

Treasure Our Wildlife— Plan to Keep Them

South Carolina's Comprehensive Wildlife Conservation Strategy

South Carolina has developed a plan to address the needs of all animal species of concern, and their habitats. This plan will not only benefit the wildlife and fisheries of the state, it will ensure that our natural heritage remains intact for future human generations.

—Rudy Mancke

What's the Plan?

The [conservation] of our wildlife is of importance to every man, woman and child in this state, and this movement deserves the wholehearted support of every right-thinking individual within our borders, whether hunter, fisherman or not.

—Harry R.E. Hampton
Founding father of South Carolina's conservation movement

you can almost hear them cheering! South Carolina hunters, anglers and their fellow outdoor enthusiasts are shouting hooray at the news of the launching of a new conservation effort for the state. “Mountains to marine” species as diverse as red-breasted nuthatches, humpback whales and Appalachian cottontails will reap the benefits of this new Comprehensive Wildlife Conservation Strategy.

Speaking for the S.C. Department of Natural Resources team, Tom Kohlsaatt, project coordinator, says the strategy came out of many hours of work. “Since the science of wildlife management was born early in the twentieth century, the population of the United States has doubled, and the problems facing our native wildlife species have compounded accordingly. Wildlife professionals have solid results and many success stories to show for their years of labor since that time, but Congress has asked the states to take stock of their management efforts and do some strategic planning in response to modern problems.

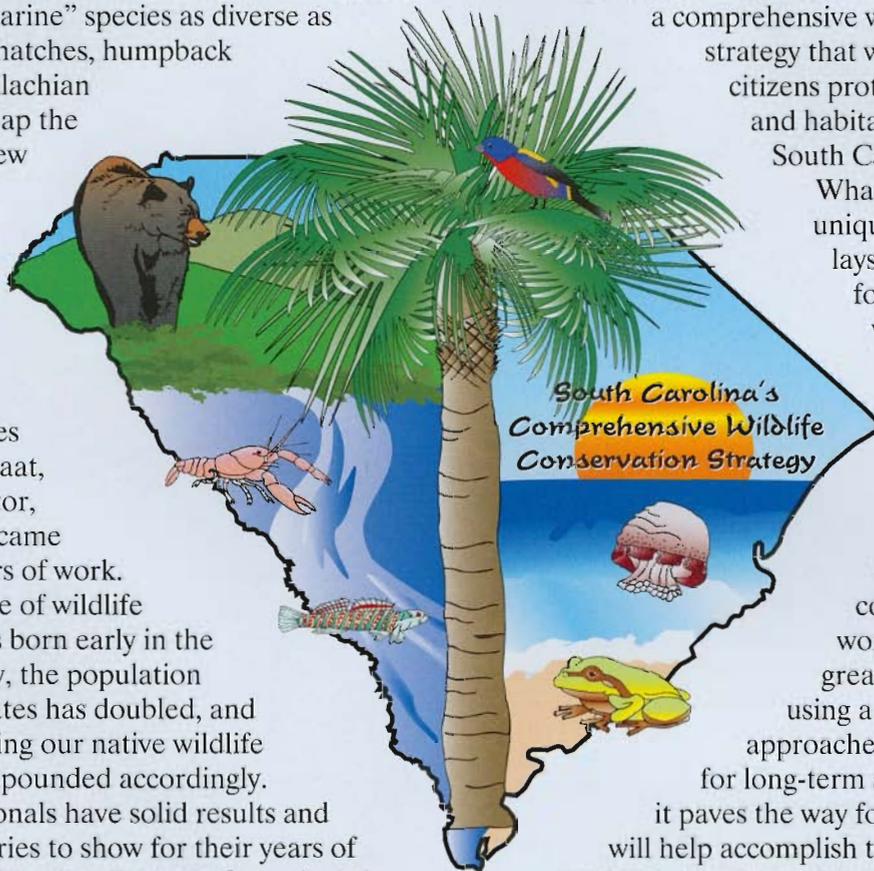
“In these pages, you will see the results of this planning. With the public's involvement, we think this strategy is a recipe for continuing success—a program to benefit all our wildlife—and, in the long

run, ourselves.”

Funded by the U.S. Fish and Wildlife Service and fueled by a federal grant from the State Wildlife Grants (SWG) program, the DNR has written a comprehensive wildlife conservation strategy that will help biologists and citizens protect and manage species and habitats of special concern to South Carolinians.

What makes this plan unique? Several things: It lays out recommendations for managing all species within specific habitats, to the advantage of all; it encompasses habitats from mountaintop to seashore; it offers opportunities for South Carolina's various conservation groups to work together toward the greatest good of our wildlife, using a variety of management approaches; it constructs a vision for long-term agency operations; and it paves the way for new funding that will help accomplish the goals—a complete package. It's also an historic effort: This kind of comprehensive conservation project has never been done before in our state, and every other state is doing it at the same time.

Like a good road map, the plan includes specific directional indicators, called the Eight Required Elements. These are the federally mandated areas that the DNR must address in its drafting of the strategy.



1. What's here now? DNR biologists and other experts determine current distribution and abundance of South Carolina's wildlife species, with a focus on low and declining species and/or species that are indicators of the health of the state's wildlife.

2. Habitat check. Biologists describe locations and condition of key habitats and community types essential to the conservation of species. "Hot spots" for conservation action are especially noted.

3. Challenges. The DNR first identifies problems that may adversely affect wildlife species or their habitats, then prioritizes research and survey efforts toward improved conservation actions and assistance in restoration.

4. Actions. Based on findings from the first three elements, the DNR prepares prescriptions and strategies for conserving wildlife species and habitats, and priorities for implementing such actions.

5. Monitoring. The experts plan how to assess and measure effectiveness of conservation actions on an ongoing basis—so changes can be made as new information arises, an approach that can be called adaptive management.

6. Review. The strategy will be assessed and updated every five years.

7. Coordination. The strategy mandates involvement of federal, state and local agencies and Native American tribes that manage lands or programs affecting targeted wildlife in the state.

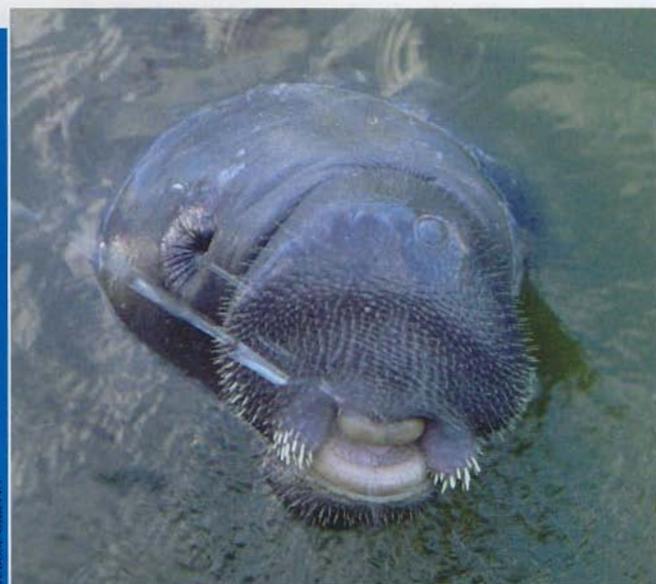
8. Public participation. The strategy must document broad public participation during development and implementation. This is essential for success in developing and carrying out the blueprint. To this end, coordinators teamed with Clemson University's Institute for Economic Development to conduct a series of focus groups and open public meetings around the state. From these information-sharing sessions, which included members of various stakeholder groups and concerned members of the public, many of them private landowners, came several key points, which have been considered in the final plan. The most notable points from these meetings: the need for ongoing public education, concerns about land-use planning/sprawl and habitat acquisition and protection.

Name: Florida manatee, *Trichechus manatus latirostris*

Status: One of the most endangered marine mammals in the United States.

Location: Rivers, bays or estuaries with submerged aquatic vegetation and water temperatures above 20 degrees C (68 degrees F); in fresh, brackish and marine habitats.

Challenges: Collisions with ship/boat hulls and/or propellers. Since manatees found in S.C. waters are in the northernmost extent of their range,



DUROSE GREEN

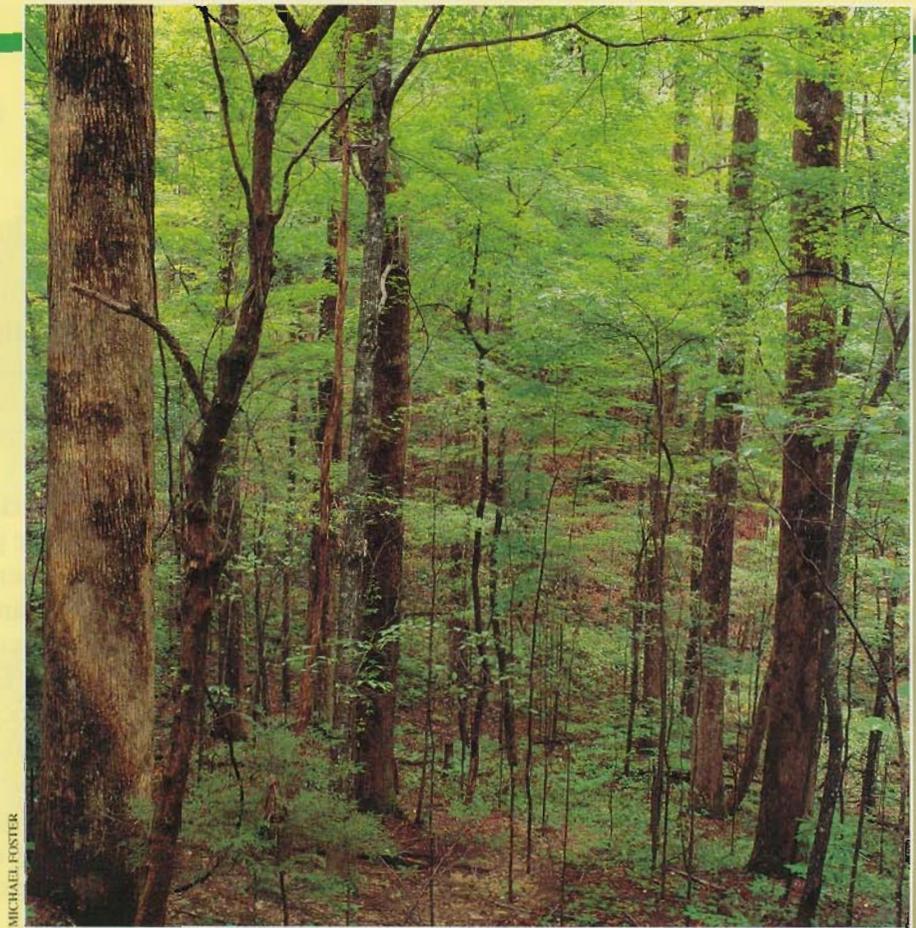
cold stunning may have a significant effect, complicated by use of heated water discharges at a variety of industrial sites in the fall.

Name: Hemlock-Rhododendron Cove Forest

Description: Well-drained, relatively sheltered sites in stream bottoms, along ravines of small streams or on hill slopes; characterized by hemlocks, either as the dominant overstory or understory tree, and rhododendrons in thickets or solitary clumps. Understory typically includes such rich vegetation as Christmas fern and strawberry-bush. Where cover is not as dense, sites support foamflower, red maple, silverbell and, occasionally, bloodroot. Oconee bells, endemic to the Blue Ridge in South Carolina, can form dense carpets.

Challenges: The hemlock wooly adelgid, an introduced insect of Asian origin spreading southward from the Northeastern U.S. that threatens hemlock trees. The effects of the invasion could be devastating to hemlocks and the wildlife species associated with them.

Selected Species: shovel-nosed salamander, seepage slope salamander, Swainson's warbler, Acadian flycatcher, Carolina red-backed vole, spotted skunk, Rafinesque's big-eared bat, Eastern small-footed myotis



MICHAEL FOSTER

How will the strategy work out in day-to-day management? Lynn Quattro, project leader, explains how things will go in the field. "Our field staff will continue doing what they've always done with managed species; they'll just be doing it with a little broader perspective. As they work with the species they've always managed, they'll be considering other animals in the habitat, as well. To assist them with these additional species, there'll be specific recommendations outlined in the conservation strategy."

But different species in the same habitat may need different management. According to Quattro, this potential problem has been anticipated. "For example, we may find in a particular habitat that a certain species requires a management technique like prescribed-burning the understory every three years—but another species' requirement is never burning the understory. That's diametrically opposed,

and we have to resolve that issue. We need to make sure we're not picking and choosing one species over another. The strategy will help to resolve issues such as these."

Sportsmen and sportswomen, there's good news for you in the new strategy: The DNR will still manage harvestable species in a way that protects your sport. And the new strategy builds upon already-existing funding for game fish, ducks, deer and other harvestable species, so these species will continue to receive appropriate attention.

"Partnerships," Quattro makes clear, "are essential to making this work. Many of our partners have responsibility for the species on their property. Our agency can make management recommendations."

That's where partnerships come in, when the DNR and its partners sit down at the table and say, "Based on the best knowledge and biological data, let's figure out how we can cooperate in our common goal of ensuring

the future of South Carolina's natural resources.”

Of course, the big question is how money figures in all this. Is the DNR going to have its hand out to all its partners? Quattro says not. “We’re not necessarily asking for money from our partners; we’re asking them to use *their* money to manage *their* property based on information in the strategy to gain a broader perspective. Also, our partnership plan may make it easier for two entities that have interests in the same property or body of water to work together to benefit the species and habitats on that property. Sometimes we’re asked, ‘Where’s the best place to purchase land for conservation? What needs protecting?’ In the strategy, our biologists have identified crucial areas of the state where it’s important to protect habitat, so we will be able to help land trusts and other partners to focus in those areas,” says Quattro.

Is the strategy written in stone? Definitely not. Rather, it’s an evolving plan for wildlife management. Planners built into it the ability to change in response to changing conditions; it will be updated every five years to allow for needed adjustments. And in the event of a wildlife catastrophe, the agency can write an immediate amendment to the strategy, even if the catastrophe involves a species not yet included. Quattro says, “We’ll be getting feedback from the biological staff so we can make necessary changes in a timely manner.”

A Biologist’s Perspective: Painted bunting

“The French named the painted bunting *nonpareil*, ‘unequaled’—probably because it was an unparalleled beauty in the eyes of early European naturalists. I consider it the most beautiful of songbirds. I always thought painted buntings were unapproachable, very shy, until I encountered males on two occasions feeding on the ground on saltmarsh hummocks while I was doing a survey in summer 2004. Almost tame, they allowed me to get within ten to twelve feet of them while they foraged for grass seeds. Painted buntings may now be more abundant on hummocks than on the mainland because of the impact on habitat. Preferred sites are scrub thickets near or within open forests with grasses, and they can still find these plant associations on the hummocks.

“I grew up in Manning, about sixty miles inland from the coast, and I never saw a painted bunting during my early years, although we had bird feeders. But in the last ten or fifteen years, it’s not been unusual to see them there. They may have moved farther inland over time as preferred habitat has been lost along the coast. Some bird-watchers have even seen them as far

inland as Columbia. You see them mostly from late March to mid-September in South Carolina, though I did once see a juvenile male at Folly Beach in December with a group of sparrows. They are very rare this far north during winter, and most winter in southern Florida, Cuba and the Bahamas.

“It’s neat to see that this species is adapting to available habitat, though habitat loss remains a major concern for the species. If you want to encourage painted buntings to visit your yard, leave some shrubs and scrubby thickets on your property and use white millet in bird feeders.”

—Billy McCord, SCDNR

Name: Painted bunting
(Eastern subspecies),
Passerina ciris ciris

Status: One of the most locally occurring, steepest-declining, high-priority species in need of conservation attention within the Southeast U.S.

Location: Scrub thickets near or within open forests with grasses.

Challenges: Loss of habitat from development, nest predation by brownheaded cowbird and other species, illegal takings for the commercial pet trade in this and other countries.



WAYNE IRVIN

A Biologist's Perspective: Christmas darter

"You don't have to visit the tropics to view colorful fishes. We have them right here in South Carolina. Among them is the Christmas darter—a favorite of mine—and it is one of a few fish species we share exclusively with our Georgia neighbors. This species is found only in streams of the Savannah and Altamaha-Ogeechee river drainages. Actually, it has been shown that populations of the two river drainages have been isolated from each other long enough that they constitute two separate subspecies. The Savannah form that occurs in piedmont streams of South Carolina has been dubbed the Christmas Eve darter. The Christmas moniker comes from the brilliant red and green stripes the male develops during the spring-early summer breeding season.

"For many freshwater fishes, color is an important part of breeding strategies, where males take on striking colors to impress typically drabber females. This can mean the male is at increased risk of being seen by predators, but on average the increased likelihood of a brightly colored male's successfully wooing a female more than makes up for it. I enjoy taking people out to locations where we might find one of these sparkling gems, and watching how it impresses those who thought that colorful fishes are only found on tropical coral reefs."

—Mark Scott, SCDNR

Case in point: "The initial draft didn't include the coastal black bear population. But after the list was put together, this species was mentioned several times as needing attention. That was a red flag that put this species on planners' 'to do' list. As a result, the coastal black bear was placed in the strategy. If a species needs to be there, it will be there. We'll always be monitoring, and it will become commonplace for support staff to notice and report the absence of songbirds or salamanders, for example, while out in the field, so we will have continuous feedback for making adjustments," says Quattro.

The public can get involved, too, by observing what's happening on their land and reporting to the DNR anything that needs attention. (For tips on getting involved, please see "What Can You Do?" on the back cover.)

A strong proponent, DNR director John E. Frampton believes the comprehensive wildlife conservation strategy is crucial to successful future management of our wildlife. "The mission of the DNR is to be the principal advocate for and steward of South Carolina's natural resources. This strategy lays out the manner in which we will do that. It's a blueprint for the future, one that will enable us to make the most of our combined resources—those of the DNR, as well as those of other public and private entities—by folding our various visions into one comprehensive, coordinated strategy to ensure that the wildlife of our state will continue to thrive. The federal funding that comes with the strategy, under the State Wildlife Grants Program, will allow us to address needed management actions for species of concern and prevent these species from reaching a status of threatened or endangered. It's something we've needed for a long time."

Name: Christmas darter, *Etheostoma hopkinsi*



FRED ROHDE

Status: Species of special concern in South Carolina.

Location: Found in the upper Savannah River drainage.

Challenges: Development, deforestation, loss of riparian cover, siltation and the effects of impoundments.



Name: Pine Savanna

Description: Thin canopy of pines, almost always longleaf or loblolly pine; woody understory essentially absent or very scattered; herbaceous flora is quite rich, consisting of many grasses and sedges.

Challenges: Fire suppression and land conversions for agriculture or development.

Selected Species: red-cockaded woodpecker, fox squirrel, gopher tortoise, Bachman's sparrow, Northern yellow bat, Rafinesque's big-eared bat, gopher frog, flatwoods salamander, Northern bobwhite quail.

Mountains to Marine: Creatures Great and Small

One of the unique aspects of the wildlife strategy is that it encompasses not just already-managed game species but also those that are neither hunted nor fished. In addition, by addressing terrestrial, freshwater and marine species and their associated habitats, the strategy covers the entire state. As part of the start-up process, the DNR formed taxa groups consisting of experts on birds, mammals, reptiles, amphibians, fish, invertebrates and insects. In these groups, headed by the DNR's own biologists, the agency received input from other state agencies, state colleges and universities, experts from outside the state, as well as DNR staff—people with the necessary knowledge. They collaborated and came up with the list of species that form the strategy's focus of attention in the Palmetto State.

There are several ways a species can get on the priority list. Any species with low or declining numbers is eligible, such as painted buntings, loggerhead shrikes or diamondback terrapins. A species can also be listed because it's indicative of the state's diversity. This refers to species that are peripheral to South Carolina (not much of their range here) or that are important to biologists because of their relationship to other species or because they're the native fauna of our state.

“Visit high-elevation Sassafras Mountain, and you'll

see dark-eyed juncos, a peripheral species at the tail end of its continental range,” says project leader Jennifer Rinehart. “If tree diseases or some other habitat-limiting factor came into play, this species would probably start to show decline on the edges of its range first. By watching such peripheral species, we can ensure that we are properly conserving the state's and the nation's biodiversity.”

Another road leading to inclusion on the list: being an indicator species, that is, a species that indicates the general health of a particular ecosystem through its sensitivity to changes in its environment. Fiddler crabs, for example, one of our marine invertebrates, are an indicator species. Everybody knows fiddler crabs are ubiquitous—you go to the marshes; you see fiddler crabs everywhere. They are important in the food chain, and they have also been shown to bioaccumulate toxic materials. So, if fiddler crab numbers decline, more than likely there's something going on in their ecosystem that bears investigation. Fewer fiddler crabs probably means biologists will notice effects on other species, as well.

“Then there are responsibility species,” Rinehart adds, “like the seagreen darter and bottlenosed dolphin. Such species make the list because they are common in this state but imperiled in other states. We want to watch them because we don't want them



Name: Carolina pygmy sunfish, *Ellassoma boehlkei*

Status: Federal species of concern; listed as threatened in South Carolina and North Carolina, the only two states where it occurs.

Location: Only a few populations identified in South Carolina: one in Big Pine Tree Creek in the Santee River Basin near Camden; a few populations in the Waccamaw River.

Challenges: Habitat destruction and alterations, including urban development and pollution. Limited distribution makes it vulnerable to extirpation.

Name: Lined seahorse, *Hippocampus erectus*

Status: Included on the IUCN (International Union for the Conservation of Nature) List of Threatened Species as vulnerable.

Location: Found from Nova Scotia along the western Atlantic coast, through the Gulf of Mexico and Caribbean to Venezuela, from shallow inshore areas to depths of over 70 meters.

Challenges: Collection for the aquarium trade; bycatch in shrimp trawl and other fisheries; habitat degradation because of coastal development; pollution.



Name: Cannonball jellyfish, *Stomolophus meleagris*

Status: Not state or federally listed; however, ecologically important because they are the major prey base for endangered leatherback sea turtles (*Dermochelys coriacea*).

Location: Abundant along the southeastern and Gulf coasts of the U.S.

Challenges: Harmful algal blooms; oil spills; nonpoint source pollution; commercial fishing.

Name: Mimic crayfish, *Distocambarus carlson*

Status: Globally classified as vulnerable.

Location: A terrestrial burrower endemic to S.C., known only from the piedmont between Newberry and Greenville counties.

Challenges: Habitat destruction and alterations; poor knowledge of the species.



to become imperiled here, which would increase the threat to the species continentally. We might also have a species that exists mainly in South Carolina—like the Carolina pygmy sunfish (although one or two individuals have been found in North Carolina). If such a species disappears from South Carolina, it will likely disappear altogether. For that reason, even though it may be common in South Carolina, we want to watch it and make sure it doesn't become imperiled.

“Finally, if you're familiar with the offshore Charleston Bump, where a number of marine species spawn or congregate during migration,” says Rinehart, “you know an example of the last category under priority species—concentration areas. This refers to places where many organisms concentrate for a specific purpose—for example, roosting areas for bats or breeding grounds for loggerhead sea turtles—and, of course, we need to protect these habitats for the sake of the species that use them.”

What can be done to keep the priority species from declining further or disappearing altogether? As the strategy's many contributors have made clear, the one issue almost all wildlife species face is people—all of us. We continually modify the landscape to create the conditions for our own survival and prosperity, often unaware that in doing so we unintentionally create

problems for wildlife. It should be no surprise, then, that the solutions also involve people.

In fact, the solutions take two broad approaches: The first addresses protection of habitat. We need to set aside places large enough for wildlife to thrive. The second involves changing our behavior. We simply must get better at sharing our space with wildlife. Following are some examples of these two basic approaches, taken from the strategy.

Some land in South Carolina has already been set aside for habitat protection, notably national wildlife refuges, natural area state parks, DNR-owned Wildlife Management Areas, and natural areas protected under the S.C. Heritage Trust Program. Private organizations such as The Nature Conservancy and more than a dozen local land trusts have also protected a large number of significant natural areas. Other public lands such as the national forests in South Carolina, military reservations, and the Savannah River Site also maintain large expanses of wildlife habitat, even though they were originally acquired for broader purposes. Yet only about 10 percent of the state's land is in full or partial conservation status.

The strategy identifies some important types of additions to this conservation land base. For example,

Name: Broad-striped dwarf siren,
Pseudobranchius striatus striatus

Status: Currently listed as a Species in Need of Management; associated with other species considered endangered or vulnerable in our state.

Location: Jasper, Hampton, Orangeburg and Charleston counties in isolated, temporary freshwater wetlands, referred to as breeding ponds. Examples of these naturally occurring ponds include Carolina bays, limesinks, flatwoods ponds. Also in small coastal plain streams with little or no flow and muck bottoms, typically too small to have established populations of predatory fish such as pickerel and sunfish.



Challenges: Lack of required upland habitat around breeding ponds. Many wetlands are now unsuitable for breeding by amphibian species because they have been left isolated in the landscape as a result of conversion of surrounding lands.

STAVELANDSNET



ROBERT CLARK

Name: Intertidal and Subtidal Estuarine Systems

Description: Among the most productive natural systems; interconnected network of intertidal marshland with tidal channels of various sizes branching throughout, generally interfacing with marine or Atlantic Ocean waters via deep channels through sounds and bays or through smaller inlets; include all habitats above and below the water that are associated with mixing of fresh and salt waters. Examples include salt marshes and flats, brackish needlerush marsh, salt-shrub thicket, intertidal mud flats, sand flats and sand bars, high marsh pool and tidal creeks and channels.

Challenges: Channelization, dredging, impoundment breaching or reimpounding former wetlands; land conversions to development, managed forestry or agriculture.

Selected Species: wood stork, white ibis, clapper rail, king rail, bald eagle, Forster's tern, black skimmer, least bittern, fat sleeper, rainwater killifish, mink, diamondback terrapin, American alligator, bottlenosed dolphin, grass shrimp, mummichog, blue crab, sheepshead minnow, inland silverside, Atlantic sturgeon, shortnose sturgeon.

acquiring in-holdings within the national forests and state Wildlife Management Areas could add habitat diversity and connect isolated parcels. Another addition to the land base could be the habitats of species with restricted ranges, such as streamside forests and adjoining uplands along the single sandhills stream that harbors the Carolina pygmy sunfish.

The strategy also identifies ways that lands already set aside can be managed to benefit a broader range of species with special conservation needs. Public land management agencies regularly ask the DNR which species they should take into account in their management plans, and what specific management practices will benefit them. The ongoing restoration of red-cockaded woodpecker populations is an example of a major success in cooperative management on public lands. Techniques for restoring this endangered species, which needs large expanses of regularly burned longleaf pine forests,

were developed on national forests, national wildlife refuges and military reservations and are now being used to good effect on a variety of other public and private lands.

Despite these past conservation successes and many more that are undoubtedly yet to come, it is naïve to think that we can maintain all of the state's wildlife species on 10 percent of the state's land. Here is where our ability to accommodate all kinds of wildlife within the space we've claimed for ourselves becomes critical. The complexities of human-wildlife interactions are illustrated in an example from the coast:

Many species of colonial water birds (American oystercatcher, brown pelican, etc.) and shorebirds (least tern, Wilson's plover, etc.) face multiple threats in the form of water contamination from oil spills and other sources, and direct or indirect effects of human encroachment. For American oystercatchers nesting on oyster rakes, boat wakes can be devastating, and least tern colonies can fail because of human disturbances

that result from a simple stroll on the beach. We all enjoy walks on the beach, often in the company of our dogs. However, beach-strolling dogs can flush birds from their nests. Even one or two such strolls on the beach can cause a problem. The unprotected eggs overheat in the direct sunlight, and the nests fail.

In drawing up the strategy, project team members have attempted to break down the complexities of human activity and the needs of wildlife and prescribe some actions within several broad areas where people can make a difference. They are private lands, public lands, urban and developing lands, education and outreach, habitat conservation, invasive exotic species, and wildlife laws and regulations.

Building on past successes, the bulk of the conservation efforts will continue to be directed at private lands, sometimes called the working landscape. Landowners played a vital role in restoring game populations in the last half of the 20th century, and they can play the same role in restoring or maintaining populations of many other species that are now in decline. The plan details how land managers can get the tools they need to maintain open pine woodlands favored by Southern hognose snakes, Bachman's sparrows and fox squirrels; open-land habitats preferred by loggerhead shrikes, Northern bobwhite quail and Appalachian cottontail rabbits; or dense hardwood forests favored by wood thrushes, scarlet tanagers and Webster's salamanders. In many instances, landowners can qualify for federal cost-share funding for management practices that benefit these and other species.

A Biologist's Perspective: Bog turtle

"An attractive little turtle with a brightly colored orange head, the bog turtle used to be favored in pet stores—which may be one of the reasons it has declined. Populations were likely exploited for the pet trade. Until about 1987, we didn't know we had them in South Carolina. They live in streamside bogs in the northern part of Greenville and Pickens counties, and if you want to find them, you have to wade in mud up to your knees and even to your thighs. Bog turtles are secretive, and rare for South Carolina because we're on the edge of their range, so I count it a real event to have seen one swim through the mud one day. I set down the specimen I had in my hands, and it placed itself at a ninety-degree angle, dived straight down into the mud and disappeared.

"Staff doing conservation surveys or population studies go 'bogging' to find these diminutive turtles. These field workers poke sticks into the mud to locate the animals, the way you find clams, and they get so good at it that they can tell merely by the sound an object makes whether it's a stick, a rock or a bog turtle.

"Since there's little habitat for bog turtles here, managing or acquiring appropriate habitat makes sense."

—Steve Bennett, SCDNR

Name: Bog turtle, *Clemmys (Glyptemys) muhlenbergi*

Status: Currently listed as a Species in Need of Management (State Threatened) in South Carolina. In the Southern Appalachians, population listed as Federally Threatened by Similarity of Appearance.

Location: Streamside bogs, seeps, beaver ponds and other wetlands; in streamside bogs, crossing roads adjacent to streams or beaver ponds; in wetlands characterized by open canopies, spring-fed water and deep silts generally found in the upper piedmont and foothills in association with small streams and rivers.



Challenges: Bog turtles' wet meadow habitats, associated with farm areas, are declining as farm lands decline, allowing the wet meadow bogs to undergo succession to red maple swamps.

A Biologist's Perspective: Pointy-lobed firefly

“The pointy-lobed firefly (*Photinus acuminatus* Green) is one of about fifty species of *Photinus* fireflies presently known from North America. *Photinus* fireflies can be distinguished from other lightning bug fireflies (those that flash) by their simple claws (not forked) and absence of a median, longitudinal keel on the collar that extends over the head (pronotum). The male flash pattern of *P. acuminatus* is a single sharp bright flash of perhaps one hundred millisecond duration, much shorter than that of its known relatives, which is emitted every two seconds or so (at 74 degrees Fahrenheit).

“This firefly occurs only in the southeastern U.S. and has been recorded from only six locations, one of which was in Pickens County. Only three specimens were seen there. Though I’ve spent hundreds of nights in the field seeking and examining flashing fireflies, populations of *P. acuminatus* seem to have disappeared.

“The rarity of *P. acuminatus* across such a broad range suggests that this firefly was once widely distributed and may now be in the final stages of disappearing altogether. There are several threats to the existence of fireflies today, and because populations of this firefly are already greatly reduced, the consequences may be even more serious. Various sources of chemical pollution and light pollution, including increased sky glow and misleading point sources such as street and porch lights, as well as loss of habitat may affect fireflies.”

—James E. Lloyd, University of Florida

As more land comes under development, much can be done on urban and developing lands to make them more hospitable to wildlife. Local governments, developers and homeowners can be encouraged to retain buffers of natural vegetation along streams and larger tracts of upland forest, reduce the runoff of water and pollutants from paved surfaces, and carry out simple practices such as leaving the dead fronds on palmetto trees for the Northern yellow bats that roost in them. Leave the fronds, and save on mosquito repellent!

Sometimes, the easiest way to bring about a change in behavior is through education. “In our travels around the state, we’ve found that many people are willing and able to do good work, but they don’t know what to do,” says Kohlsaat. “But the fact that they do volunteer work through Clemson’s established Master Gardener program and its newer Master Naturalist program confirms their desire to help. In other situations, people just need to know what *not* to do, such as extending fertilizer-demanding lawns up to the edges of creeks. Therefore, education figures prominently in the strategy.”

Landowners in town and country can also be provided with information and technical support to control the many invasive exotic species that displace native fish and wildlife and the indigenous plants that sustain them. As the world shrinks through international travel



J. E. LLOYD, UNIVERSITY OF FLORIDA

Name:
Pointy-lobed firefly,
Photinus acuminatus

Status: Records of occurrence few; small populations documented in six southeastern states; rare in South Carolina.

Location: Mesic forests and forest margins; stream sides, lawn edges and agricultural fields; one site in S.C. in Pickens County.

Challenges: Chemical and light pollution; destruction of habitat.



MICHAEL FOSTER

Name: Blackwater Stream

Description: Supports a mosaic of communities. Systems follow the topography of the stream valleys and support small stream swamp forest in the lowest areas that are subject to permanently flowing water or, at least, seasonal inundation by flood waters. Small stream swamp forests are bordered on either side by streamside pocosin forests that can have inclusions of hillside herb bogs, Atlantic white cedar swamp forests and loblolly bay forests. Extreme headwaters support streamhead pocosin.

Challenges: Conversion of habitats from changes in land use on surrounding landscape; fire suppression on adjacent longleaf pine communities.

Selected Species: American alligator, pine barrens treefrog, swallow-tailed kite, Acadian flycatcher, Louisiana waterthrush, star-nosed mole, meadow vole, Eastern woodrat, mink, Carolina pygmy sunfish, bluebarred pygmy sunfish, bannerfin shiner, blackbanded sunfish, pugnose minnow, broadtailed madtom, lowland shiner.

and trade, the spread of plants and animals from their native habitats, where they are usually not a problem, to new places, where they cause major problems, constitutes a “quiet crisis.” For example, wetlands managers on the coast have worked hard to establish habitats that are beneficial to waterfowl, wading birds and other wetland wildlife. However, all this good work could be undone by an introduced pestilent reed known as phragmites. This plant is rapidly taking over large expanses of coastal impoundments, providing nothing in the way of food or cover for wildlife.

The ultimate but least preferred way to change people’s behavior is through the state’s wildlife laws and regulations. When instituted and used with restraint, the regulatory approach can benefit the few species that truly need it, while not unduly interfering with people’s needs and wants. The regulatory approach is especially needed to control access to a large class of marine species, some of which have been overlooked or perhaps not adequately protected. For instance, the cannonball jellyfish is a primary food source for sea turtles. There are international markets for jellyfish consumption, and South Carolina has plenty of this

invertebrate. In response to market demand, jellyfish are being harvested here. However, no regulations govern this harvesting. If it goes unchecked, the jellyfish population could be depleted, so we may need to investigate developing regulations on taking this species. It may mean a commercial fishery, or it may simply be a permitting system.

Where Do We Go From Here?

As with any other well-constructed plan, components are going to be prioritized and updated as needed. Project leader Rinehart reveals an exciting provision of the plan that will help everyone keep up with the changes. “Part of this strategy is the creation of an electronic-database version of the plan that will allow us to see very quickly the present condition of wildlife in our state. It will be Web-based and can be used by biologists, planners, other agencies and interested citizens. The public can access the wildlife strategy database and look up species accounts and distribution maps. Biologists can go online and update information periodically.”

In the past, such information has been readily

available only to the biologists who deal with it, but all the information will be available all the time to anyone who wants to get on the Internet and look. “We may even have a ‘contact us’ icon on each page so visitors can give us immediate feedback on things they’ve noticed in the field that they think we ought to know,” says Rinehart. “Of course, they can continue to contact us directly.”

What can South Carolina’s hunters and anglers expect in the future when they are out in the fields or rivers? It’s likely that the landscape will look just the same, but they may see that the land on which they’ve been hunting or fishing has more species variety. Managers are looking at mammals, birds, fish and

everything else. “Wildlife need an ecosystem that works correctly,” says Quattro. “If we manage for any one species, it may be detrimental to the entire ecosystem in the long run. It will benefit the whole state—its people and its wildlife—for us to manage comprehensively.”

If the strategy’s success is to be ongoing, partnerships, another crucial component, must be formed and cultivated. “When we talk about partnerships,” Quattro urges, “we’re talking about anyone in the state who wants to help work toward the goals of this strategy. Our partners are all the citizens of South Carolina. Our present working partners were involved before we ever had a strategy in hand. We wanted them to be a part of it along with us from the very beginning. Partnerships



TED BORG

Name: Swallow-tailed kite, *Elanoides forficatus*

Status: Considered endangered in South Carolina; disappearance of the swallow-tailed kite from three-fourths of its U.S. breeding range between 1880-1910 was one of the most dramatic range contractions of any bird before the post-WW II peregrine falcon crash.

Location: In floodplain forests and other large tracts of forested wetlands/mixed pine habitats of the outer coastal plain, where nesting sites in loblolly pines or bald cypresses occur. A main component of its nesting material is Spanish moss. Bird spends much of the day in flight catching insects and other foods, including anoles, treefrogs, small snakes, and nestling birds. It eats, drinks and bathes on the wing.

Challenges: Wetland loss and drainage; possibly vulnerable to chemical pesticides similar to the effects of these same chemicals on other birds like bald eagles and peregrine falcons.

Name: Fox squirrel, *Sciurus niger niger*

Status: Vulnerable in surrounding states. South Carolina’s populations may serve as a crucial link between other groups and a source for genetic diversity.

Location: Preferred habitat in the sandhills and piedmont in mixed stands of longleaf, loblolly and shortleaf pine, hardwoods and bottomlands.

Challenges: Widespread loss of preferred habitat.



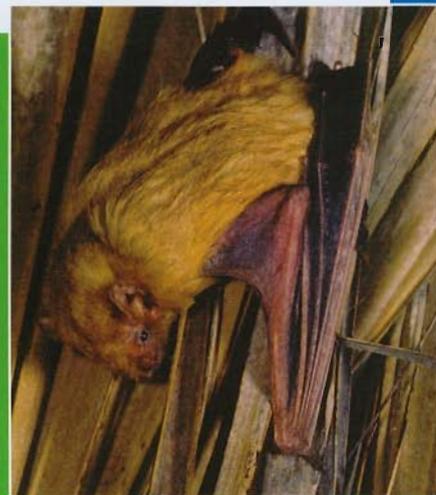
PHILIP JONES

Name: Northern yellow bat, *Lasiurus intermedius*

Status: Because little information is available concerning the status of this species, S.C. biologists rank this species of greatest conservation priority for mammals.

Location: Inner and outer coastal plain and coastal zone of South Carolina, over open areas such as fields, pastures, golf courses and marshes and along lake and forest edges. Roosting areas are usually in clumps of Spanish moss or old palmetto fronds.

Challenges: Loss of habitat represents the greatest threat; one of the least-known mammalian species in South Carolina.



MERLIN TUTTLE, BAT CONSERVATION INTERNATIONAL



MICHAEL FOSTER

Name: Eastern diamondback rattlesnake, *Crotalus adamanteus*

Status: Listed as a Species of Special Concern in South Carolina; thought to be declining range-wide; in South Carolina, still relatively common on large tracts of land in the southern portion of its range; uncommon to rare north of the Santee River.

Location: Primarily restricted to lower terraces of the coastal plain; typically associated with moderately moist longleaf communities, including longleaf pine flatwoods; also in coastal maritime communities such as maritime grassland and maritime forests, especially on barrier or estuarine islands; typically spends colder months underground.

Challenges: Degradation of longleaf pine habitats; collection for the pet trade.

can mean anything from talking with the State Park Service about implementing specific conservation measures on its land, to asking the folks at DHEC to bring us samples of crayfish from the field because we're doing a survey, to working with private landowners concerned about red-cockaded woodpeckers on their property. We envision we'll be working a lot on grants with groups like federal agencies, state agencies and environmental conservation groups. We'll also work with river advisory groups and school groups with conservation projects."

And little things count. Individual wildlife watchers can do things that range from the very, very small (like putting out the right kind of seed to attract a certain kind of bird or keeping a portion of the yard natural to attract wildlife) to the very, very grand.

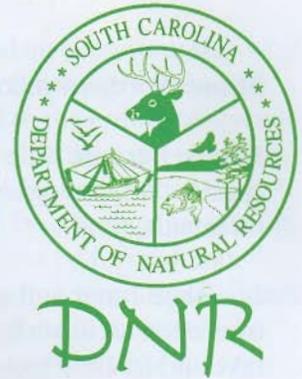
"When it comes to money," Quattro says, "some of

the groups that fund conservation projects have come forward and said that they want to fund projects that conform to the strategy. We expect other funding sources to do the same. In such cases, even if the DNR isn't directly involved, a partnership exists because we drew up the strategy that the funding entity is using as a screening device for potential beneficiaries. Our whole vision for this program is that it should be a guidebook for conservation efforts in the entire state."

Because of this strategy, the future looks bright for South Carolina's wildlife. The task of conserving declining species is challenging, but success is possible: look at the history of wildlife comebacks like the wild turkey, white-tailed deer and striped bass. Partner with the DNR, and help make South Carolina's Comprehensive Wildlife Conservation Strategy happen. 🦋

Get More Information...

From star-nosed moles to Atlantic ghost crabs, and everything in between...visit the Web site and check out the complete list of species included in the Wildlife Strategy—some 898 mammals, birds, reptiles/amphibians, fish, freshwater snails, crayfish, and marine invertebrates in habitats from the mountains to the sea—many with photographs! Also on the Web site, find information about the needs and challenges of these species, along with contact information for biologists specializing in these species. Go to www.dnr.state.sc.us/wcp!



Text for this supplement by Rosanne McDowell, a free-lance writer from Columbia.

What Can You Do?

Citizens of South Carolina can take some simple steps to benefit wildlife species and their habitats in this state.

- Leave palm fronds on the trees. Instead of trimming your fronds, leave them to provide roosting habitat for Northern yellow bats. These creatures consume thousands of mosquitoes each night. By leaving the fronds, you benefit the bats and reduce mosquitoes.
- Keep some Spanish moss in your trees. Bats will roost in this moss, and some birds rely on Spanish moss for nesting material.
- Plant native vegetation in your yard. Native vegetation provides food and cover for a variety of wildlife species including birds, reptiles and mammals. Planting native vegetation can set you on the path toward creating your own functioning backyard wildlife habitat.
- Keep vegetated buffers around water bodies. No matter how small the water body, every stream, river, pond and lake benefits from natural vegetated buffers. These buffers help eliminate harmful contaminants, nutrients and sediment from runoff. Buffers also provide shade to keep water temperatures optimal for fish. Naturally vegetated areas also slow runoff so that stream channels are not eroded.
- Respect beach dunes and other sensitive habitats. It's not just turtles that use the dunes; lots of other creatures live or forage there.
- Minimize the use of fertilizers, pesticides and herbicides near water bodies. Make sure not to apply more than is needed so you can reduce the potential for runoff into the aquatic environment.
- Keep non-native species out of the environment. Sure, that tropical fish looks cool in your aquarium, and that's where it needs to stay. Don't set exotic pets free; not only can they become a nuisance, they can end up harming our native species.
- Likewise, keep non-native plants out of the environment. Not all non-native plants are as obvious as kudzu, but some can be even more dangerous to wildlife. Non-native plants can out-compete natives and reduce forage for wildlife. Non-native aquatic plants can choke waterways and deplete oxygen levels for native fish.
- Don't litter. And if you see litter in the environment, clean it up. The problems with litter are as persistent as plastics in the environment. Animals can become trapped in bottles or jars or become entangled in litter, resulting in serious injury or death. Some animals eat litter that later causes gut blockage and, ultimately, death. No matter how you look at it, litter is bad for wildlife.
- Encourage local governments to use low-impact development designs for future projects. These designs have been shown to greatly reduce impacts to natural habitats.