GREEN SALAMANDER

NORTH CAROLINA WILDLIFE RESOURCES COMMISSION *fact sheet, 2005*

The southeastern United States has the largest diversity of salamander species in the world. North Carolina is home to approximately 56 species of salamanders, many of which are located only in specific isolated habitats. One rare salamander that lives in our state is the green salamander. This unique Southern Appalachian Mountain amphibian occurs only in two relatively small areas of North Carolina.

The green salamander reaches approximately 5 inches in length and can live for up to 10 years. This salamander species has unusual camouflage—its black flat body is covered in patches that range in color from bright green to yellow which allows it to blend in with its typical environment of lichen-covered rocks and mossy tree branches. The tips of its padded toes are squared, another unique feature of this salamander's appearance.

HABITAT PREFERENCES

The green salamander is usually active at night due to the cooler and wetter conditions produced by mountain fog and evening dew. Although it sometimes lives in decaying tree cavities, this rare salamander will usually inhabit rocky outcrops with deep, narrow crevices. Its flat body allows it to squeeze into tiny rock crevices that provide protection from predators and the high humidity it needs. Recent and ongoing research has shown that this species can be arboreal, often using trees as cover and for foraging.

Like most salamanders in the United States, the green salamander does not have lungs. Instead it must exchange oxygen and carbon dioxide through its skin. It requires cool, moist habitats that provide enough moisture to allow for the gas exchange.

A UNIQUE BREEDING STRATEGY

Green salamanders usually mate in the spring and typically breed every two years. Unlike most amphibians, including frogs, toads and some other salamanders, green salamanders do not have an aquatic larval life stage. Instead, the female will lay her 20 or so eggs in a cluster and suspend them from the ceiling of her rock crevice. This seems to be an adaptation to help insulate the egg cluster and maintain warmer temperatures for incubation. The eggs will hatch in approximately 45 days, and the female will stay with the hatchlings for a few months before crawling deeper into the crevice for the winter.

These green salamanders were captured on film in their typical habitat—lichen-covered rock outcrops in the Southern Appalachians.

Information on the green salamander is limited due to its nocturnal habits and preference for tight spaces.

A Wildlife Commission biologist searches for green salamanders.

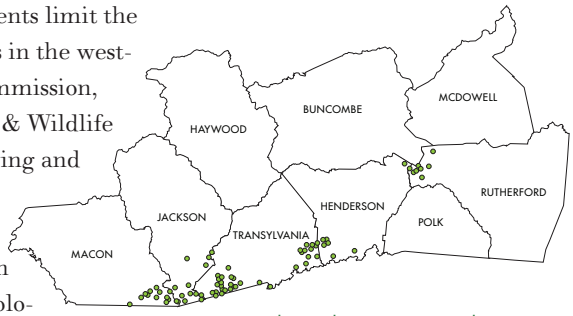
POPULATION DECLINE

Green salamanders are very difficult to locate and monitor since they are usually active at night and live in small inaccessible rock crevices. Therefore, not much is known about the exact range and abundance of the green salamander in North Carolina. Some researchers believe that populations declined between the 1970s and 1990s. However, biologists are uncertain if green salamander populations actually declined and, if so, what possible causes contributed to the decline.

The N. C. Wildlife Resources Commission became concerned about the green salamander population in North Carolina. Because of the salamander's restricted range and possible decline, the Commission listed this salamander as an endangered species in 1990.

SURVEYS AND MONITORING

Its specialized habitat requirements limit the green salamander to a few areas in the western region of our state. The Commission, with a grant from the U. S. Fish & Wildlife Service, recently began a surveying and monitoring program in the mountains to locate and assess green salamander populations in North Carolina. Commission biologists will record the breeding status or age class of each green salamander found and its location. With more intense monitoring, biologists hope to locate more of these secretive salamanders. The data collected through these monitoring efforts will be used to update the status of our state's population and determine the need for continued research and conservation.



Green salamanders occur in two distinct population clusters in North Carolina—one on the Transylvania/Henderson boundary and the other in Macon, Jackson and Transylvania counties.

HOW YOU CAN HELP

1. Maintain forest habitat around rock outcrops used by green salamanders to prevent them from drying out.
2. Educate yourself and others about the green salamander.
3. If you see a green salamander in the wild, do not collect it.
4. Join a conservation organization to stay informed about current research and conservation efforts.
5. Donate to the N. C. Nongame and Endangered Wildlife Fund.

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1722 Mail Service Center
Raleigh, N.C. 27699-1722
(919) 707-0050

www.ncwildlife.org

COLONIAL WATERBIRDS

NORTH CAROLINA WILDLIFE RESOURCES COMMISSION *fact sheet, 2005*

Colonial waterbirds are just that — birds that nest in colonies or groups. Nesting colonies may consist of only a few pairs to a few thousand pairs of birds. Twenty-five species of colonial waterbirds nest in North Carolina, many of which you may have seen in our coastal towns and on our barrier beaches such as pelicans, egrets, herons, terns, skimmers and gulls.

Colonial waterbirds use a wide variety of nesting habitats ranging from barrier island beaches and estuarine islands to maritime forests and swamps. Each species is adapted to a particular nesting "substrate" and plant community. Terns and skimmers generally nest on bare sand and shell with little or no vegetation. Other birds, such as pelicans, prefer to nest in grasses or low shrubs while wading birds, like egrets and herons, most often nest in shrubs or trees. Our beaches and estuaries also provide important roosting and foraging habitat for migrating and wintering colonial waterbirds.

SURVEYS AND RESEARCH

Biologists with the N. C. Wildlife Resources Commission conduct coast-wide colonial waterbird surveys every two to three years. This work has provided valuable information on the location, species composition and size of nesting colonies, as well as population trends. Data have shown that populations of some species of colonial nesters are declining. Beach nesters — such as common terns, gull-billed terns and black skimmers — have shown the most significant declines. Coastal development, increased nesting disturbances by humans and increased nest predation all contribute to these declines.

In response to these declines, Commission biologists have conducted several research projects to investigate causes of these declines. Recently, Commission biologists have examined reproductive success on the barrier island beaches and used video surveillance to identify causes of nest failures. The Commission also pusues techniques to increase reproductive success, such as using decoys and recorded calls to attract birds to suitable nesting habitat on dredged material islands.

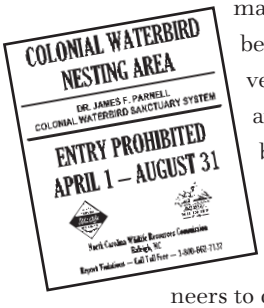
Royal terns nest within inches of one another on the bare sands of mostly uninhabited islands.

HABITAT PROTECTION

Humans and their pets easily disturb nesting waterbirds. Flushing the adults from their nests, especially during cool spring or hot summer weather, may put excessive stress on the eggs or nestlings. In addition, nests and chicks of many waterbirds are extremely well camouflaged. People can easily step on them, and dogs often trample nests and break eggs or crush chicks.

In an attempt to protect colonial waterbird nesting habitats from human disturbance, the Commission prohibits entry on 21 state-owned islands every year. These areas are closed to the general public from April 1 to August 31 to protect the nesting colonies during the breeding season. Signs are maintained year-round to notify fisherman, outdoor enthusiasts and other users of the protected nesting areas.

As the human population increases along our barrier beaches, colonial waterbird nesting sites are vanishing at an alarming rate. Many marshes and nesting islands are being converted to housing developments and private getaways. In an attempt to combat the decline of nesting areas, the Commission works closely with the United States Army Corps of Engineers to create nesting habitat for colonial nesting waterbirds using dredged material



Based upon Commission recommendations, the dredged material is used to stabilize existing islands and create new islands that can be used as alternative nesting sites for colonial waterbirds. Dredged material islands are becoming extremely important as habitat on barrier island beaches is lost to development. These islands provide isolated areas relatively free of human disturbance and predators. Commission biologists survey these islands every year for nesting use and success.

Biologists hope that with the joint efforts of the Commission, other conservation organizations and concerned citizens, colonial waterbird nesting habitat will continue to be protected and waterbird nesting success will increase enough to sustain the waterbird population in North Carolina for future generations.

A Wildlife Commission biologist and volunteers prepare to survey nesting birds.

White ibis adults and chicks.

COLONIAL NESTING WATERBIRDS IN NORTH CAROLINA

Anhinga	Snowy egret	Black-crowned night heron	Herring gull	Sandwich tern
Double-crested cormorant	Little blue heron	Yellow-crowned night heron	Great black-backed gull	Common tern
Brown pelican	Tricolored heron	White ibis	Gull-billed tern	Forster's tern
Great blue heron	Cattle egret	Glossy ibis	Caspian tern	Least tern
Great egret	Green heron	Laughing gull	Royal tern	Black skimmer

HOW YOU CAN HELP

1. Do not enter posted nesting areas from April 1 through August 31.
2. Keep dogs on a leash when on the beach.
3. Do not leave any trash on the beach. Discarded garbage attracts predators to nesting areas. Fishing line that is left on the beach entangles and kills birds.
4. Educate yourself and others on waterbird biology, identification and the importance of protecting habitat.
5. Volunteer with wildlife management agencies to help conduct annual waterbird surveys.
6. Join a conservation organization to stay informed about current population trends and conservation efforts.
7. Donate to the N.C. Nongame and Endangered Wildlife Fund.

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SEA TURTLE

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There are only seven species of sea turtles worldwide, and six are listed as threatened or endangered in the United States. Although the most common species in North Carolina is the loggerhead sea turtle, five sea turtle species regularly visit North Carolina waters: the loggerhead, Kemp's ridley, leatherback, green and hawksbill. Only loggerhead, green and leatherback sea turtles lay their eggs on North Carolina beaches.

Each species specializes according to its "ecological niche." For instance, leatherbacks have long flippers to help travel great distances across oceans during feeding and reproductive migrations. Loggerheads have big heads and jaws to help them crush whelks and other mollusks that they feed on. Green turtles have a serrated beak to help them cut seagrass and algae, their principal food.

NESTING ACTIVITY

When in reproductive condition, female sea turtles will migrate to beaches in the same region where they were born. In the ocean waters close to nesting beaches, females mate with one or more males, and roughly one month later are ready to lay their eggs. Females nest several times in a single season, but will nest only every second or third year. Sea turtles generally emerge from the ocean at night to lay their eggs as a way to avoid daytime predators and the drying effect of the hot sun. Once on the beach, the female may take an hour or more to carefully dig her nest 18 inches deep in the sand. She will lay about 120 leathery eggs in this vase-shaped cavity, cover them with sand and then return to the ocean, leaving the eggs to incubate on the beach.

Following approximately 60 days of incubation, the hatchlings will emerge from the nest and immediately scramble to the ocean where they remain for 15 to 30 years before they reach sexual maturity and are ready to mate. Although sea turtles can live to be over 50 years old, they have a very low survival rate. Only about one in 1,000 hatchlings will live to reproduce.

A rehabilitated sea turtle makes its way back to the ocean.

POPULATION DECLINE

Many sea turtle populations worldwide are declining. The existing seven species face different dangers, both on nesting beaches and in the ocean. Some of the threats that turtles face in North Carolina include

- development and heavy traffic on beaches that can disrupt adults or destroy incubating eggs;
- indirect capture by fishing nets, which can lead to injury or death;
- accidental collisions with boats;
- beach renourishment activities that can uncover or compact sea turtle nests; and
- general ocean pollution.

A HELPING HAND

The N.C. Wildlife Resources Commission has been lending a helping hand to the sea turtles nesting in our state since 1983. The Commission

ECOLOGICAL NICHE

The concept of an ecological niche for each species helps us to understand how different species of animals and plants interact with each other. Each species requires a different set of environmental conditions under which it can take in food, reproduce and avoid predators. Those conditions determine where it can live and how abundant the population can become. Likewise, during its life cycle, each species makes use of the resources within its environment in a particular way based on its biological needs and characteristics.

created the North Carolina Sea Turtle Protection Program to monitor sea turtle nesting activity in North Carolina, document reproductive success and mortality, and protect beach habitat along the North Carolina coast for sea turtle nesting. Commission biologists coordinate hundreds of volunteers who participate in the year-round monitoring of sea turtle activities in North Carolina. During the nesting season (May through September), biologists and volunteers mark and observe nests during incubation and also document all cases of sea turtle mortality.

A COLLABORATIVE EFFORT

Sea turtle conservation in North Carolina involves collaborative effort. The Commission works with many different organizations to help protect sea turtles and their nesting habitat. Commission biologists work with the U.S. Army Corps of Engineers to coordinate dredging efforts to prevent sea turtle nests from being destroyed. They also provide important information to public and private property owners along the coast about sea turtle conservation, which helps to minimize potential negative impacts to sea turtles. The Commission heads up a "Stranding and Salvage" network that responds to all cases of injured or sick turtles. A collaborative effort among the Commission, the North Carolina Aquariums, and the Karen Beasley Sea Turtle Rescue and Rehabilitation Center on Topsail Island ensures that dozens of turtles are rehabilitated and released back to the wild each year.

A researcher measures a turtle's carapace for the health assessment study.

Commission biologists are also involved in research projects that will help benefit future management. In collaboration with the NCSU School of Veterinary Medicine and the National Marine Fisheries Service, Commission biologists currently are conducting a "Health Assessment" study that will characterize the physiological state of juvenile loggerhead sea turtles inhabiting our inshore waters. The information gained will be extremely useful in improving rehabilitation techniques and serve as a baseline for future studies. By working together, the Commission and other conservation organizations can effectively protect sea turtle nesting habitat along the North Carolina coast and conserve the sea turtle populations that nest on our beaches.

Wildlife Commission biologists work hands-on with the turtles.

HOW YOU CAN HELP

1. Use red filters on flashlights when walking on the beach at night.
2. Do not disturb nesting sea turtles.
3. Turn off all outside lights facing the beach front during the nesting season.
4. Keep dogs on a leash.
5. Reduce beach traffic around sea turtle nests to prevent nest compaction.
6. Dispose of trash in an appropriate manner.
7. Be careful when navigating watercraft to prevent turtle collisions and injuries.
8. Volunteer with the Commission, Topsail Island Sea Turtle Hospital or beach clean-up crews.
9. Join a conservation organization to remain updated on current sea turtle conservation efforts.
10. Donate to the N.C. Nongame and Endangered Wildlife Fund.

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