

MELISSA MCGAW





Forests stop erosion, keep sediment and debris out of our water supply, and replenish groundwater. Those trees produce oxygen and absorb carbon dioxide and ozone from the air, helping to reduce levels of these greenhouse gases. They give shade to the stream, maintaining water temperatures at livable levels for fish, salamanders, insects and mussels. A riparian buffer also provides diverse habitat for songbirds, deer, frogs and other beneficial and beautiful wildlife that many people enjoy hunting or viewing. It is also important to note that nationwide economic studies have proven that living within reach of such amenities as this natural bounty of recreational and scenic opportunities raises your own property values.

And it does all this for free. Conserving natural forests, wetlands, streams and prairies is exponentially cheaper than paying for engineered stormwater treatment, multi-stage drinking water purification, repair of flood damage, environmental mitigation and pricey sediment retention practices that are only a fraction as effective as natural processes.

MAKING OPPORTUNITIES

But aren't North Carolina's numerous parks and preserves enough? (See "Not all open

space is created equal," page 12). The sad truth is that the human population across our state is exploding while available natural resources continue to shrink. Many Piedmont streams are already listed as degraded and unable to support recreation or aquatic life, and forests are being lost daily. If we are to continue to have access to clean water and air, we must do better at protecting the diversity and habitats that we still have. Isolated parks won't do the trick—these habitats must be large enough and connected enough for animals to move freely from system to system.

As communities struggle to keep pace with off-the-charts growth, scrambling for water, sewer, space and roads, they lose control of how this growth occurs and where it settles its bulky footprint. In a rush to cash in on the housing boom, developers stripped massive tracts of land of vegetation, causing tons of sediment to flood into streams and rivers. As forested stream buffers fall to bulldozers, flooding increases in severity and frequency, water becomes increasingly polluted by runoff, and the threat to municipal water supplies grows.

Tentacles of scrape-and-build subdivisions extended out from cities, unchecked by site-specific planning, proactive stormwater control or effective resource conservation measures. Where they landed, much has been lost and communities are paying the price in traffic congestion, ozone warnings and contaminated streams.

The white-breasted nuthatch and the marbled salamander suffer from the loss of Piedmont habitat such as this wetland.

The sad story is long and filled with missed opportunities. The developers, residents and municipalities that contributed to this sprawling growth were certainly not driven by bad intentions. Most of the new home buyers were simply seeking an affordable house in a safe, peaceful neighborhood away from the concrete jungle of the city center. Ironically, the pursuit of a natural haven away from the city has brought the pavement and traffic with it. The cumulative impacts of poorly planned sprawl now threaten many of the important wildlife species and habitats in the Piedmont and diminish the values many homeowners were pursuing.

Piedmont residents have a chance to push the pendulum the other way, to change how we grow and to build communities that are livable and attractive without sacrificing essential natural resources. And the Wildlife Action Plan gives us one tool to help get it done. ♦

Brena Jones, Kacy Cook and Jeff Marcus work in the Piedmont for the NCWRC's Wildlife Diversity Program. Jones is regional nongame aquatic biologist, Cook is regional land conservation biologist and Marcus is region supervisor.

TOWN PLANNING WITH CONSERVATION IN MIND

When determining how any area should be developed, it is important to consider not only where new homes and businesses will be located, but how they should fit into the overall fabric of the landscape. This is where watershed and regional planning comes into play. Ecologically sound decisions can save money, increase property values and expedite permit processes and sales. A land use plan that addresses growth needs and conservation needs can be a powerful tool in guiding a community forward without sacrificing natural resources and the quality of life.

Each town also has the ability to protect important resources and habitat by controlling stormwater and preserving floodplains, forested areas and headwaters using tools such as ordinances and zoning. Overlay and cluster zoning gives local governments the tools to grow while preserving the integrity of their watershed. For example, the Town of Cary has enacted an ordinance stating that the riparian zones along streams may not be included in platted lots, preserving these natural areas for public enjoyment and watershed health.

— Brena Jones

READ AND LEARN MORE

Cary's riparian buffer ordinance:

www.townofcary.org/depts/dsdept/engineering/engproj/stormwater/bufferfacts.htm

Low-impact development:

www.epa.gov/owow/nps/lid/

Minimizing impervious surfaces:

www.stormwaterauthority.org

Smart Growth for communities:

www.smartgrowth.org

Cluster development and conservation subdivisions:

www.uwsp.edu/cnr/landcenter/tracker/summer2002/conssubdiv.html

Bioretention areas and rain gardens:

www.bae.ncsu.edu/topic/raingarden/

Tools for land-use planning:

www.smartcommunities.ncat.org/landuse/tools.shtml

GETTING AHEAD OF GROWTH

The Greater Uwharries Conservation Partnership works to preserve a pristine patch of the Piedmont

Life in the Uwharries is different. People know their neighbors, many of whom still make a living from the land. There are more than 50,000 acres of national forest and game lands where most rivers and streams have high water-quality ratings. Rare North Carolina freshwater mussels and fish are supported by diverse aquatic insects and systems. Despite this, the region faces the same growth issues as cities and suburbs because the infrastructure and development ordinances that spur sprawl exist there, too.

The greater Uwharries region is one of North Carolina's greatest opportunities. For now development is manageable, and lifestyles and culture are rural, but the health of the region's wildlife habitat depends largely on private land management and planning. Haphazard growth leads to degradation of terrestrial and aquatic wildlife habitat, but there can be responsible development if local governments encourage open space conservation, and growth is based on land-use plans.

To that end, the Greater Uwharries Conservation Partnership is focused on helping the region harness its opportunity for balanced land use and growth founded in high-quality wildlife habitat and a high-quality of life. Comprised of 12 conservation- and economic-based organizations and agencies working together, the partnership targets funding for conservation and sustainable economic growth in the region and brings information in North Carolina's Wildlife Action Plan to the counties and landowners of the south central Piedmont.

Until recently, the greater Uwharries thrived mainly on agriculture and manufacturing. The region now has the opportunity to expand and revitalize its economy by inviting new residents, retirees, tourists and recreationists who appreciate the natural, tranquil character of the area. The possibilities are exciting. By planning with conservation and place-based economics in mind, community leaders can secure the way for economic growth and

needed jobs, many of which are attracted by an aesthetically and culturally pleasing environment.

Failure to conserve these natural and cultural assets while the region grows will likely relegate this region to the sprawling suburban development of strip malls, traffic congestion and poor water quality which are common symptoms of unplanned growth in neighboring counties. Without comprehensive planning, this unique rural area could begin to look and feel the same as its metropolitan neighbors.

WHAT YOU CAN DO

- Sign on as a supporter of Teaming with Wildlife, the coalition which secures State Wildlife Grant funding from the U.S. Congress.
- Be informed about land-use and planning policies and ordinances affecting your county and municipality. Obtain information from your local, state and federal government offices. County commission board meeting minutes can usually be found on the county's Web site. Sign up for newsletters from your state legislators. It's surprising how informative meeting minutes and legislation can be.
- Write your county commissioners and state representatives to share your opinion and constructive ideas.
- Contact your local land trust, the Wildlife Commission or the N.C. Department of Environment and Natural Resources for technical guidance if you are interested in trying to conserve resources. These organizations are less interested in regulating landowners and development than they are in working cooperatively with landowners and government to find win-win solutions.
- Pay attention to road and development infrastructure plans and land sales so you have time to weigh in on any planning decisions.

—Kacy Cook

JACK DERMID



MELISSA MCGAW/NCWRC



Variety in the Plain

WILDLIFE ACTION PLAN KEEP COMMON ANIMALS COMMON



In North Carolina's Coastal Plain, water is the hub around which conservation of land and animals revolves.

This is the fourth 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.

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SEPTEMBER	COASTAL PLAIN REGION
NOVEMBER	STATEWIDE PROJECTS AND PARTNERSHIPS

If you are traveling across the Fall Line, where would you fall? Well, you might tumble down a cascade or two, but you would enter into a region of North Carolina that makes up about 45 percent of the state—the Coastal Plain. The Fall Line, which is actually a zone a couple of miles wide, separates the Piedmont from the Coastal Plain.

Up above the Fall Line, the rivers bubble out of the rocks and springs in the Piedmont and tumble down ancient bedrock and cobble. As water flowing east approaches the Fall Line, somewhere around Interstate 95, rivers exchange their rocky falls and cascades for sandier bottoms and logjam riffles. Large, ancient-looking cypress trees and their knees

border the rivers and the wide floodplains, as the surrounding terrain flattens.

The Coastal Plain landscape is home to some of the state's rare creatures and unique habitats. Endangered creatures found only in eastern North Carolina, such as the Carolina madtom and the federally endangered Tar River spiny mussel, call the region home. The rivers wind eastward past Tarboro, Greenville and Kinston, Cliffs of the Neuse and Great Dismal Swamp. They meander by Washington, New Bern and Jacksonville, Bladen Lakes and Croatan National Forest.

On the last leg of these rivers' journeys before entering the sounds, the full effect of tannins from the trees are seen in the

tributaries and swamps. Water becomes so black that the surface looks like a mirror. The rivers run to the coastline and mingle together in the estuaries and sounds. It is here that submersed vegetation is found, providing refuges and nursery areas for a host of shorebirds and waterfowl, sea turtles, salt-water fish and shellfish.

The Coastal Plain hosts 16 different types of unique habitat such as floodplain forests, longleaf pine stands, grasslands, forested wetlands, coastal dunes and savannas. Dotting the landscape are mysterious Carolina bays and pocosins, which boast unique aquatic fauna such as the Carolina pygmy sunfish, Phelps killifish, Waccamaw silverside and

written by **ROB NICHOLS**

Waccamaw fatmucket mussel. Many terrestrial creatures use these habitats as well: the prairie warbler, red-headed woodpecker, hooded warbler, star-nosed mole, long-tailed weasel, Southern bog lemming, oak toad and many-lined salamander. Ancient sand dunes in the Sandhills boast an amazing diversity of wildlife, including the fox squirrel, Carolina crawfish frog, Northern pine snake, bald eagle and Rafinesque's big-eared bat.

Unfortunately, these places are also some of the most endangered ecosystems in the country. Many of the threats to these systems

are related to human population growth — land development, fragmentation, sedimentation, increased wastewater discharges and water withdraws. Many unique Coastal Plain species do not react well to habitat changes and loss. Fortunately, the state is planning ahead by using partnerships and land conservation to preserve many of these habitats, creatures and ecosystem functions.

The Wildlife Action Plan addresses these threats to our unique Coastal Plain habitats and wildlife. But planning and action are not just for the sake of animals; people will benefit

too. As we work to protect wildlife and the places it lives, we will be working to protect our drinking water, our recreation areas, our farmland and our quality of life.

CATFISH IN A COAL MINE

The Tar and Neuse rivers exist entirely within North Carolina. They are born in the Piedmont and flow through the Coastal Plain into the Pamlico Sound. The rivers host many of the same fish, freshwater mussels and other aquatic organisms. On both waterways, the fall zone is an area where many rare fishes and

SURVEYING THE SEABOARD This is a sampling of the many Wildlife Diversity projects occurring in North Carolina's Coastal Plain. Some of these projects are also occurring in numerous other locations.

1 OYSTERCATCHER RESEARCH
OREGON INLET, DARE COUNTY
COASTWIDE SURVEYS ARE CONDUCTED TO MONITOR POPULATIONS OF NESTING WATERBIRDS.

1



JUAN PONS

2 RED-COCKADED WOODPECKER RESEARCH
CRAVEN COUNTY
WILDLIFE DIVERSITY PROGRAM BIOLOGISTS WORK WITH PARTNERS TO PROMOTE CONSERVATION OF THIS RARE BIRD.

2



KEN TAYLOR/NCWRC

3 MADTOM RESEARCH
NEUSE RIVER, WAYNE COUNTY
SURVEYS ON THE TAR AND NEUSE ARE CURRENTLY UNDER WAY TO UPDATE INFORMATION ON THIS FISH'S STATUS.

3



ROB NICHOLS/NCWRC

4 SEA TURTLE RESEARCH
TOPSAIL BEACH, ONSLOW COUNTY
BIOLOGISTS DOCUMENTED MORE THAN 150 SEA TURTLE NESTS ON N.C. BEACHES IN 2007.

4



KEN TAYLOR/NCWRC

MAP ILLUSTRATION BY BILL TIPTON

CHANGING CLIMATE, CHANGING COAST

As a result of global warming, temperatures are expected to increase over the next century by 3 to 9 degrees Fahrenheit, and sea level is expected to rise by 7 to 24 inches. These environmental changes would have significant impacts on the beaches and coastal communities of North Carolina. Storm surges may alter the location of inlets, and the sounds are likely to be saltier. If climate change continues unabated, many of our barrier islands and much of the far eastern Coastal Plain would be underwater.

But what about the other residents of our coastal communities—the wild creatures that live on the beaches and in the sounds? While people will have the option to move away from the coast as water levels threaten their homes, wildlife will be more limited because it is often closely tied to the ecosystems it inhabits.

The most serious threat to wildlife is loss of habitat. Rising sea levels would drown beaches and marshes critical for nesting and feeding. While new beaches and sounds would form eventually, it is impossible to know if they will provide suitable habitat to support the animals that currently use our ocean habitats. Increased storm intensity may further threaten nesting success for animals like sea turtles and coastal birds.

Interestingly, even the gender of sea turtles may be impacted as temperatures rise. Clutches that incubate in higher sand temperatures produce more female than male turtles. Under current conditions, Florida nests produce mostly females while North Carolina nests at the cooler, northern extent of nesting grounds hatch nearly half males. As temperature rises, N.C. nests would tend to produce more females. It will be important that suitable nesting areas be available at higher latitudes, where turtles do not currently nest. Protecting potential nesting sites now is one way humans can plan ahead for coastal wildlife.

American oystercatchers, piping plovers, black skimmers and least terns are some of the beach-nesting birds that would be impacted as sea level rises. Hotter weather is stressful for nestlings. These waterbirds rely on marsh and estuary ecosystems for food. Increased storm activity, sedimentation in estuaries and changes in salinity are likely to affect the prey species that waterbirds feed on.

The distribution patterns of coastal songbirds also may be altered as the climate changes. The summer ranges of some species may shrink or increase in North Carolina as the rise in temperatures affects the plant and insect communities these birds rely on for food and shelter. Waterfowl would have to adjust their migratory behavior in response to temperature and water conditions. Another big concern in North Carolina is the availability of suitable marsh habitat and winter food resources for ducks, geese and swans as the aquatic habitats throughout the Coastal Plain change.

It is very difficult to foresee the full extent that climate changes would have on North Carolina's wildlife diversity. But there are ways to help wildlife maximize its chances of surviving the impact of climate change. By conserving existing coastal habitats and creating buffer areas with no development, especially near shorelines, protected habitat will be available inland. And most importantly, any steps that we can take now to slow global warming can lessen the impact of climate change for humans and wildlife.

—Carol Price



JACK DERMID

BLACK-NECKED STILT
(*Himantopus mexicanus*)

mussels are found and where rapid development is occurring. Centers of diversity such as Swift Creek and Fishing Creek in the Tar basin are becoming endangered.

The history of human activity in the two river systems looks quite different. The Neuse River has its origins near the rapidly growing Raleigh-Durham area. This population expansion in the Neuse basin has driven an increased need for drinking water, pollution controls and rapid land development. Sediment and excess nutrients in the Neuse—consequences of rapid growth—have resulted in degraded water quality. The Neuse is now on the top-10 list of the most endangered rivers in the country. Disappearing populations of rare fishes such as the Carolina madtom have reflected the changes in water quality and habitat.

Current projections show an upward population growth in the upper sections of the Neuse and Tar rivers. Because the Tar River basin has been sheltered from many of the impacts that are happening in the Neuse, the Tar has been able to retain some rural characteristics. However, pressure to develop land in the Tar basin is predicted to follow the same path as the Upper Neuse. To see the effects of changes in the Tar and Neuse basins, biologists can monitor populations of sensitive animals.

Like a canary in a coal mine, the Carolina madtom can serve as a warning that things are not well. Biologists are surveying 60 sites in the Tar and Neuse basins and comparing the results to where the fish occurred in the past. The madtom is nocturnal, well camouflaged, and hides in nooks and crannies during the day. To find the fish, biologists put on wetsuits and snorkels and shine dive lights into cavities underneath packs of leaves, sticks, logs and large rocks.

For the madtom to survive and successfully raise young, its hiding places cannot be buried in silt and sediment. Excess nutrients that cause algal growth, and chemicals from wastewater can inhibit reproduction. The madtom has disappeared from many areas in the Neuse River but is faring better in the upper section of the Tar River and its tributaries.

Coastal conservation initiatives are designed to protect animals and habitat such as the piping plover (chicks and eggs in a nest), the marsh rabbit, the barking treefrog and natural Carolina bays such as Singletary Lake.



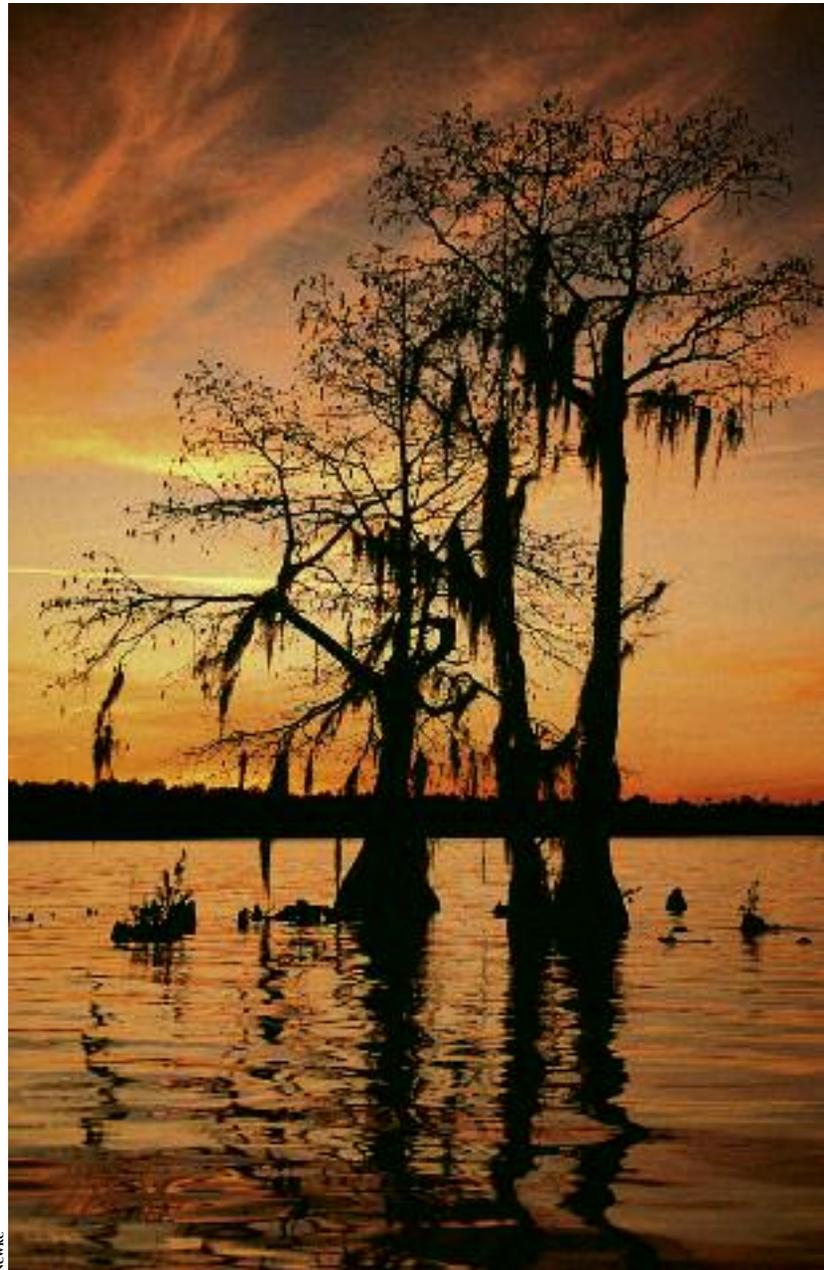
JAMIE CAMERON



JACK DERMID



JUAN PONS



NCWRC

As we work to *protect wildlife and the places it lives*, we will be working to *protect our drinking water, our recreation areas, our farmland and our quality of life.*

UNPRECEDENTED LAND ACQUISITION HELPS PUT WILDLIFE INTO ACTION

During 2007 and 2008, the N.C. Wildlife Resources Commission will acquire 66,000 acres of land formerly owned by International Paper. The purchase represents the largest land conservation action in the Wildlife Commission's history. This massive, landscape-scale acquisition provides an opportunity to put an important part of the N.C. Wildlife Action Plan into practice. The tracts are associated with four major river basins: Chowan, Roanoke, Tar and Juniper Creek in the Lumber basin. Purchasing such large acreages on major waterways also helps protect water quality.

The scale of this acquisition has tremendous benefits for managing wildlife in our state. Acquisition of large pieces of property allows the commission to acquire contiguous, unfragmented habitat that is useful for species that require large interior tracts. These sizable tracts also enable fish and wildlife populations to attain healthier population sizes.

Chowan River

The Chowan River tracts total 15,000 acres of high quality wetlands that serve as a critical nursery for anadromous fish such as river herring, American shad and hickory shad. The eastern portion of the Chowan tracts, known as the "sandbanks," represents the northernmost range of longleaf pine and may prove to be a critical area for recolonizing red-cockaded woodpeckers.

Roanoke River

The bottomlands that border the Roanoke River are part of the most ecologically diverse bottomland hardwood river system in North Carolina, hosting large populations of wild turkeys and deer. These tracts are just upstream of another 50,000 acres of conservation land owned by both the state and federal governments. Protecting this extensive, high-quality habitat corridor also allows for the protection of many species if rising sea levels alter the composition of lower Roanoke game lands.

Tar River

The tracts that will be acquired on the upper Tar River in Warren, Franklin, Nash and Halifax counties help protect water quality in the healthiest streams in North Carolina's Piedmont. Many of the streams running through these properties still provide habitat for a wide range of freshwater mussels, species that are vulnerable to sedimentation coming in from land disturbance and development. These species have long disappeared from many other streams in our state.

Juniper Creek

Juniper Creek represents a large, 18,500-acre bottomland hardwood forest amid the timber plantations and the phenomenal residential development of the state's fastest growing county, Brunswick. As such, it represents a large refuge for interior-dwelling birds such as the Acadian flycatcher and the prothonotary warbler, and is a critical watershed that drains into the Waccamaw River and its nationally significant swamplands.

—George Norris



ROB NICHOLS/NCWRC

The Carolina madtom's population density in coastal rivers indicates water quality.

The Wildlife Action Plan recognizes the sensitive habitat that the Carolina madtom and other creatures inhabit in Swift and Fishing creeks in the Tar basin as unique on the East Coast. Since it is easier to protect wildlife than to restore habitat and populations, the proactive measures in the Wildlife Action Plan provide an opportunity to protect the Tar basin from further impacts. Preserving the quality of the Tar River is one of the goals of the plan.

To do this, conservation partners such as the Tar River Land Conservancy (see "Coordinating Conservation on the Tar," June 2007) and The Nature Conservancy work to broker deals for conservation easements and buffers. Protecting land in priority areas helps reduce sedimentation, buffer the river from adverse impacts and generally maintain the integrity of river basins. It is up to all of us — conservation groups and agencies, local government, industry, agriculture, and citizens — to plan now so the unique resources of the Coastal Plain are healthy for future generations. ♦

Rob Nichols is Eastern aquatic diversity coordinator for the N.C. Wildlife Resources Commission. Jeff Hall is the coordinator of Partners in Amphibian and Reptile Conservation for the commission. George Norris is NCWRC grants and contracts biologist. Carol Price is the commission's Wildlife Action Plan coordinator.

TROUBLE IN THE WETLANDS

Wetlands abound in the Coastal Plain. There are rivers, streams, swamps, pocosins, pine flatwoods, savannas, lakes, ponds and Carolina bays. As a result of these abundant, varied wetlands, amphibian diversity in the Coastal Plain is extremely high. Frogs are particularly diverse—27 of the 30 species found in the state live in the Coastal Plain. At least 22 species of salamanders call these wetlands home. Researchers are learning more and more about these animals. In some cases, a salamander that has been regarded as a single species for many years is actually a suite of species that look similar, but do not reproduce with one another or share the same geographic distribution.

Unfortunately, Coastal Plain amphibian diversity is in trouble. Two frog species, the Carolina gopher frog and the river frog, are currently listed as threatened and of special concern, respectively (see “The Secret Frog,” April 2007, and “The Frog Nobody Missed,” Dec. 2005). Of our salamander species, the Eastern tiger salamander is listed as threatened and three others as species of special concern (dwarf salamander, four-toed salamander and Neuse River waterdog). However, there are many other species that also may be suffering declines.

An additional seven frogs (oak toad, Eastern spadefoot, barking treefrog, pine barrens treefrog, Brimley’s chorus frog, striped Southern chorus frog and ornate chorus frog) and 10 salamanders (Eastern lesser siren, greater siren, Mabee’s salamander, spotted salamander, marbled salamander, Southern dusky salamander, three-lined salamander, four-toed salamander, many-lined salamander and an undescribed species known as the Sandhills Eurycea) are priority species in the N.C. Wildlife Action Plan. Biologists are concerned about these species and will be researching them in the coming years.

Biologists have been looking closely at the Mabee’s salamander. Although a terrestrial salamander as an adult, Mabee’s salamanders, like other members of the mole salamander family Ambystomatidae, require ephemeral pools for egg deposition and larval development. Researchers from East Carolina University and the Wildlife Commission have searched ponds in Pitt County, the Croatan National Forest and Holly Shelter Game Land for signs of the continued existence of this species. Ponds containing larvae have been found in Pitt County and across the Croatan, but no larvae were found this year in Holly Shelter.

So far, much of the research points toward a connection between Mabee’s salamanders and Carolina bays, which appear to offer some of the best breeding habitat for this species.

Although the Coastal Plain is rich in aquatic habitats, not all of these hold the same value for amphibians. Nearly all of the protected and priority amphibian species listed above spend part or all of their lives in small, temporary wetlands. These ephemeral pools can be quite small and still be invaluable to amphibians. They can range in size from several acres to no bigger than a bathtub. Vernal pools usually fill in the spring, while autumnal ponds typically fill during the fall.

One of the reasons these wetlands are so rich in amphibian fauna is their hydrology. Some of these ponds dry up once a year, some of them dry up every few years, and still others may hold water for many years and only dry up occasionally. The fact that these ponds do dry up makes them wonderful sites for amphibians. When they dry, invertebrate predators such as giant water bugs, crayfish and dragonfly larvae are reduced or eliminated in many of these wetlands. Only the hardiest of fish species such as mud minnows and mosquito fish are able to endure in a few of these wetlands. Many ephemeral ponds are completely free of fish.

Ephemeral wetlands are being lost due to development and many of the most valuable of these temporary pools are found in wet pine savannas. These same savannas also host a wide variety of reptiles, mammals, birds, invertebrates and plants. Outright draining or filling in of these wetlands, along with fragmentation of our landscapes, have caused declines in amphibian species across the Coastal Plain. Increased runoff can overload these small ponds, eventually causing them to become permanently dry.

There are plenty of ways we can help amphibians: reduce the amount of chemicals added to yards, retain large upland buffer zones around wetlands, do not add fish to waters that are currently fish-free, and create small depressions on your land that will only hold water during part of the year. Amphibians will travel considerable distances to get to breeding ponds. Chances are good that if you create one of these ponds on your land, you will have breeding amphibians.

—Jeff Hall

JEFF HALL/NCWRC

MANY-LINED SALAMANDER
(*Stereochilus marginatus*)



A New Cooperation

WILDLIFE ACTION PLAN KEEP COMMON ANIMALS COMMON



Bringing together new collaborators, stakeholders and partners across the state to focus on comprehensive wildlife needs has ushered in a new era of wildlife conservation.

This is the last of a five-part series about North Carolina's Wildlife Action Plan. This final piece will focus on statewide initiatives.

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

Wildlife agencies have been around for a long time doing game and fish restoration and management, all the while supported mainly by hunters and anglers. The long-term trend is for wildlife conservation to be broader in scope. Twenty years ago, many states had small, fledgling nongame or wildlife diversity programs with minimal or no funding and few projects. Programs focused mainly on efforts to conserve and restore endangered species.

The completion of the N.C. Wildlife Action Plan on 2005 changed all that. It introduced a new approach to collaborative conservation, and a new understanding for a diverse array of interest groups that have not always read

from the same script. The advent of the Wildlife Action Plan ushered in a new era of collaboration, partnerships and comprehensive conservation focus that has never been seen before.

This series of articles has highlighted Wildlife Action Plan projects and initiatives under way in North Carolina's Mountains, Piedmont and Coastal Plain. The stories have shown a few examples of the wide range of projects under way to address the needs of wildlife and goals of wildlife conservation. The growth of interest, scope and effort towards a more comprehensive approach to conservation is evident not only in these regional examples, but in the language and

thought processes of agencies, organizations and the minds of citizens.

The Wildlife Action Plan is influencing this new approach at the state and national levels, too. Statewide initiatives and projects such as the Landowner Incentive Program, the Forest Landbird Legacy Program, Recovery Land Acquisition and numerous others are all coming together to address needs and actions identified in the plan. Every state has completed a Wildlife Action Plan, and now regional and national organizations such as the Southeastern Association of Fish and Wildlife Agencies are collaborating more than ever before to address the issues identified through this new approach. Here, we take a

written by CHRIS MCGRATH

look at several examples of statewide initiatives that are contributing to our goals of protecting rare creatures and keeping common animals common.

Never before has there been such a high level of collaboration toward the goal of comprehensive wildlife conservation that the plan makes possible. Partnerships with a host of individuals and organizations dramatically alter the scope of participation from anything experienced before. Partnerships with colleges and universities to study distribution, life history and habitat needs are numerous and increasing. Collaborations with other local, state and federal agencies to prioritize and protect significant natural resources and

develop new approaches to conservation are coming along daily.

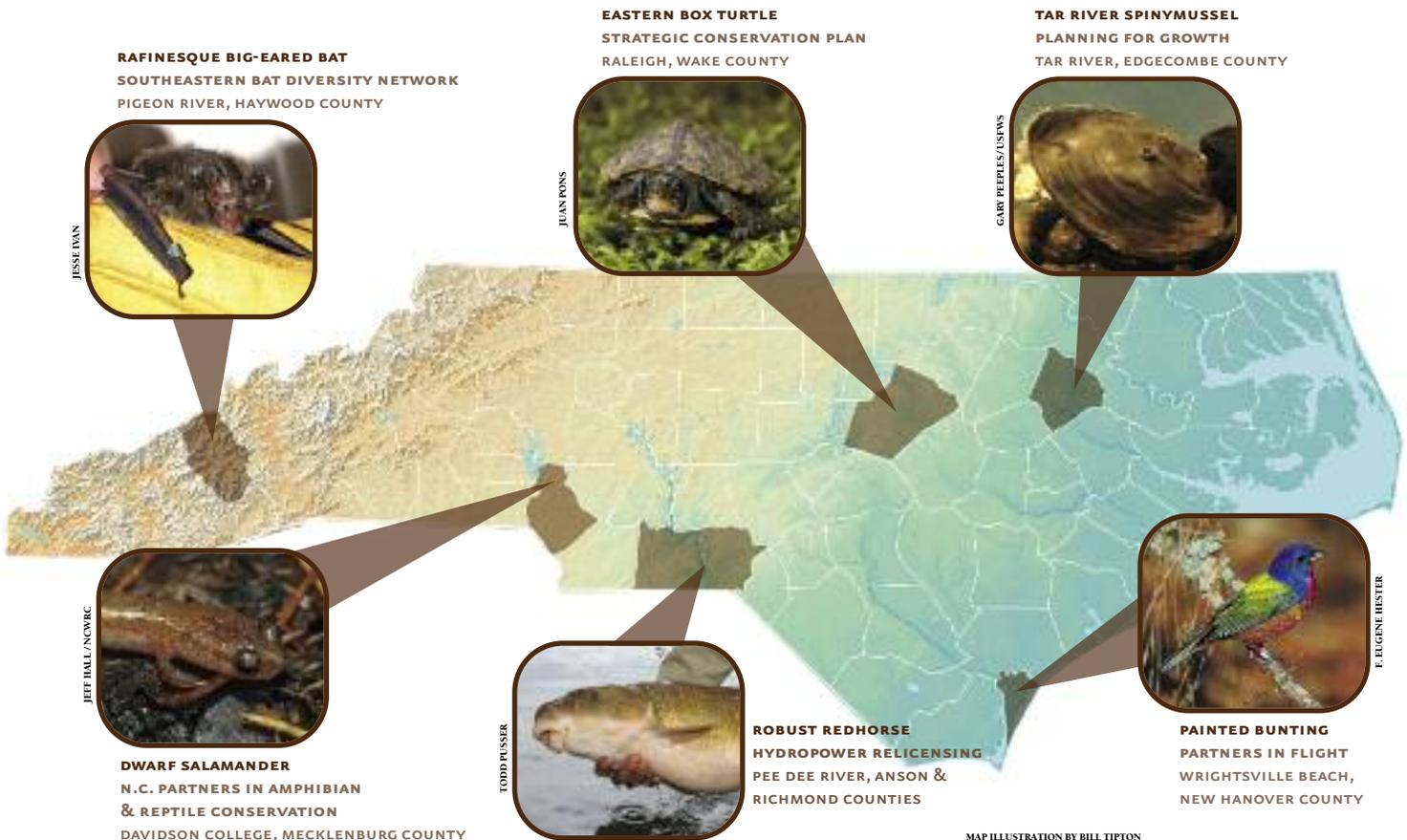
The Wildlife Commission is more engaged with an array of nongovernmental organizations in pursuit of the goals and objectives of the plan, too. A part of this new collaboration is the greater availability of funding to help collectively achieve goals. The Wildlife Action Plan can focus and leverage existing funding, but it can also help develop new funding that will benefit conservation.

Sister agencies within state government have partnered on projects for many years. The Wildlife Commission's Nongame and Endangered Wildlife Program has often received grants to facilitate working together

with the N.C. Natural Heritage Program to inventory natural resources around the state. The Wildlife Action Plan has facilitated a new collaboration with the Natural Heritage Program to share funding for two aquatic ecologists. Their focus is galvanizing local, state and private partners to identify and initiate land conservation in priority watersheds to protect aquatic animals and their habitats.

The Wildlife Commission also is partnering with the Conservation Trust for North Carolina to develop a comprehensive program to share information about the plan's priorities with local land trusts. The commission is forging new relationships in some cases, strengthening others and working to make

PROPAGATING PARTNERSHIPS To be effective, statewide initiatives such as the ones shown below need multiple partners working together. The Wildlife Commission is leading the way or helping with each of these projects or programs in conjunction with universities, nonprofits, industry or other state agencies.



THREE STATEWIDE INITIATIVES MAKE GREAT CONSERVATION STRIDES

The N.C. Wildlife Resources Commission has embraced a trio of organizations on regional, national and international levels by hiring personnel to coordinate the groups' work in North Carolina. Representatives of Partners in Flight, Partners in Amphibian and Reptile Conservation and the Southeastern Bat Diversity Network all work for the commission to conserve populations of these types of animals. By fostering many types of partnerships, these three groups have made a real difference in the conservation of these ecologically critical creatures.

N.C. PARTNERS IN FLIGHT

Neotropical migratory songbirds spend their summers nesting in North America and then fly to Mexico, Central America, the Caribbean and parts of South America for the winter. These birds include beloved and well-known species such as the ruby-throated hummingbird, purple martin and wood thrush. Many neotropical migrants breeding in some parts of North Carolina are vividly colored and unforgettable, such as the adult male scarlet tanager, painted bunting or rose-breasted grosbeak. Some, like the painted bunting of the immediate southern coast, have very narrow ranges in our state. Dozens of these migrants nest in North Carolina, and some fly back and forth across the Gulf of Mexico in nonstop flights each spring and fall to do so.

In 1993, the N.C. Wildlife Resources Commission formed the N.C. Partners in Flight (NC PIF) program to promote and improve the conservation of migratory birds and their habitats. This program is part of the International Partners in Flight Initiative originally organized in 1990 to create partnerships among government agencies, conservation organizations, industries, academia and concerned citizens to further migratory bird conservation. The main goal of the current NC PIF program is to increase communication, cooperation and collaboration among a diverse set of statewide partners to improve the overall status of birds

of all types through monitoring, research, management and protection efforts and strategies.

In addition, ongoing bird identification workshops for natural resource professionals and presentations related to bird conservation are conducted throughout the state by various partners. Partners in Flight provides technical guidance to government agencies and many others on quality bird management options. Each spring since 1993 there have been programs and events throughout the state related to the importance and conservation of birds via International Migratory Bird Day. Many materials on birds and bird conservation, as well as volunteer opportunities, are available on the NC PIF website at <http://faculty.ncwc.edu/mbrooks/pif/>.

Keeping common birds common is a central theme of the N.C. Partners in Flight program. Anyone can help do just that by making certain simple lifestyle choices that benefit birds and other wildlife.

N.C. PARTNERS IN AMPHIBIAN AND REPTILE CONSERVATION

Reptiles and amphibians are important components of healthy ecosystems in part because they can be used as indicators of overall environmental health. Worldwide declines in both groups of animals prompted the creation of Partners in Amphibian and Reptile Conservation (PARC) in 1999.

PARC was based on the Partners in Flight model set for bird conservation. Groups represented within PARC include state and federal agencies, conservation organizations, museums, the pet trade industry, nature centers, zoos, the energy industry, universities, herpetological organizations, research laboratories, forest industries and environmental consultants.

The N.C. Wildlife Resources Commission decided to support this a *continued on page 24*

sure that conservation dollars, whether from public or private sources, are being focused upon the most important places and the most critical needs.

Davidson College's Herpetology Lab, which studies reptiles and amphibians, is partnering with the Wildlife Commission and just about anybody with an internet connection. You see, the Wildlife Action Plan notes that we lack information about the current distribution and status of many reptiles and amphibians. So Mike Dorcas and Steve Price at Davidson worked with the commission to develop an online herpetology atlas. Anybody who spots a reptile or amphibian in North Carolina can register at the site (www.carolinaherpatlas.org) and record species and

locations, upload pictures to verify species identification and do a bunch of other things. It is an amazing tool that will provide abundant information on these poorly studied animals. It's a relatively inexpensive way to gather large amounts of information, it provides people with an opportunity to participate, and it has a number of really cool educational applications built to help generate children's interest in conservation.

North Carolina boasts an abundance of outstanding educational institutions, and many of them are working with a host of partners (including the Wildlife Commission) on high-priority Wildlife Action Plan species and issues. The commission is partnering extensively with N.C. State University and numerous other schools on a wide range of research topics: investigating and evaluating bird monitoring protocols, studying Swainson's warbler breeding ecology, figuring out the life history of Carolina heelsplitter mussels, working to develop captive breeding capacity for other freshwater mussels.

Since 1998, the Wildlife Commission has been very involved with the relicensing of hydropower dams in the state. Nongame wildlife has played an important role in most of these efforts because most of the state's priority nongame species are aquatic.

The Appalachian elktoe mussel was instrumental in making the case for restoring water to a 9-mile-long stretch of the Cheoah River that had stream flow diverted for more than 75 years. Field studies conducted during the relicensing process indicated that only a handful of mussels remained in the river after many decades of low flow conditions. A new flow pattern enacted in 2005, designed to mimic a natural stream, has already improved habitat for the elktoe and many species of fish.

Statewide projects help protect habitats for the rare water shrew (far left), the pine barrens treefrog (top left), the mirror shiner (top right), the Northern flicker (lower right) and the coachwhip.





TODD PUSSEY

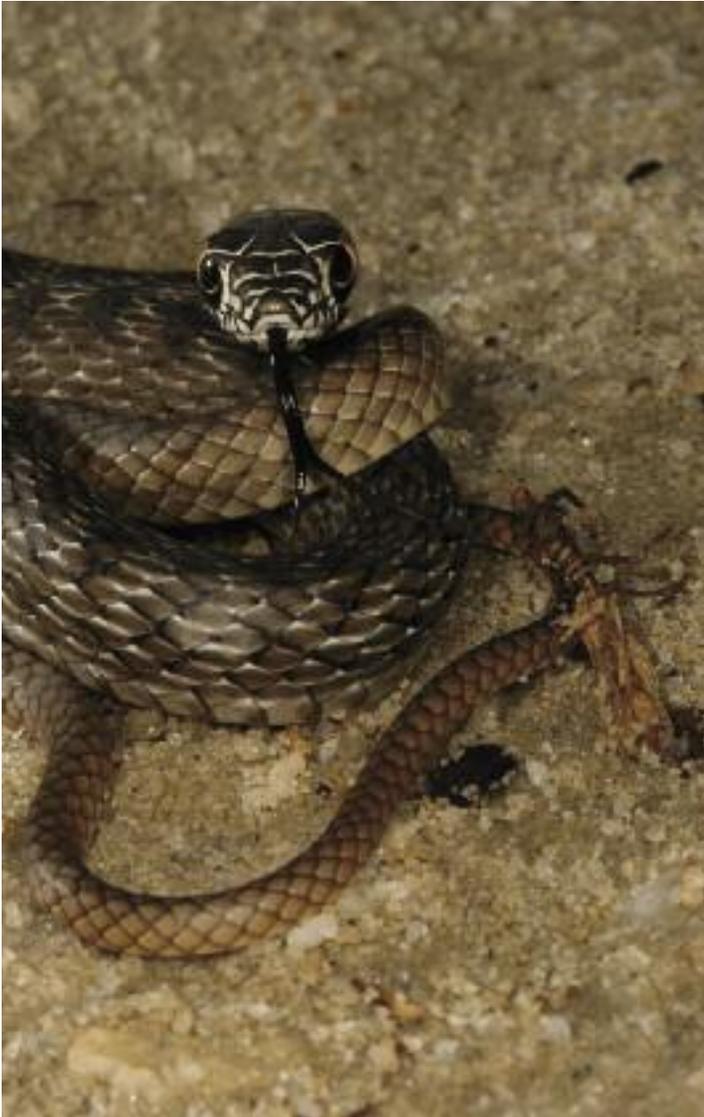
BRADY BECK

The Wildlife Action Plan *brings it all together.*
Us, them, game, nongame, plants, water,
 hunters, watchers, anglers, consumers, wildlife
 recreationists—*you name it—there is*
something in there for everyone.



STEVE FRALEY/NCWRC

BRADY BECK



continued from page 22

national effort by hiring a statewide coordinator and starting a North Carolina chapter of PARC in 2004. NC PARC has three technical working groups which regularly meet and discuss various aspects of reptile and amphibian conservation. The organization maintains an interactive Web site that allows members to keep up to date on the three working groups' projects and news related to amphibians and reptiles in North Carolina (www.ncparc.org).

Education about reptiles and amphibians is one of the most important facets of NC PARC because these animals are often perceived as dangerous or of little environmental or economic value. Working to change these perceptions, members of the Education & Outreach working group give talks to organizations, attend festivals, visit schools and present workshops about the conservation of reptiles and amphibians. Other initiatives include producing brochures, media relations and promoting PARC publications of such as the recently published "Habitat Management Guidelines for Amphibians and Reptiles of the Southeastern United States."

The Research, Inventory, Monitoring & Management working group has developed an online registry of North Carolina herpetologists to facilitate communication and collaboration among researchers. A research bibliography is also being compiled to help locate relevant literature on the state's amphibians and reptiles. This group helped develop the Carolina Herp Atlas (www.carolinaherpatlas.org), a repository for species locality data, including photo documentation, from professionals and amateurs. Members of the working group were instrumental in developing the state's Calling Amphibian Survey Program (CASP) for monitoring frog and toad populations and distributions. Routes have been run in 2006 and 2007, and additional volunteers are needed to conduct routes in 2008. Find out more at www.ncparc.org.

The Policy, Regulation & Trade working group handles issues surrounding the legal status of reptiles and amphibians. Its members took a stand and supported a ban on the use of gill nets in the flounder fishery because of excessive bycatch that sometimes includes sea turtles. This group was also heavily involved in drafting regulations limiting the commercial harvest of land and freshwater turtles. Currently, this group is working hard to draft a fair and balanced system for permitting or licensing owners who keep certain inherently dangerous animals such as giant constrictors, venomous reptiles and crocodilians.

Opportunities for involvement in NC PARC abound. The only membership requirement is an interest in the conservation of amphibians, reptiles and/or their habitats. Membership is free—just by e-mail NC PARC coordinator Jeff Hall at jeff.g.hall@earthlink.net. Individuals from all walks of life, all professions and all herpetological skill levels are welcome to join. Diverse membership creates a more broadly reaching voice for the conservation of North Carolina's rich amphibian and reptile heritage. So join a working group, volunteer to survey a CASP route, or add a record to the Carolina Herp Atlas.

To learn more about NC PARC, browse through our website (www.ncparc.org) and the National PARC website (www.parcplace.org).

SOUTHEASTERN BAT DIVERSITY NETWORK

Bats play a vital role in ecosystem health and are crucial to maintaining natural balance. All state wildlife action plans in the southeastern United States list a number of bats among the mammals of greatest conservation need. All of these plans identify habitat loss and degradation of habitat as a major conservation concern for bats.

Many bats range widely, regularly cross state boundaries in seasonal migrations, and use a variety of habitats. Efforts to maintain the diversity of bats—to keep common species common and to increase the populations of species in decline—must include actions and collaborations at local and landscape levels.

Recognizing this, in 2005 the N.C. Wildlife Resources Commission partnered with a nonprofit foundation, the Southeastern Bat Diversity Network (SBDN), to support a staff position to facilitate bat conservation efforts in the Southeastern United States. The main goals of the SBDN are similar to those of other focus groups—to increase communication, cooperation and collaboration among a diverse set of state and regional partners. The commission/SBDN partnership to support a position devoted entirely to bats is unique in the United States and represents a model effort to provide more focused and unified efforts across the region for this group of mammals.

A major project of the position is a review and synthesis of bat information in the state wildlife action plans that comprise the 16 states in the region. Products resulting from this effort will be available to land managers and agency personnel in late 2007. This synthesis will provide a valuable regional baseline and will facilitate partnerships and collaborations by identifying common trends and concerns.

Providing this kind of information serves to better inform local efforts, such as land acquisition needs for North Carolina's Strategic Conservation Plan, and more broad-scale efforts like those in place to protect bottomland hardwood forests, a habitat type that is imperiled at www.sbdn.org.

—Mark Johns, Jeff Hall, and Mary Kay Clark

The Southeastern Bat Diversity Network helped coordinate the efforts of biologists to implant transmitters in bats in Haywood County near the Pigeon River.





WALKER GOLDBER

The red knot visits North Carolina during its amazing 9,000-mile migration from its Arctic breeding grounds to South America.

Mussels and nongame fish have been important factors in several other hydropower relicensing in western North Carolina river basins such as the Little Tennessee, Tuckasegee and Hiwassee. These species have included spotfin chub, sicklefin redhorse and wavy-rayed lampmussel. Ecologically equivalent species are currently playing a large role in changing the management of river flows in the Yadkin River. Priority nongame species there include robust redhorse, Carolina redhorse, Roanoke slabshell and alewife floater.

In all these relicensing proceedings, the study, design and negotiation phases were driven, in substantial part, by the needs of rare nongame species. Providing more natural water flows will benefit not only these species, but the entire aquatic community.

In the Wildlife Commission, it's not game or nongame anymore. It's the whole package — animals and their habitats. The commission is using its personnel on several projects in the Cooperative Upland-habitat Restoration and Enhancement (CURE) Program to prioritize research and management on grass/shrub bird species. There are birds such as Bachman's sparrows and red-cockaded woodpeckers, along with bobwhite quail in those habitats.

As the population of North Carolina continues to grow and more land is developed, the strain on wildlife resources increases. However, with effective planning and foresight, we can work together to reduce the conflicts between growth in the state and its wildlife resources.

WHICH MILLION ACRES SHOULD WE CHOOSE?

In June 2000, the N.C. General Assembly passed the Million Acre Initiative. Its goal is to protect 1 million acres of conservation land, farmland and open space by December 2009. Land in North Carolina is being quickly converted from natural habitats into urban landscapes to accommodate the need for residential and industrial development. The purpose of the Million Acre Initiative is to protect for future generations the state's many natural resources—a spectacular array of animals and plants, clean water to sustain wildlife and humans, beautiful hiking trails, fishing waters and hunting lands, fertile farmland, and outdoor recreation areas. The N.C. Department of Environment and Natural Resources coordinates the Million Acre Initiative.

But which of North Carolina's 31 million acres are most valuable, and which are most threatened? To assess this across the state, a systematic way to identify and prioritize essential, high-quality natural resources across the state is needed. In early 2007, work began on the Strategic Conservation Plan to address this need. Spearheaded by the N.C. Natural Heritage Program, this effort reflects a state-of-the-art analysis and evaluation method. Digital maps are being collected from various sources to pinpoint where the state's natural resources can be found. Map contributors include the Natural Heritage Program, the N.C. Division of Water Quality, the state Division of Marine Fisheries, The Nature Conservancy, Audubon, the U.S. Fish and Wildlife Service and the N.C. Wildlife Resources Commission.

Each map is a storehouse of information about plant and wildlife distributions, sources of drinking water, where land is already being protected, and where working farms exist. Collectively, these maps provide a comprehensive look at the array of resources that need our protection. By layering these maps on top of one another using Geographic Information Systems technology, it becomes possible to see where natural resources are concentrated, where multiple resources can be protected with one project, and where resources may be at greatest risk. In addition, this tool focuses and prioritizes research needs and reveals areas where too little information is available.

The Strategic Conservation Plan is an endeavor to highlight areas of opportunity for collaborative conservation that will sustain the most significant natural areas across our state for years to come. Importantly, the data that underpins this plan will be updated every six months and additional map layers will be added to ensure that the most current information is being used to drive conservation decision-making processes. North Carolina is well on its way to knowing which million acres to choose.

To view a draft of the N.C. Strategic Conservation Plan, visit conservation-nc.net.

— Kim Douglass and Carol Price

In 2006, the Wildlife Commission worked with the N.C. Department of Natural Resources, the N.C. Department of Transportation and the U.S. Fish and Wildlife Service to produce a 20-page booklet entitled "Swimming with the Current: A Guide to Help Local Governments Protect Aquatic Ecosystems While Streamlining Environmental Review." This booklet details the importance of aquatic ecosystems, describes the environmental review process, and provides suggestions for minimizing impacts to aquatic ecosystems.

As a complement to "Swimming with the Current," the Wildlife Commission has organized a series of workshops entitled "Planning for Growth." These workshops discuss ways that communities can plan for growth so that impacts to wildlife are minimized. For more information on "Planning for Growth" or "Swimming with

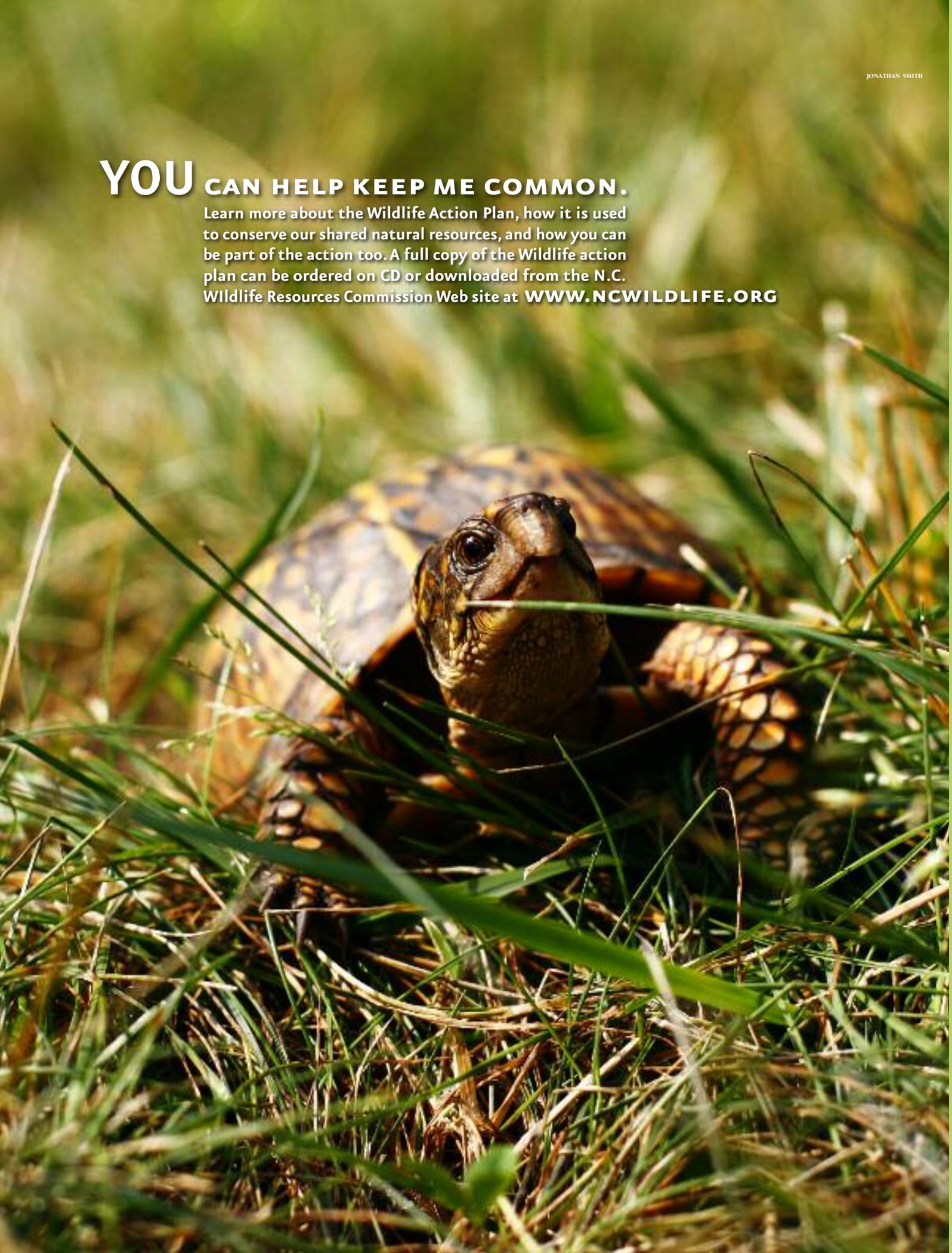
the Current," go to www.ncwildlife.org/planningforgrowth.

The Wildlife Action Plan brings it all together. Us, them, game, nongame, plants, water, hunters, watchers, anglers, consumers, wildlife recreationists — you name it — there is something in there for everyone. ♡

N.C. Wildlife Resources Commission staff contributing to this article included the following: Wildlife Diversity program coordinator Chris McGrath, Partners in Flight coordinator Mark Johns, Partners in Amphibian and Reptile Conservation coordinator Jeff Hall, hydropower relicensing coordinator Chris Goudreau, special project coordinator Vann Stancil, Southeastern Bat Diversity Network coordinator Mary Kay Clark and Wildlife Action Plan coordinator Carol Price. Kim Douglass is a conservation planner with the N.C. Natural Heritage Program.

YOU CAN HELP KEEP ME COMMON.

Learn more about the Wildlife Action Plan, how it is used to conserve our shared natural resources, and how you can be part of the action too. A full copy of the Wildlife action plan can be ordered on CD or downloaded from the N.C. Wildlife Resources Commission Web site at WWW.NCWILDLIFE.ORG





You can support the conservation projects such as the ones featured in these articles by contributing to the Nongame and Endangered Wildlife Fund. Every dollar donated goes to help restore and conserve nongame wildlife, and can be matched dollar for dollar with federal money.

Donations are tax deductible and easy to make. Here's how you can help North Carolina's wildlife and its habitats:

Contribute a portion of your state income tax refund through the N.C. Tax Check-off for Nongame and Endangered Wildlife. Simply enter an amount on line 26 of your North Carolina income tax form.

Go to the Wildlife Diversity Program page at www.ncwildlife.org/give to donate online or print a mail-in form. Also at the Web site, you may order a Wildlife Conservation license plate for your vehicle, trailer or camper.

Visit one of the N.C. Wildlife Resources Commission's wildlife education centers at Pisgah Forest, Raleigh or Corolla. Make a purchase in the center's N.C. Wild Store and round up your total to the nearest dollar, \$5 or \$10. Details about Round Up for Wildlife, and directions to the wildlife education centers, are available at the Wildlife Diversity Program page online.

Thank you.



WILDLIFE ACTION PLAN KEEP COMMON ANIMALS COMMON

BE A *Backyard* CONSERVATIONIST

- Plant a wildflower garden to attract birds and butterflies.
- Minimize herbicide and insecticide use—they can be toxic to wildlife.
- Use native plants to landscape for wildlife.
- Hang bird and bat houses to help control pests naturally.
- Protect water quality by planting native vegetation around ponds and creeks.
- Do not litter.

BE A *Community* CONSERVATIONIST

- Protect natural areas where you live.
- Promote the creation of wildlife parks in your neighborhood.
- Support local and state environmental legislation that helps wildlife.
- Become part of the Teaming with Wildlife Coalition.



The North Carolina Resources Commission protects and conserves the state's terrestrial and aquatic wildlife species and their habitats, ensuring present and future generations will be able to enjoy North Carolina's natural splendor.