Endangered Species

OF MISSISSIPPI

INTRODUCTION:

Mississippi has 80 species and subspecies of plants and animals which are officially recognized as endangered. This number does not include whales, which, although officially listed as endangered, rarely occur in Mississippi waters.

Extinction is a natural process, but it normally occurs at a low rate. Extinctions have increased due to human actions. It has been estimated that man is responsible for the extinction of up to 1000 species worldwide per year. Unfortunately, this number appears to be increasing.

Species become endangered for a variety of reasons. In some cases, crucial habitats are destroyed or drastically modified, making it impossible for a species to find food or a place to live. In other cases, species have been overused by man for food, commercial purposes, or sport. Species may also decline from the effects of diseases, pollution, or predation. The accounts that make up this packet provide information on the appearance of each species, where it occurs, its habitat, aspects of its life history and ecology, the basis for listing it as endangered, recommendations on management necessary to ensure it remains part of Mississippi's diversity, and selected references which can provide additional information. The descriptive information and illustration in each account provide a general idea of what each species looks like. In many cases, however, closely related species that are similar in general appearance also occur in Mississippi. Additional photographs and illustrations of the endangered species and characters useful for distinguishing them from other species can be found in the field guides and reference materials cited at the end of this introductory section.

Some of Mississippi's endangered species have been designated as such by the State of Mississippi, some by the Federal Government, and others by both. The former are referred to as "state-listed species," the latter two categories as "federally-listed species." The State of Mississippi does not have an endangered species designation for plants.

STATE PROTECTION OF ENDANGERED SPECIES:

Mississippi's endangered species law, entitled "The Nongame and Endangered Species Conservation Act of 1974," declares that "Species or subspecies of wildlife indigenous to the state should be accorded protection in order to maintain and to the extent possible enhance their numbers." An endangered species, as defined by this law, is any species or subspecies of wildlife whose survival and continued welfare in the state is in jeopardy or is likely to become so in the near future. The law prohibits taking, possessing, transporting, exporting, processing, selling, offering to sell, or offering to ship endangered species. Penalties for violating provisions of the Nongame and Endangered Species Act include fines between $2000 and $5000 and/or imprisonment for up to one year. Mississippi's official list of endangered species is reviewed every two years by the Commission on Wildlife, Fisheries and Parks, and may be amended by additions or deletions as deemed appropriate. The Commission is responsible for management of endangered species and enforcement of the Nongame and Endangered Species Conservation Act.

FEDERAL PROTECTION OF ENDANGERED SPECIES:

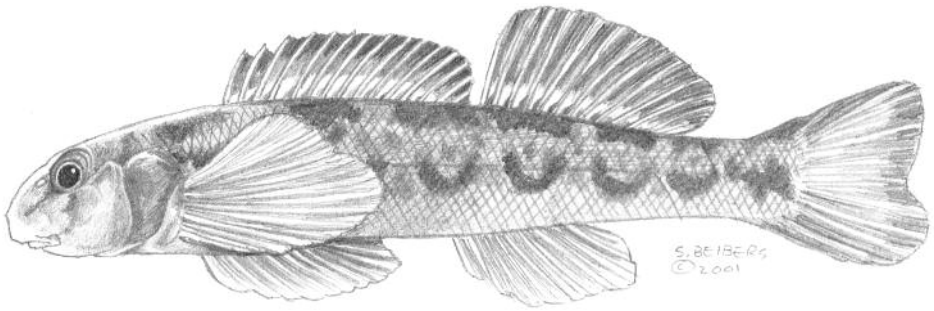
The United States government protects endangered species under authority of the "Endangered Species Conservation Act of 1973," as amended. This act groups species into two main categories, endangered and threatened. Endangered species are defined as those that are in danger of becoming extinct throughout all or a significant portion of their range. Threatened species are those that are likely to become endangered in the near future in all or a significant portion of their range. A third classification is used for some species and is referred to as "threatened by similarity of appearance." In Mississippi, the American Alligator is protected under this classification. The alligator and other species in this category, although not listed as either threatened or endangered, are treated as if they were. This classification is used when the species so closely resembles a threatened or endangered species that enforcement personnel have a difficult time distinguishing between them. This difficulty could act as an additional threat to the listed species especially if the unlisted species or its parts were in commercial demand. Threatened by similarity of appearance is used when such treatment of an unlisted species will aid in the enforcement of the Endangered Species Act.

The U.S. Government agencies responsible for implementing the Endangered Species Act are The Department of Interior and The Department of Commerce. The U.S. Fish and Wildlife Service, part of the Department of the Interior, has been given the responsibility of listing and protecting terrestrial and inland aquatic animals and plants, along with some marine mammals (the polar bear, sea otter, walrus, manatee, and dugong). The National Marine Fisheries Service, part of the Department of Commerce, is responsible for listing and protecting all other marine organisms. Responsibility for protecting sea turtles belongs to the Fish and Wildlife Service when the turtles are on land and to the National Marine Fisheries Service when the turtles are at sea. Penalties for violating the U.S. Endangered Species Act include fines up to $100,000 and/or imprisonment for up to one year.

The protection provided by the U.S. Government to federally listed species

Greenside Darter

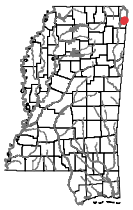
Etheostoma blennioides Rafinesque
Family Percidae
Order Perciformes



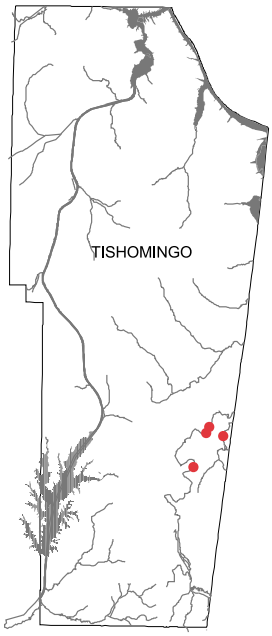
DESCRIPTION:

The greenside darter is a robust darter with a blunt snout, broadly connected gill membranes and long, expansive pectoral fins. The fusion of the skin over the upper lip with the skin of the snout makes this species unique among all darters. The body color is tan to greenish-brown with six to eight dark saddles along the dorsum and orange-red spots scattered along the upper portion of the sides. The sides are marked with five to eight lateral blotches that are "W" or "U" shaped. Breeding males are intense green to blue-green and the lateral blotches often elongate to become dark vertical bars. The greenside darter is one of the largest species in the genus *Etheostoma* with a maximum size of 166 mm (6.5 in.) total length.

RANGE:



Etheostoma blennioides has a disjunct distribution with population centers broadly separated by the Mississippi River. East of the Mississippi River, greenside darters are widespread from New York and Maryland, south from Ontario to Alabama, Tennessee, Georgia and northern Mississippi. Populations west of the Mississippi River occur in upland streams of Arkansas, Kansas, Oklahoma and Missouri. In Mississippi the greenside darter only occurs in Bear and Cedar creeks in Tishomingo County.



HABITAT:

Greenside darters typically occur in upland creeks and small rivers. Reaches are characterized by clear water flowing over gravel and rubble riffles with moderate to fast current, or shallow silt-free pools with steady current and a bedrock substratum. Some studies report a strong association with stream reaches containing aquatic vegetation or green algae.

LIFE HISTORY AND ECOLOGY:

Greenside darters feed on the immature stages of aquatic insects, such as midges, black flies, caddisflies, mayflies, stoneflies, beetles and dragonflies. One study from Tennessee reports that adults also consume snails. Spawning occurs from February to April in southern populations. Individuals typically spawn in very swift, rubble-bottomed riffles among areas with vegetation, boulders or sand. Females may produce 500-2000 mature eggs per season but may spawn several times during a single season. The life span for greenside darters is four to five years.

BASIS FOR CLASSIFICATION:

In Mississippi, this species is known from only a few individuals taken from Bear and Cedar creeks in Tishomingo County. This scarcity is of particular concern, given that this species is often abundant where it is found in Alabama, Arkansas and Tennessee. The greenside darter seems to be intolerant of turbidity and sedimentation, and could be at risk of extirpation from the state.

RECOMMENDATIONS:

Survey efforts in 1999 and 2000 have documented the continued occurrence of *Etheostoma blennioides* in both Bear and Cedar creeks. However, additional survey work is needed to further document its status in Mississippi and to identify ecological and habitat associations of Mississippi populations. Restrictions on water quality degradation and habitat alterations should be implemented for those streams known to harbor greenside darters.

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differs substantially from that provided by most state governments, including Mississippi's. Not only is the species protected from hunting or illegal possession, its habitat is partly protected as well. The Endangered Species Act requires that the actions of federal agencies and the use of federal funds do not jeopardize listed species or their habitats.

THE FEDERAL LISTING PROCESS:

Listing a species or changing the status of an already-listed species usually begins as an action of the Fish and Wildlife Service, National Marine Fisheries Service, or when an organization or person files a petition requesting such action. Both foreign species and species that occur in areas under the jurisdiction of the U.S. Government can be listed. Full species and subspecies of both plants and animals, and distinct populations of animals, are eligible for federal listing. When the appropriate agency decides that a species should be proposed for listing, notices to that effect are published in the Federal Register and in local newspapers in areas affected by the listing. State and local governments that may be affected are also informed. A final decision on whether to formally list the species is required within one year.

During the listing process, the federal agency may identify and propose critical habitat. Critical habitat is a specific area (or areas) within the known range of the species which has biological or physical features essential for the survival of that species. Critical habitat designation is not required in order for a species to be listed, and may in fact be detrimental to it, as such information may focus the attention of unscrupulous hunters or collectors on the areas where the species occurs.

The federal government provides opportunities to state and local governments, scientific organizations, or concerned individuals or groups to support or oppose the proposal to list a species. If valid scientific evidence is provided by these parties which does not support the need for listing, the proposal is usually withdrawn and the status of the species is re-examined.

Once a species is listed, a recovery plan is prepared for it. The recovery plan is a document which details how the species will be managed. The goal of a recovery plan is to increase the population size of a species to the point that the species will no longer need federal protection. Recovery plans are issued only for species that occur in areas under the jurisdiction of the U.S. Government. Unfortunately, the time lag between listing and preparation of a recovery plan is often long, and some listed threatened and endangered species lack formal recovery plans. Species that have been listed are reviewed every five years to determine whether they should have their status changed or should be removed from the federal list.

THE VALUE OF ENDANGERED SPECIES:

Endangered species are part of the biological diversity of this planet. There are many reasons for preserving biological diversity. From an ethical standpoint, the right of an endangered species, or any other species for that matter, to exist is regarded by many as no different from the right of mankind to exist. It has also been argued that species should be preserved because of their beauty or because they are intrinsically interesting. Species, including endangered species, are part of ecosystems which provide a wide variety of indirect benefits to humanity, such as maintenance of the quality of the atmosphere, generation of soils, disposal of waste, recycling of nutrients, pollination of plants, and pest and disease control. If enough species are driven to extinction, the ecosystems of which they are members may collapse, meaning that these indirect benefits will no longer be available. Wild species also provide a wide variety of direct benefits to mankind. In agriculture, the productivity of most of the major crop species is maintained and expanded by the constant influx of genetic material from the wild relatives of modern crop plants. A high percentage of medicines, pharmaceutical products, and organic industrial chemicals owe their origins to compounds from wild organisms. It has been reasonably argued that, by driving other species to extinction, man is in reality contributing to his own.

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Endangered Species

OF MISSISSIPPI

FEDERAL STATUS

PLANTS[1]:

American Chaffseed (*Schwalbea americana*) . . . . . Endangered
Louisiana Quillwort (*Isoëtes louisianensis*) . . . . . Endangered
Pondberry Spicebush (*Lindera melissifolia*) . . . . . Endangered
Price's Potato Bean (*Apios priceana*) . . . . . Endangered

MUSSELS:

Alabama Moccasinshell (*Medionidus acutissimus*) . . . . . Threatened
Black clubshell (*Pleurobema curtum*) . . . . . Endangered
Cumberlandian Combshell (*Epioblasma brevidens*) . . . . . Endangered
Delicate Spike (*Elliptio arctata*) . . . . . None
Fat Pocketbook (*Potamilus capax*) . . . . . Endangered
Inflated Heelsplitter (*Potamilus inflatus*) . . . . . Threatened
Kidney Shell (*Ptychobranchus fasciolaris*) . . . . . None
Monkeyface (*Quadrula metanevra*) . . . . . None
Mucket (*Actinonaias ligamentina*) . . . . . None
Orange-nacre Mucket (*Lampsilis perovalis*) . . . . . Threatened
Ovate Clubshell (*Pleurobema perovatum*) . . . . . Endangered
Purple Wartyback (*Cyclonaias tuberculata*) . . . . . None
Pyramid Pigtoe (*Pleurobema rubrum*) . . . . . None
Rabbitsfoot (*Quadrula cylindrica cylindrica*) . . . . . None
Sheepnose (*Plethobasus cyphyus*) . . . . . None
Slabside Pearlymussel (*Lexingtonia dolabelloides*) . . . . . Candidate
Snuffbox (*Epioblasma triquetra*) . . . . . None
Southern Clubshell (*Pleurobema decisum*) . . . . . Endangered
Southern Combshell (*Epioblasma penita*) . . . . . Endangered
Southern Pink Pigtoe (*Pleurobema taitianum*) . . . . . Endangered
Southern Round Pigtoe (*Pleurobema marshalli*) . . . . . Endangered
Spike (*Elliptio dilatata*) . . . . . None
Stirrupshell (*Quadrula stapes*) . . . . . Endangered

CRAYFISH:

Camp Shelby Burrowing Crayfish (*Fallicambarus gordoni*) . . . . . Candidate

INSECT:

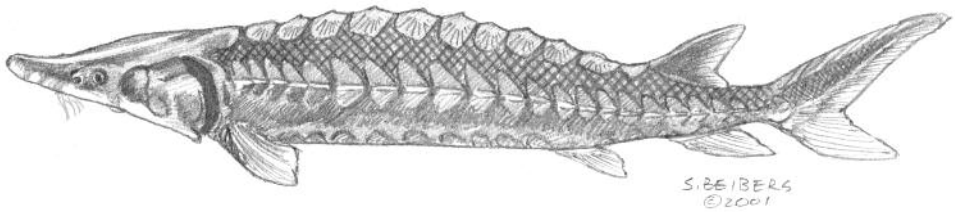
American Burying Beetle (*Nicrophorus americanus*) . . . . . Endangered

FISHES:

Alabama Sturgeon (*Scaphirhynchus suttkusi*) . . . . . Endangered
Bayou Darter (*Etheostoma rubrum*) . . . . . Threatened
Bigeye Shiner (*Notropis boops*) . . . . . None
Crystal Darter (*Crystallaria asprella*) . . . . . None
Frecklebelly Madtom (*Noturus munitus*) . . . . . None
Greenside Darter (*Etheostoma blennioides*) . . . . . None
Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) . . . . . Threatened
Ironcolor Shiner (*Notropis chalybaeus*) . . . . . None
Northern Madtom (*Noturus stigmosus*) . . . . . None
Pallid Sturgeon (*Scaphirhynchus albus*) . . . . . Endangered
Pearl Darter (*Percina aurora*) . . . . . Candidate
Slender Madtom (*Noturus exilis*) . . . . . None

Gulf Sturgeon

Acipenser oxyrinchus desotoi Mitchill
Family Acipenseridae
Order Acipenseriformes



DESCRIPTION:

The Gulf sturgeon is a large fish, attaining an average length of 1.8-2.5 m (6-8 ft.). A large female caught in the Pearl River north of Jackson in 1942 was 2.4 m (7.75 ft.) long and weighed 154 kg (340 lbs.). This species has an elongated head and a pointed, slightly upturned snout. The body is covered with five rows of bony, scale-like plates and the upper section of the caudal fin is markedly longer than the lower section. The mouth is sucker-like, toothless, and has thick lips. There are four elongate fleshy projections, or barbels hanging down between the tip the snout and the mouth. The head and back are grayish-blue to dark olive and the belly is white.

RANGE:

Acipenser oxyrinchus desotoi historically occurred along the Gulf Coast from the Suwannee River in Florida west to the Mississippi River. In Mississippi, this species has been collected in the Pearl River upstream to Madison County and in the Bogue Chitto River to Pike County. In the Pascagoula drainage, it has been collected upriver in the Chickasawhay River to Waynesboro, and in the Leaf River upriver to Hattiesburg. There is one reported record from the Mississippi drainage in the Big Sunflower River.

LIFE HISTORY AND ECOLOGY:

The Gulf sturgeon is an anadromous species, spending much of its life cycle in marine environments but returning to freshwater to breed. A female sturgeon may produce between 800,000 and 2,500,000 eggs per spawning season. Eggs are laid in running water over rubble, gravel, clay or shell at water temperatures between 22-23 C (71-74 F). The eggs hatch in approximately one week. Young sturgeon apparently remain in fresh water for up to six years, after which they migrate to the sea. They reach sexual maturity in 7-12 years at weights of 45-60 kg (100-150 lbs.). Gulf sturgeon may grow to as large as 3 m (10 ft.) and may live up to 70 years.

Spawning may occur every year, although there is some evidence that Gulf sturgeon require a long resting period between spawnings. Mature sturgeon move into freshwater from the Gulf in early spring to spawn and migrate back to saltwater in the autumn or early winter. Younger, immature sturgeon may participate in these yearly migrations, but typically do not move as far upriver as spawning adults. Gulf sturgeon, like salmon, appear to return as adults to spawn in the same river in which they hatched.

The diet of the Gulf sturgeon consists of soft-bodied organisms such as aquatic insects and other aquatic invertebrates while they inhabit freshwater, and mollusks, shrimps, other invertebrates, and small fish while in marine environments.

BASIS FOR CLASSIFICATION:

Acipenser oxyrinchus desotoi was listed as a Federally threatened species on 30 September 1991 by the U.S. Fish and Wildlife Service. The decline of the Gulf sturgeon throughout its range appears to have resulted from overfishing and the loss or alteration of spawning habitat. Commercial fishing depleted Gulf sturgeon stocks shortly after the turn of the century. In the Pascagoula River, for example, 11,000 kg (24,000 lbs.) of sturgeon were taken in 1902. Since that time, this species has only been occasionally observed in that river system. Incidental take by shrimp boats or other commercial fishing operations in the Gulf of Mexico may also contribute to the continued low population size of this species. River modifications, such as dam construction, dredging, and channelization, may prevent sturgeon from gaining access to spawning grounds or may destroy the substrates on which eggs are deposited, either through direct effects or indirectly through increased siltation. Finally, widespread industrial and domestic pollution has reduced both feeding and spawning habitat for sturgeon.

RECOMMENDATIONS:

Existing Gulf sturgeon populations in the Pascagoula and Pearl River systems should be inventoried to determine the current status of this species in Mississippi. Life history studies to determine spawning periods and locations, feeding grounds, and population structure should be conducted. Any proposed channel modifications in the Pearl or Pascagoula watersheds should be scrutinized for possible impact on the survival of the Gulf sturgeon.

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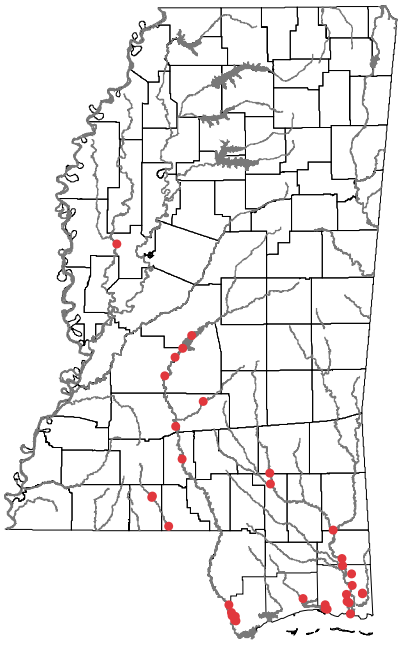

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Slenderhead Darter (*Percina phoxocephala*) . . . . . .None
Southern Redbelly Dace[2] (*Phoxinus erythrogaster*) . . . . . .None
Suckermouth Minnow (*Phenacobius mirabilis*) . . . . . .None

AMPHIBIANS:

Cave Salamander (*Eurycea lucifuga*) . . . . . .None
Mississippi Gopher Frog (*Rana sevosa*) . . . . . .Proposed Endangered
Green Salamander (*Aneides aeneus*) . . . . . .None
One-toed Amphiuma (*Amphiuma pholeter*) . . . . . .None
Spring Salamander (*Gyrinophilus porphyriticus*) . . . . . .None

REPTILES:

Atlantic Ridley (*Lepidochelys kempi*) . . . . . .Endangered
Black-knobbed Sawback (*Graptemys nigrinoda*) . . . . . .None
Black Pine Snake (*Pituophis melanoleucus lodingi*) . . . . . .Candidate
Eastern Indigo Snake (*Drymarchon corais couperi*) . . . . . .Threatened
Gopher Tortoise (*Gopherus polyphemus*) . . . . . .Threatened
Green Turtle (*Chelonia mydas*) . . . . . .Endangered
Hawksbill Turtle (*Eretmochelys imbricata*) . . . . . .Endangered
Leatherback Turtle (*Dermochelys coriacea*) . . . . . .Endangered
Loggerhead Turtle (*Caretta caretta*) . . . . . .Threatened
Alabama Red-bellied Turtle (*Pseudemys alabamensis*) . . . . . .Endangered
Rainbow Snake (*Farancia erytrogramma*) . . . . . .None
Ringed Sawback (*Graptemys oculifera*) . . . . . .Threatened
Southern Hognose Snake (*Heterodon simus*) . . . . . .None
Yellow-blotched Sawback (*Graptemys flavimaculata*) . . . . . .Threatened

BIRDS:

Bachman's Warbler (*Vermivora bachmanii*) . . . . . .Endangered
Bald Eagle (*Haliaeetus leucocephalus*) . . . . . .Threatened
Bewick's Wren (*Thryomanes bewickii*) . . . . . .None
Brown Pelican (*Pelecanus occidentalis*) . . . . . .Endangered
Ivory-billed Woodpecker (*Campephilus principalis*) . . . . . .Endangered
Least Tern[3] (*Sterna antillarum*) . . . . . .Endangered
Mississippi Sandhill Crane (*Grus canadensis pulla*) . . . . . .Endangered
Peregrine Falcon (*Falco peregrinus*) . . . . . .None
Piping Plover (*Charadrius melodus*) . . . . . .Threatened
Red-cockaded Woodpecker (*Picoides borealis*) . . . . . .Endangered
Snowy Plover (*Charadrius alexandrinus*) . . . . . .None
Wood Stork (*Mycteria americana*) . . . . . .None

MAMMALS:

Black Bear (*Ursus americanus*) . . . . . .Threatened
Florida Panther (*Puma concolor coryi*) . . . . . .Endangered
Gray Bat (*Myotis grisescens*) . . . . . .Endangered
Indiana Bat (*Myotis sodalis*) . . . . . .Endangered
West Indian Manatee (*Trichechus manatus*) . . . . . .Endangered
Whales, Order Cetacea, excluding Family Delphinidae

[1] Mississippi has no statutes concerning endangered plants.

[2] West Mississippi disjunct populations

[3] Interior populations nesting along the Mississippi River

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MISSISSIPPI WILDLIFE, FISHERIES & PARKS

Endangered Species

OF MISSISSIPPI

Identification References

GENERAL INFORMATION

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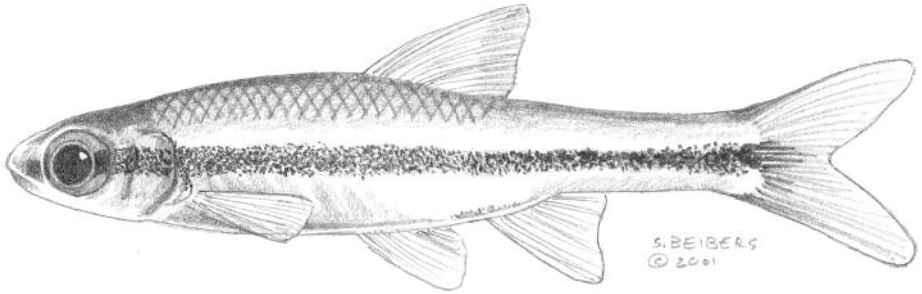
Ironcolor Shiner

Notropis chalybaeus (Cope)
Family Cyprinidae
Order Cypriniformes

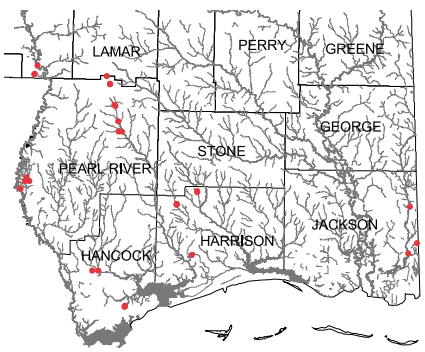


DESCRIPTION:

Notropis chalybaeus is a small shiner with a deep, compressed body which is generally arched, being deepest at the origin of the dorsal fin. The body is straw-olive to dark olive with the dorsal scales lightly pigmented along their margins. A conspicuous, black lateral band extends from the tip of the snout to the base of the tail and terminates as a small irregular shaped caudal spot. The lips and chin are lightly pigmented by the lateral band as it encircles the snout, and the inside of the mouth is distinctly sprinkled with black pigment. Breeding males develop an orange to rosy hue over the entire body. The maximum size is 65 mm (2.5 in.) total length.

RANGE:

Notropis chalybaeus is a widespread species with three separate population centers: the Atlantic Slope and Gulf Coastal Plain drainages from New York to eastern Louisiana; the Mississippi Embayment from northern Louisiana to southern Illinois (exclusive of Tennessee); and the upper Mississippi basin in Michigan and Iowa. Within Mississippi, the ironcolor shiner historically occurred along the coastal area of the state in the Biloxi, Jourdan, Wolf, Escatawpa (Pascagoula drainage), and Pearl River systems (Pearl drainage).



HABITAT:

Notropis chalybaeus is found primarily in lowland streams where stream reaches are characterized by either abundant aquatic vegetation, open swamp habitat and/or areas draining densely canopied woodlands. Individuals often aggregate at the upstream ends of pools, in water 60-90 cm (23.6-35.4 in.) deep, with a moderate to sluggish current, and sand, mud, silt, or detrital substrata.

LIFE HISTORY AND ECOLOGY:

The ironcolor shiner is a sight feeder with its diet including small crustaceans, aquatic insects, terrestrial insects and filamentous algae. The spawning season extends from mid-April to late-September with peak activity in the Mississippi likely occurring in late June. Eggs are adhesive and stick to sand and detritus along the bottom.

BASIS FOR CLASSIFICATION:

A survey conducted in 1995-1996 of historic localities of this species in Mississippi failed to yield any specimens, although a single individual was documented from a backwater area of the Escatawpa River in 1996. *Notropis chalybaeus* is intolerant of habitat degradation, and the absence of *Notropis chalybaeus* from several historic sites may be related to its intolerance of recent habitat degradation (eg., channel and floodplain alteration, loss of stream side vegetation, drainage improvement). Poor land management practices (eg., conversion of riparian areas to pasture) near other localities may have also played a role in local population declines or extirpations.

RECOMMENDATIONS:

A thorough survey should be conducted within the Escatawpa and Wolf River systems. This survey should attempt to identify new localities and prioritize them for future conservation. The only known extant population of *Notropis chalybaeus* in Mississippi should be protected from habitat degradation in the Escatawpa River, floodplain and local watershed. Establishing a riparian buffer zone will aid in protecting instream habitat and water quality. The coastal counties of Mississippi are experiencing rapid development and a large influx of new residents. As such, deterioration of water quality within coastal drainages is very likely if new development within these watersheds is not encouraged to follow best management practices to minimize impacts on the aquatic systems.

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Acknowledgements

Executive Director, Sam Polles, Ph.D.

Deputy Director, Al Tuck

Museum Director, Libby Hartfield

Project Director, Martha B. Cooper

Species Accounts Coordinator, Charles Knight

Maps by Christopher Szell

Illustrations by Sam Beibers

Species Accounts Writers:
Ken Gordon
Paul Hartfield
R.L. Jones, Ph.D.
Tom Mann
Cary Norquist
Cathy Shropshire, Ph.D.
William T. Slack, Ph.D.
Ron Wieland
Mark S. Woodrey, Ph.D.
Steve Leonard

Technical Assistance:
Ellen Buntyn
Mary Stevens

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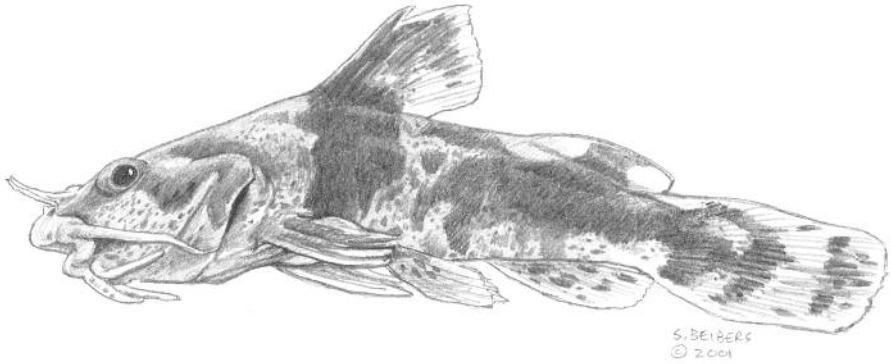
Northern Madtom

Noturus stigmosus Taylor
Family Ictaluridae
Order Siluriformes

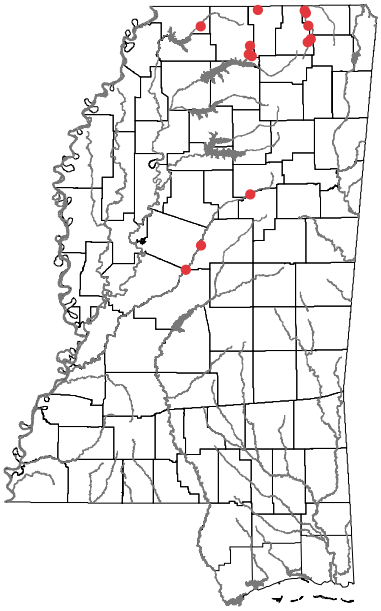


DESCRIPTION:

The northern madtom is a robust madtom with a broad, flat head. The back and sides are clearly marked with four dark brown to black saddles. The body is yellow to tan with distinct mottling between saddles. The first saddle usually encloses two unpigmented circles in front of the dorsal fin. The rear edge of the caudal fin is straight and there is a dark crescent-shaped band in middle of the fin. The adipose fin is continuous but nearly free where it joins the caudal fin. Maximum size is 132 mm (5.2 in.) total length.

RANGE:

Noturus stigmosus occurs throughout the Lake Erie and Ohio River basins from Pennsylvania to Minnesota south to Kentucky, and in tributaries of the Mississippi River in western Tennessee and northern Mississippi. Within



Mississippi, the northern madtom historically occurred in the Big Black, Coldwater, Tallahatchie, Hatchie, and Wolf (Benton Co.) River systems.

HABITAT:

The northern madtom occurs in large creeks and rivers, over mixed sand, gravel and rubble substrata with moderate to swift currents. In northern Mississippi it occurs in streams 4-15 m wide (13-49 ft.), at depths of 15-30 cm (6-12 in.). The habitat is usually slowly moving water, over sand or mud substrata, often in pools below riffles. Fish are usually associated with instream cover such as logs and leaf litter or occur along undercut banks.

LIFE HISTORY AND ECOLOGY:

Spawning likely occurs from June to August with females producing 61-41 eggs. Males guard the nest with nest sites associated with large rocks and limbs as well as other submerged objects such as cans, bottles and boxes. In the northern portion of their range, individuals have occasionally been taken on trot lines by fishermen. The maximum size is 132 mm (5.2 in.).

BASIS FOR CLASSIFICATION:

Recent efforts to document its occurrence in Mississippi have been unsuccessful except for collections in the Hatchie and Wolf River systems. Northern madtoms normally occur in low numbers and consequently may be particularly sensitive to both natural and human causes of environmental change. It is a species of special concern in Tennessee, and although fairly common in the Hatchie River in Tennessee, it is rare elsewhere in the state. Because the northern madtom exhibits a disjunct distribution and its populations are fragmented, it is vulnerable to local extirpation.

RECOMMENDATIONS:

A survey of the current status of this species in Mississippi is needed, as are studies of its natural history. Restrictions on water quality degradation and habitat alterations should be implemented for those streams known to harbor northern madtoms.

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American Chaffseed

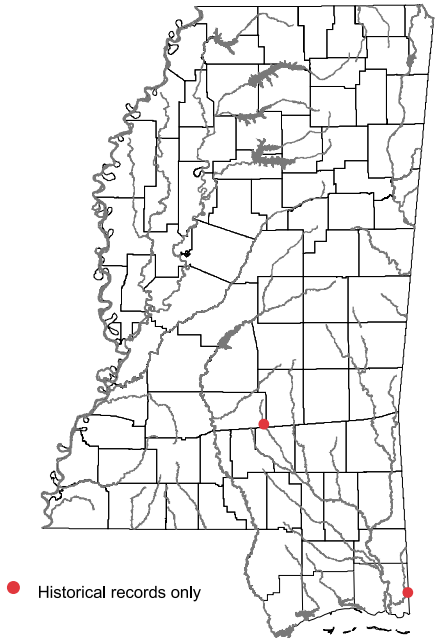
Schwalbea americana (Linnaeus)
Family Scrophulariaceae
Order Scrophulariales

DESCRIPTION:

American Chaffseed, a perennial herb in the figwort family, occurs in a single-species genus. Plants are densely hairy throughout and grow to heights of 3-8 dm (12-13 in.). The leaves are alternate, lance-shaped to elliptic, stalkless, 2-5 cm (1-2 in.) long, and smooth on the edges; the upper leaves are reduced to narrow bracts. Large (15 mm long and 7 mm wide, 0.6-0.3 in.), purplish, tubular flowers occur singly on short stalks in the axils of these upper reduced leaves and form a many- flowered, spike-like raceme. The fruit is a long narrow capsule (up to 10 mm long, 0.4 in.), enclosed in a loose-fitting sac-like structure composed of persistent sepals that provides the bases for the common name, chaffseed.

RANGE:

This plant is primarily a coastal plain species of the Atlantic and Gulf Coasts, with historic locations documented from 9 states. Today approximately 25 populations are known to exist and these occur in Alabama, Florida, Georgia, New Jersey, North Carolina, and South Carolina. Two historic populations are documented from Mississippi, one from Jackson County and another from Simpson County. There is still a chance that the species will be rediscovered in Mississippi.



HABITAT:

Characteristically the species occurs in sandy (sandy peat, sandy loam), acidic seasonally moist soils. It is found in habitat described as open, moist pine flatwoods, fire-maintained savannas, areas between peaty wetland and wet sandy soils, and other open grass-sedge systems.

LIFE HISTORY AND ECOLOGY:

Flowering occurs from April to June in the South, and from June to mid-July in the North. Fruits mature from early summer in the South to October in the North. American chaffseed is a semi-parasite. It is considered to be one of the rarest root-parasitic flowering plants in the Southeast. The species is not host-specific, parasitizing a wide variety of woody and herbaceous plants. The species appears to be shade intolerant and is dependent on factors such as fire and fluctuating water tables to maintain open to partly open conditions.

BASIS FOR CLASSIFICATION:

American Chaffseed is listed as an endangered species by the U.S. Fish and Wildlife Service. Three-fourths of the known populations have been extirpated due to conversion of the habitat to residential and commercial purposes, incompatible agriculture and forestry practices, and succession of the vegetative community towards a dominance of shrubby species due to fire suppression. Current populations continue to be threatened by such activities.

RECOMMENDATIONS:

Protection and appropriate management should be sought for key populations. Research will be needed to determine optimum management techniques for populations (i.e. fire frequency and timing). Additional studies are needed to gain information on this species' life history and ecology. Monitoring will assist in determining population trends and assessing results of management experiments.

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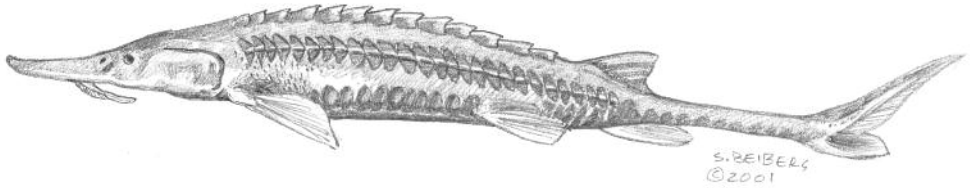
Pallid Sturgeon

Scaphirhynchus albus (Forbes and Richardson)
Family Acipenseridae
Order Acipenseriformes



DESCRIPTION:

This freshwater sturgeon is grayish white, and has a broad, shovel-shaped snout and a slender caudal peduncle (area just in front of the tail fin). It differs from the similar (and much more common) shovelnose sturgeon in its lighter hue, in its barbel arrangement (the bases of the lateralmost two barbels beneath the snout are usually just posterior to the bases of the medial barbel pair; the opposite arrangement is characteristic of the shovelnose), and in the absence of scale-like scutes on the belly between the rows of ventrolateral plates. Additionally, the pallid has more rays in its dorsal fin (37 or more) and anal fin (24 or more) than does the shovelnose, and attains a larger maximum weight, 39 kg (85 lbs.), and length, 168 cm (66 in.). Adult pallids typically weigh 6.8-11.3 kg (15-25 lbs.).

RANGE:

The pallid sturgeon is nearly restricted to the main channels of the Lower Yellowstone River, the Missouri River, and the lower Mississippi River. In Mississippi this fish has been collected from the Mississippi River and the Big Sunflower River in Sharkey County.

HABITAT:

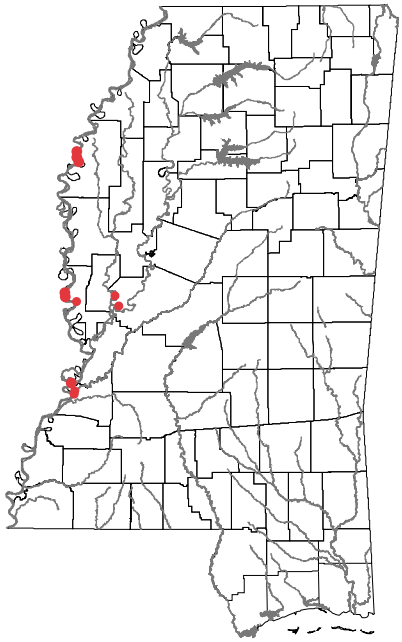
The pallid sturgeon prefers turbid water with strong current over sandy or rocky bottom.

LIFE HISTORY AND ECOLOGY:

This is one of the most poorly known and infrequently encountered North American fish. It spawns in June and July and feeds on aquatic insects and small fish.

BASIS FOR CLASSIFICATION:

The pallid sturgeon was Federally listed as endangered on 6 September 1990. Its numbers have drastically declined throughout its 3500 mile river range during the past 20 years. Fifty-one percent of its range has been channelized, an additional 28 percent has been impounded, and the remaining 21 percent is affected by related changes in flow regimes. These alterations have blocked movements of the fish, modified or destroyed spawning habitat, destroyed and/or rendered food sources less accessible, and changed important environmental factors (water temperature, for example). Pallids are occasionally stranded in water diversion channels. Commercial fishing and snag hook fishing for paddlefish have probably been detrimental to pallids, also. Water pollution and hybridization with shovelnose sturgeon are additional threats.



RECOMMENDATIONS:

A pallid sturgeon recovery team has been established by the U.S. Fish and Wildlife Service. Research is underway to develop techniques that will permit genetic differentiation of shovelnose, pallid, and shovelnose-pallid hybrids. This will facilitate law enforcement and permit better assessment of the hybridization problem. As channel alteration is apparently the most important factor in the rapid decline of this species, it is obvious that additional channel modification projects within the range and habitat of the pallid should be curbed. Instead, projects should focus on the development and implementation of programs to improve existing habitat availability and quality.

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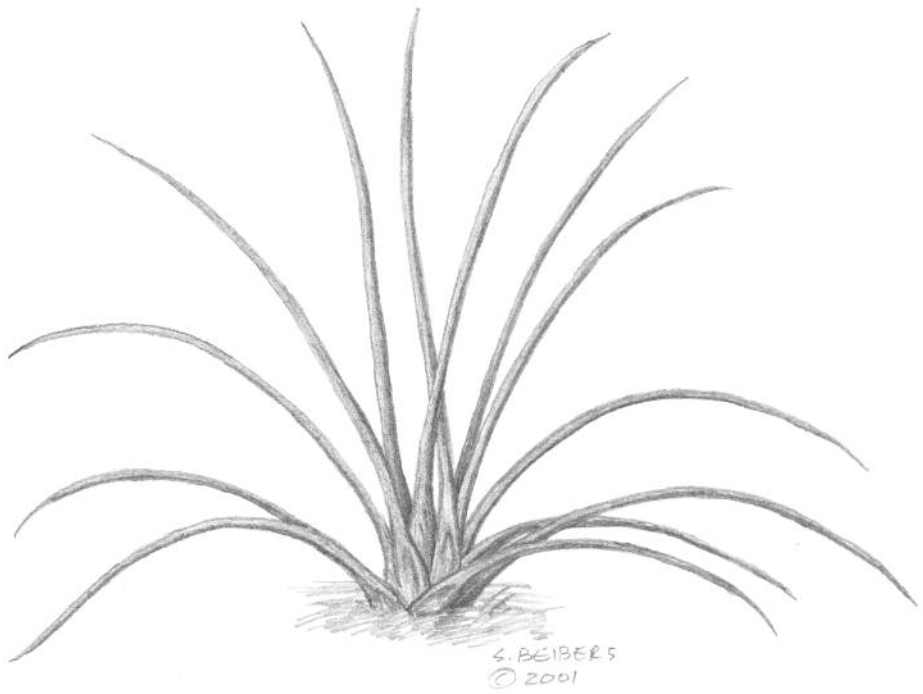
Louisiana Quillwort

Isoëtes louisianensis Thieret
Family Isoëtales
Order Isoetales

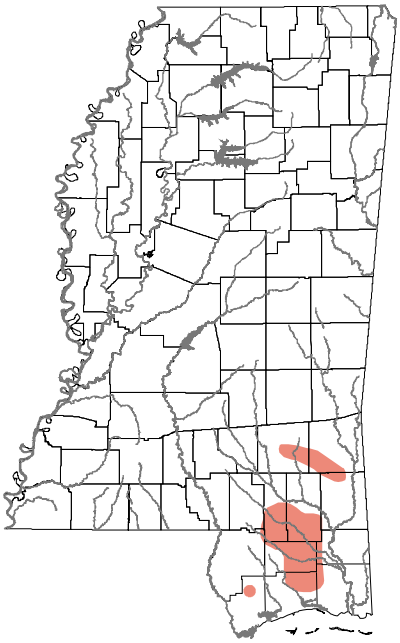


DESCRIPTION:

The Louisiana Quillwort, a perennial emergent aquatic or wetland herb, is a primitive relative of true ferns and is related to club mosses (Lycopodiaceae)and spike mosses (Selaginellaceae). It reproduces via spores instead of seeds. The grass-like plants are comprised of a whorl of linear, arching, leaf-like sporophylls, each of which encloses four parallel air chambers (a unique feature of all quillworts). Each sporophyll contains a basal pouch where highly ornamented spores of two sizes develop. The sporophylls, as shown in the diagram, are attached to a shallowly buried two-lobed rootstock. As one of about two dozen species of quillworts occurring in the southeastern United States, the Louisiana quillwort is intermediate in size between the extremely rare granite outcrop quillworts of Georgia that are scarcely more than 2-3 cm (0.79-1.18 in.) tall and the robust quillwort species of south Alabama that are upwards of 50 cm (19.69 in.) tall.

RANGE:

The type locality for Louisiana Quillwort is in Washington Parish, Louisiana, where the plants were first discovered in 1972. A few additional colonies were found in neighboring St. Tammany Parish over the next two decades but not until 1996 were Louisiana Quillwort plants verified in Mississippi. A few thousand quillwort plants have been observed in the Chickasawhay District of DeSoto National Forest and adjacent private lands (Jones, Wayne, Greene counties). However, most of the Mississippi colonies are found in the De Soto Ranger District of DNF (Forrest, Perry, Stone, Harrison, Jackson counties) with a small cluster of sites in north-central Hancock County. One colony is known from Pearl River County.



HABITAT:

Louisiana quillworts grow in mineral soil, usually light gray in color, in bottomlands that are periodically washed free of leaves and debris. Overstory trees are typically laurel oak, red maple, tulip poplar, and swamp black gum. Pine trees are only occasionally observed, but they may have been more common, as large old pine stumps are frequently observed around quillwort populations. The shrub layer is sparse with titi being the usual dominant plant.

Streams along which quillworts grow, may flow year round; however most quillwort sites dry out enough that the plants wither in June-July and do not resprout until early November when the weather is cooler and rains return.

LIFE HISTORY AND ECOLOGY:

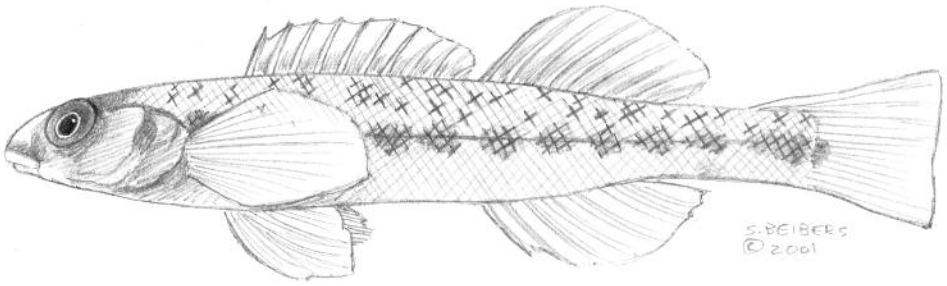
A healthy, mature quillwort plant is comprised of as many as 60 leaf-like sporophylls. New sporophylls form at the center of the whorl as the outer ones mature and wither or are lost by abrasion from floodwater scouring. In some colonies leaves are also browsed by marsh rabbits and deer. The outer leaves form subterranean megaspores and the inner leaves form microspores. Egg cells are produced by the female gametophyte developing with the megaspore, and a sperm cell is produced by the male gametophyte which develops within the microspore. Water is necessary for fertilization. A sperm cell swims to and enters a megaspore, uniting with an egg therein. After fertilization, the new plant (known as a sporeling) germinates and becomes buoyant, facilitating dispersal by flowing water. If the young plant reaches bare moist soil, roots develop and a new colony is formed.

BASIS FOR CLASSIFICATION:

The Louisiana Quillwort was listed as an

Pearl Darter

Percina aurora Suttkus and Thompson
Family Percidae
Order Perciformes



DESCRIPTION:

The pearl darter is a relatively small, nondescript fish. The body is olive to light brown in color with the sides marked with a series of dark oval to oblong blotches and a single black caudal spot located at the base of the caudal fin. The upper sides are speckled with dark "X" shaped markings. The common name, pearl darter, is in reference to the pearly, pastel blue coloration prominently located on the sides and lower portions of the head. The maximum size is 75 mm (2.95 in.) total length with males reaching a larger adult size than females.

RANGE:

The pearl darter, *Percina aurora*, is known only from Louisiana and Mississippi where it originally occurred in the Chickasawhay, Leaf, and Pascagoula River systems of the Pascagoula drainage, and in the Pearl and Strong River systems of the Pearl drainage. The pearl darter was last taken from the Pearl drainage during the early 1970's, and it is now assumed that both Mississippi and Louisiana populations in the Pearl drainage are extirpated.

HABITAT:

The pearl darter has been known to occur in rapids or riffles over gravel or bedrock substrata in slow to moderate currents. In the Pascagoula River, it occurs in the slow flowing waters along the downstream edge of sandbar point bars in runs 90-150 cm deep over a substratum of sand with scattered patches of detritus.

LIFE HISTORY AND ECOLOGY:

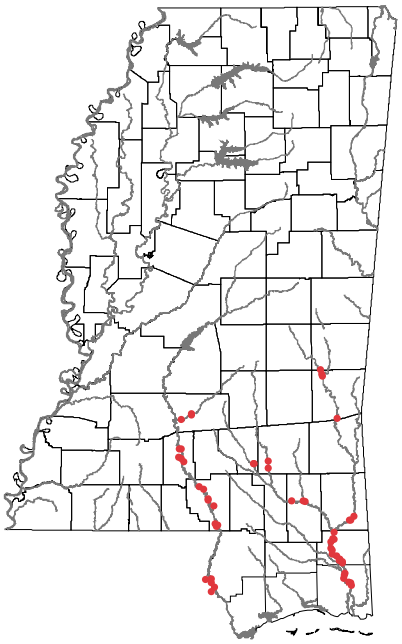
Little is known about the biology of the pearl darter. Spawning likely occurs from late February or March to May.

BASIS FOR CLASSIFICATION:

Extirpation in the Pearl drainage is attributed to the deterioration of instream habitat. The primary cause is increased sedimentation resulting from localized gravel mining, removal of bankside riparian vegetation and extensive cultivation near the river's edge. Recent survey efforts (1996-2000) have documented its continued existence in the Leaf, Chickasawhay, Chunky, Bouie and Pascagoula rivers.

RECOMMENDATIONS:

Additional surveys should be conducted in the Pascagoula drainage to determine the distribution and status of these populations. Field studies should be conducted to identify spawning areas, evidence of recruitment and seasonal habitat use. Restrictions on water quality degradation and improved land management practices should be implemented to reduce instream habitat alterations for those streams known to harbor pearl darters. Historic locations in the Pearl drainage should continue to be monitored periodically for pearl darters.



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endangered species by the U.S. Fish and Wildlife Service in 1992 before populations were discovered in Mississippi. Although the majority of known Mississippi colonies are found on public land, various land uses thereon, including certain silvicultural activities, military training, and certain recreational activities (all terrain vehicles, for example), as well as natural alterations arising from impoundment of streams may contribute to adverse impacts on quillwort habitat.

RECOMMENDATIONS:

Monitoring of Louisiana Quillwort colonies at Camp Shelby has been ongoing since November 1999. U.S. Forest Service biologists are monitoring colonies elsewhere in DeSoto National Forest. Genetic research at University of Wisconsin-Milwaukee has shown subtle differences within quillwort colonies across the Louisiana-Mississippi range. Private landowners should be made aware of quillwort habitat and encouraged to voluntarily protect colonies because bottomland hardwood forests provide benefits not only for quillworts but also fish and game.

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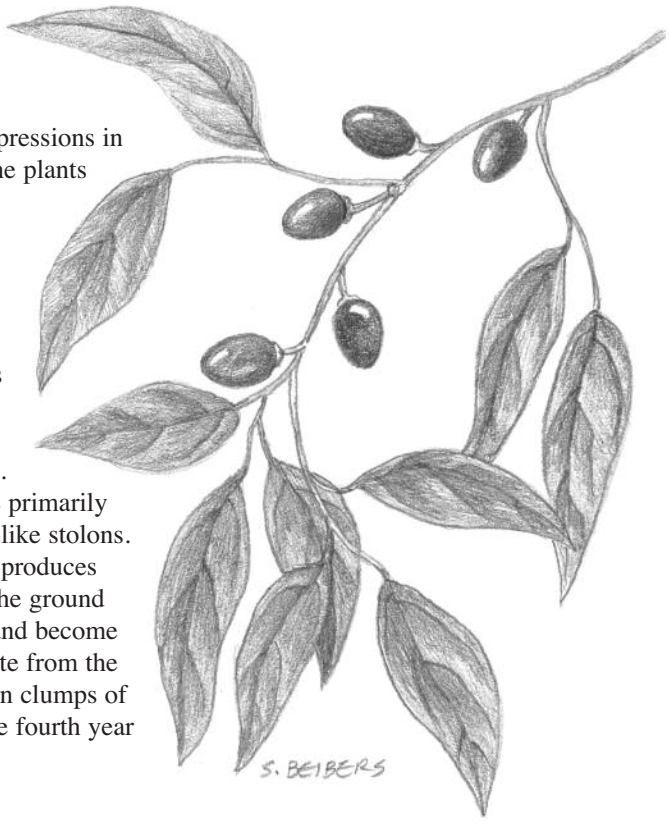
Pondberry or Southern Spicebush

Lindera melissifolia (Walt.) Blume
Family Lauraceae
Order Laurales



DESCRIPTION:

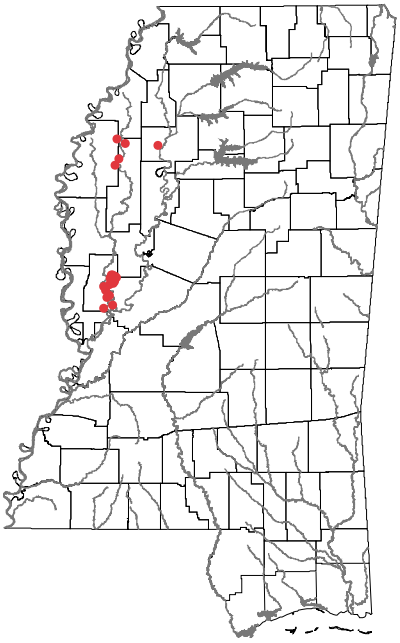
This deciduous shrub grows to approximately 2 m (6 ft.) tall, and spreads underground by root-like structures. Pale yellow flowers appear in the spring before the leaves. The bright red, 12 mm (0.5 in.) long, oval-shaped fruits mature in the fall. Pondberry is distinguished from the two other North American members of this genus (*Lindera benzoin* and *Lindera subcoriacea*) by its drooping, thin oval to elliptic leaves that have a strong, sassafras odor when crushed.

RANGE:

Pondberry is known to occur in six states in the southeast, including Arkansas, Georgia, Missouri, Mississippi, North Carolina, and South Carolina. This species' historical range also included Alabama, Louisiana, and Florida. In Mississippi, four populations are known to occur in the Yazoo Delta Region in Bolivar, Sharkey, Sunflower, and Tallahatchie counties.

HABITAT:

Pondberry is associated with wetland habitats such as bottomland hardwoods in the interior areas, and the margins of sinks, ponds and other depressions in the more coastal sites. The plants generally grow in shaded areas.



LIFE HISTORY AND ECOLOGY:

Individuals of this species are either male or female. Populations are typically dominated by male plants. Reproduction seems to be primarily asexual by means of root-like stolons. This means that the plant produces stems that spread across the ground and eventually take root and become an individual plant separate from the parent. The plants grow in clumps of clones which flower in the fourth year of growth.

BASIS FOR CLASSIFICATION:

Pondberry is listed as an endangered species by the U.S. Fish and Wildlife Service. The most significant threats are drainage and subsequent conversion of its habitat to other uses. Even ditching without the later conversion of land use can alter the water regime in a manner that reduces the plant's vigor or eliminates it from the site. Cattle grazing and timber harvesting have also impacted the plants at some sites. Additional factors increasing this population's vulnerability to extirpation are the extreme, male-biased sex ratio and limited seedling establishment.

RECOMMENDATIONS:

Protection should be obtained for all populations. Surveys to locate additional populations are ongoing and should continue. Demographic studies and ecological research are needed to gain more information on this species and its habitat. To help in this effort, the Delta National Forest, which contains Mississippi's largest population has developed a program for population monitoring and management.

SELECTED REFERENCES:

Morgan, S. 1983. *Lindera melissifolia*, a rare Southeastern shrub. Natural Areas Journal 3:62-67.

U.S. Fish and Wildlife Service. 1990. Technical Draft Recovery Plan for Pondberry (*Lindera melissifolia* {Walt.} Blume). Atlanta, Georgia. 52 pp.

U.S. Fish and Wildlife Service. 2000. Endangered and threatened species of the Southeastern United States (The Red Book) FWS Region 4 (As of 2/91).

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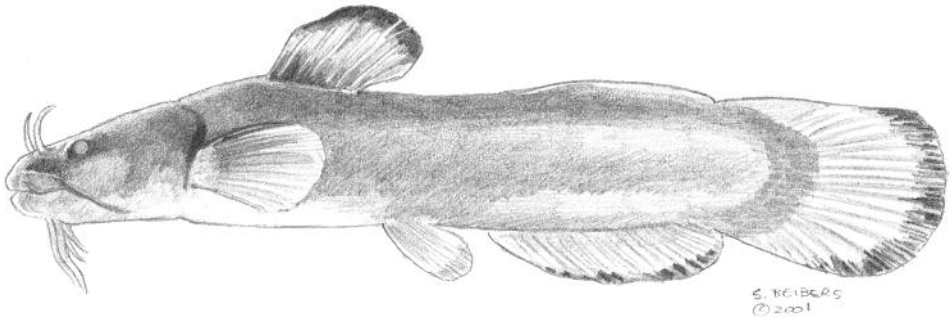
Slender Madtom

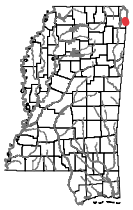
Noturus exilis Nelson
Family Ictaluridae
Order Siluriformes



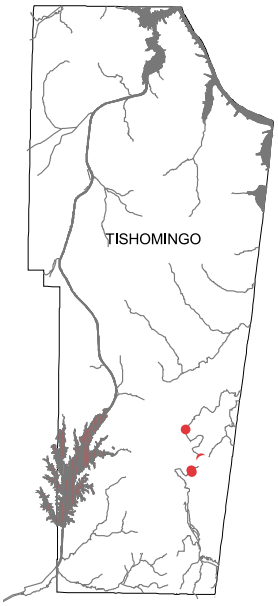
DESCRIPTION:

A member of the catfish family, the slender madtom is a relatively small species with a flattened head and long, slender body. The body is uniform in color ranging from yellowish brown to gray along the back and sides, fading to a pale yellow along the abdomen. There are no dark saddles or blotches. The margins of the dorsal, caudal and anal fins are outlined with a black band. The adipose fin is continuous with the caudal fin except for a shallow indentation. Adults range in size from 76-127 mm (3-5 in.) total length with a maximum size of 152 mm (6 in.) total length.

RANGE:



Noturus exilis exhibits a disjunct distribution with two population areas. Populations west of the Mississippi River are generally confined to Ozark highland streams of Oklahoma, Arkansas, and Missouri north to southern Wisconsin and Minnesota. Populations east of the Mississippi River occur in upland streams of Alabama, Tennessee, and Kentucky. In Mississippi, the slender madtom is known only from two localities in Bear Creek in Tishomingo County.



HABITAT:

Slender madtoms occur in small to medium-sized streams with clear water and rock or gravel bottoms. It is generally more common in riffle and pool habitats with moderate to swift currents. Adults utilize large rocks and instream debris for cover during the day with most activity taking place at night.

LIFE HISTORY AND ECOLOGY:

Major food items include small aquatic insects and crustaceans. Most feeding activity occurs at night, particularly at dusk and dawn. Reproduction occurs from June to July with females producing 20-150 mature eggs. Males excavate nest cavities under large, flat rocks and defend the nest until the young fish have absorbed the yolk sacs and are capable swimmers. Individuals likely reach maturity at age two with a life span of four to five years.

BASIS FOR CLASSIFICATION:

The slender madtom was last collected in Mississippi in 1988. It is intolerant of siltation and has declined in the northern part of its range due to agricultural runoff and alterations in river flow.

RECOMMENDATIONS:

A status survey is needed to determine whether this species still occurs in Mississippi, as are studies of its natural history. Restrictions on water quality degradation and habitat alterations should be implemented for those streams known to harbor slender madtoms.

SELECTED REFERENCES:

Burr, B.M. and R.L. Mayden. 1984. Reproductive biology of the checkered madtom (*Noturus flavater*) with observations on nesting in the Ozark (*N. albater*) and slender (*N. exilis*) madtoms (Siluriformes: Ictaluridae). American Midland Naturalist 112(2):408-414.

Lyons, J. 1996. Recent decline in the distribution and abundance of slender madtom (*Noturus exilis*) in Wisconsin. Journal of Freshwater Ecology 11(4):415-419.

Mayden, R.L. and B.M. Burr. 1981. Life history of the slender madtom, *Noturus exilis*, in southern Illinois (Pisces: Ictaluridae). Occasional Papers of the University of Kansas Museum of Natural History 93:1-64.

Taylor, W.R. 1969. A revision of the catfish genus *Noturus* Rafinesque, with an analysis of higher groups in the Ictaluridae. Bulletin of the United States National Museum 282.

Vives, S.P. 1987. Aspects of the life history of the slender madtom *Noturus exilis* in northeastern Oklahoma (Pisces: Ictaluridae). American Midland Naturalist 117(1):167- 176.

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Price's Potato Bean

Apios priceana B. L. Robins
Family Fabaceae
Order Fabales

DESCRIPTION:

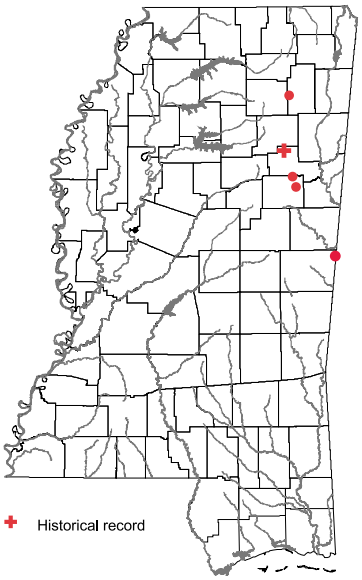
This member of the pea family is a twining perennial vine, arising from a large, thickened potato-like tuber, and climbing to 5 m (15 ft.) in height. Leaves are alternate, made of several leaflets joined to a central rib with typically 5-7 leaflets that are oval sharpening to a lanceloate point. The flower cluster is borne in the leaf axils (angle formed by the junction of the leaf and stem) and consists of long flower clusters 5-15 cm (2-6 in.) long. Individual flowers are about 2 cm (0.75 in.) in length and are greenish-white tinged with purplish-pink tips. The fruit is a cylindrical legume 13-20 cm (5-8 in.) in length.

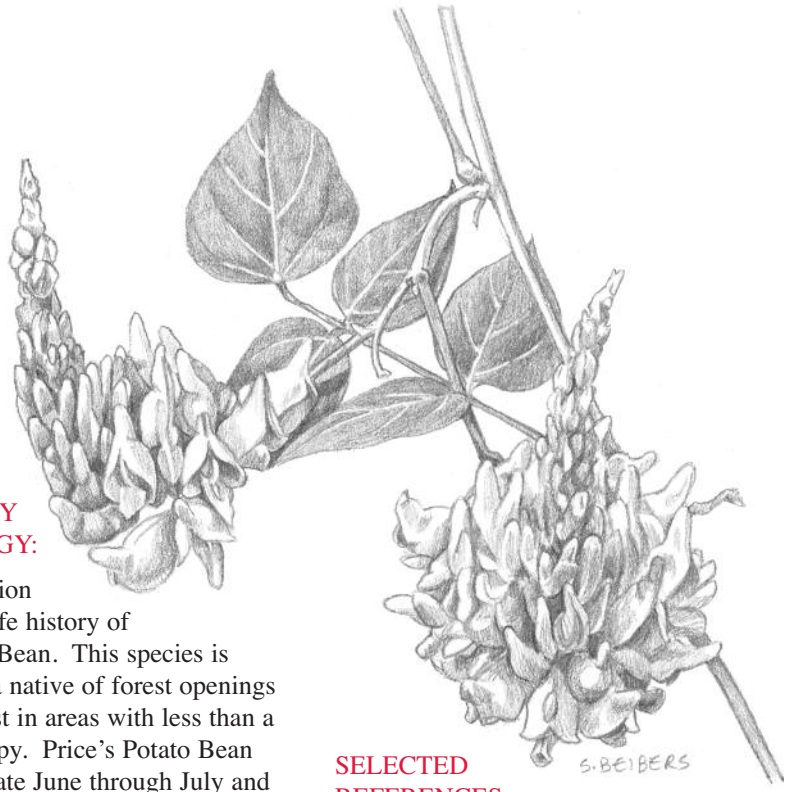
RANGE:

Price's Potato Bean is known to exist at over 30 sites in the States of Alabama, Mississippi, Tennessee, Kentucky, and South Carolina. An historic record exists for Illinois. In Mississippi, there are four confirmed populations with two in Oktibbeha County, one in Lee County, and one in Kemper County..

HABITAT:

Populations occur in open woods and along woodland edges in limestone areas, often where bluffs grade into creek or river bottoms. Several populations extend onto roadside or powerline rights-of-way. The soils are described as well-drained loams on old alluvium or over limestone.





LIFE HISTORY AND ECOLOGY:

Little information exists on the life history of Price's Potato Bean. This species is thought to be a native of forest openings and thrives best in areas with less than a complete canopy. Price's Potato Bean flowers from late June through July and produces fruit in August. Seed production is reported to be low.

BASIS FOR CLASSIFICATION:

Price's Potato Bean is listed as a threatened species by the U.S. Fish and Wildlife Service. This species has disappeared from over 30 percent of the reported sites and several of the existing populations have declined. Price's Potato Bean is threatened by cattle grazing and trampling, in areas enclosed in pastureland, clearcutting, road and line right-of-way activities (i.e. construction, herbicides), and excessive shading and competition associated with plant succession. Recently several of Mississippi's populations have be damaged or destroyed by construction or agricultural disturbances.

RECOMMENDATIONS:

Protection is needed for all known sites of the Price's Potato Bean. Studies are needed to gain information on this species' life history and ecology, as well as, to determine appropriate habitat management measures. Surveys to locate additional populations are ongoing and should continue.

SELECTED REFERENCES:

Kral, R. 1983. A report on some rare, threatened, or endangered forest-related vascular plants of the South. USDA, Forest Service, Tech. Pub. R8-TP2. 1305 pp.

U.S. Fish and Wildlife Service. 1992. Price's Potato Bean Recovery Plan. Jackson, Mississippi. 60 pp.

U.S. Fish and Wildlife Service. 2000. Endangered and threatened species of the Southeastern United States (The Red Book) FWS Region 4 (As of 1/92).

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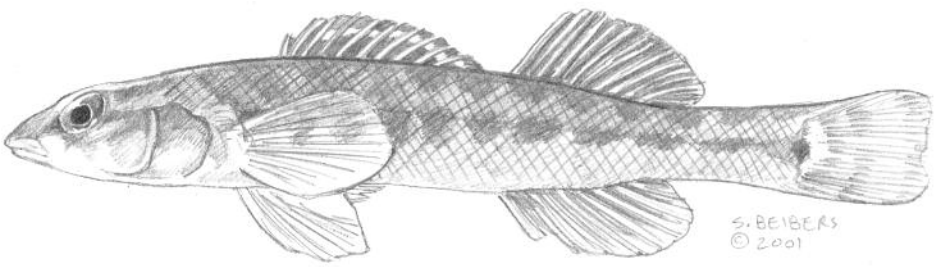
Slenderhead Darter

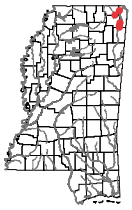
Percina phoxocephala (Nelson)
Family Percidae
Order Perciformes



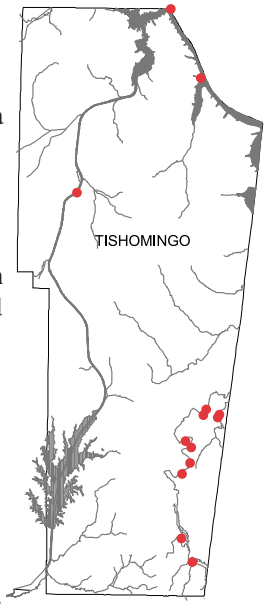
DESCRIPTION:

Percina phoxocephala is a slender darter with an elongated head and relatively long, pointed snout. The snout and cheek are marked with well developed pre- and postorbital bars. The suborbital bar is generally absent or reduced to a small, teardrop shaped bar below the eye. The back and upper sides are straw yellow to light olive in color with numerous irregular shaped dark saddles that coalesce along their lower margins to produce a faint, wavy line. The sides have 10-16 small, round to rectangular blotches often connected by a faint lateral stripe. There is a dark, round black spot at the base of the tail. Bright colors are generally absent, except for the first dorsal fin which has a distinctive orange submarginal band. The lower portions of the head and body are white to yellow and generally lack dark pigment except for breeding males which develop darker fins and body coloration. Maximum size is 92 mm (3.6 in.) total length.

RANGE:



Percina phoxocephala occurs in the upper and middle portions of the Mississippi River basin from Minnesota south to Arkansas, Oklahoma, northwestern Alabama and northeastern Mississippi. In Mississippi, the slenderhead darter is found in Bear, Yellow and Cedar creeks in Tishomingo County. In addition, a single specimen is reported near the Arkabutla Reservoir in the Coldwater River.



HABITAT:

Slenderhead darters inhabit moderate to large sized streams with moderate to swift currents. They typically occur in raceways with gravel, sand and rubble substrata, although in Alabama slenderhead darters are reported in pools mixed with sand, silt and detritus substrata. Young or small fish are noted to inhabit gravel riffles, and all individuals may move to deeper waters to overwinter. In Wisconsin, slenderhead darters occur more frequently in streams with turbid waters than clear waters.

LIFE HISTORY AND ECOLOGY:

Feeding occurs primarily during the day with food items including mayfly, midge, blackfly, and caddisfly larvae. Spawning occurs from April to June in swift flowing runs or riffles 15-60 cm deep over gravel and rubble substrata. Males generally move to the spawning area before females. Maximum life span is three to four years.

BASIS FOR CLASSIFICATION:

Percina phoxocephala has rarely been collected in Mississippi waters and could be extirpated from the state. However, populations still occur in the Alabama portion of Bear and Cedar creeks, and therefore represent the potential for downstream movement and colonization of Mississippi's waterways (Tishomingo County) provided instream habitat remains suitable. Populations have declined in Illinois and Ohio due to siltation of gravel riffles.

RECOMMENDATIONS:

A survey of the current status of this species in Mississippi is needed, as are studies to identify ecological and habitat associations of Mississippi populations. Restrictions on water quality degradation and improved land management practices should be implemented to reduce instream habitat alterations for those streams known to harbor slenderhead darters.

SELECTED REFERENCES:

Thomas, D.L. 1970. An ecological study of four darters of the genus *Percina* (Percidae) in the Kaskaskia River, Illinois. Illinois Natural History Survey Biological Notes No. 70. 18 pp.

Page, L.M. and P.W. Smith. 1971. The life history of the slenderhead darter, *Percina phoxocephala*, in the Embarras River, Illinois. Illinois Natural History Survey Biological Notes No. 74. 14 pp.

Karr, J.R. 1963. Age, growth and food habits of johnny, slenderhead and blackside darters of Boone County, Iowa. Proceedings of the Iowa Academy of Science 70:228-236.

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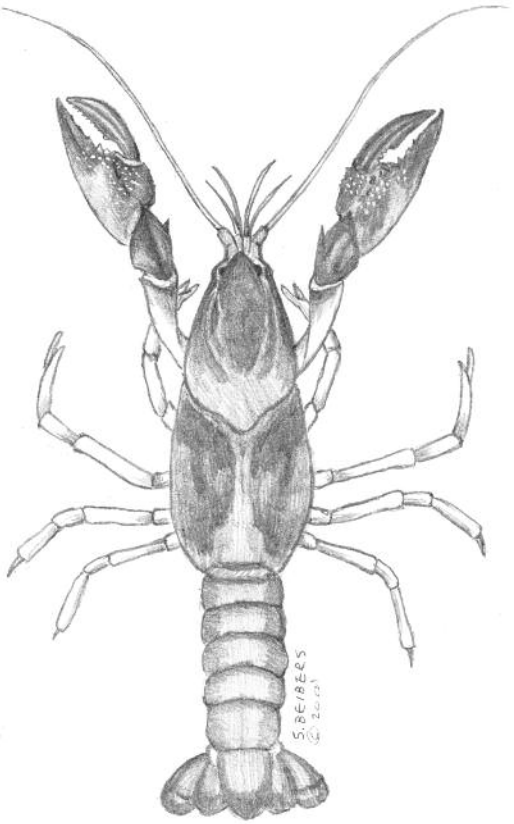
Camp Shelby Burrowing Crayfish

Fallicambarus gordoni Fitzpatrick
Family Cambaridae
Order Decapoda



DESCRIPTION:

This is a small crayfish, approximately 41 mm (1.6 in.) in total length. The cephalothorax is dark grey dorsally and yellowish-grey laterally; the abdomen is a drab yellow. The claws (chela) are grey with a slight lavender wash. The eyes are tiny. This species is similar to several other members of the genus *Fallicambarus* found elsewhere in Mississippi. Crayfish identification is the domain of a few specialists, as classification is typically based upon the shape of the copulatory structures (pleopods) of mature males. Pleopods are the anteriormost abdominal appendages.

RANGE:

This crayfish occurs only on the Camp Shelby National Guard Training Facility on the DeSoto National Forest. It lives in pitcher plant bogs in the Cypress Creek, Dickey Creek, Sweetwater Creek, and Coleman Creek drainages.

HABITAT:

The Camp Shelby burrowing crayfish lives only in pitcher plant flats.

LIFE HISTORY AND ECOLOGY:

This is a primary burrower, as are most members of its genus. This means that its activities are largely confined to its burrow system, although it may emerge on the surface for feeding or mating at night during mild, wet weather. The burrow system is complex, but relatively shallow, with vertical and horizontal tunnels and side passages.

BASIS FOR CLASSIFICATION:

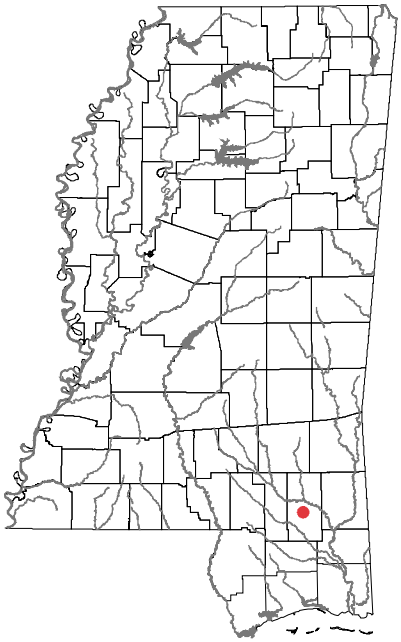
Potential threats to the existence of this species include modification of its pitcher plant habitat by construction of military training platoon lanes, by all-terrain vehicle trails, by destructive logging practices, and by inadequate control of brush because of insufficient burning.

RECOMMENDATIONS:

Threats to habitat due to military construction can be averted with careful planning, since this species is not widely distributed at Camp Shelby. All-terrain vehicles should be excluded from areas where this species occurs. Logging operations in the vicinity of pitcher plant bogs must be carefully planned and conducted to avoid vehicle wheel ruts and skidder trail troughs which can alter the subtle topographical features and drainage patterns which permit development of the pitcher plant community. The DeSoto Ranger District must adopt an adequate program of growing season prescribed burns. This would help maintain pitcher plant flat communities and would also maintain appropriate habitat for listed species occurring, or historically occurring, on adjacent well-drained sites.

SELECTED REFERENCE:

Fitzpatrick, J.P., Jr. 1987. *Fallicambarus* (*Creaserinus*) *burrisi* and *F.* (*C.*) *gordoni,* two new burrowing crawfishes associated with pitcher plant bogs in Mississippi and Alabama (Decapoda: Cambaridae). Proc. Biol. Soc. Wash. 100(3):433-446.



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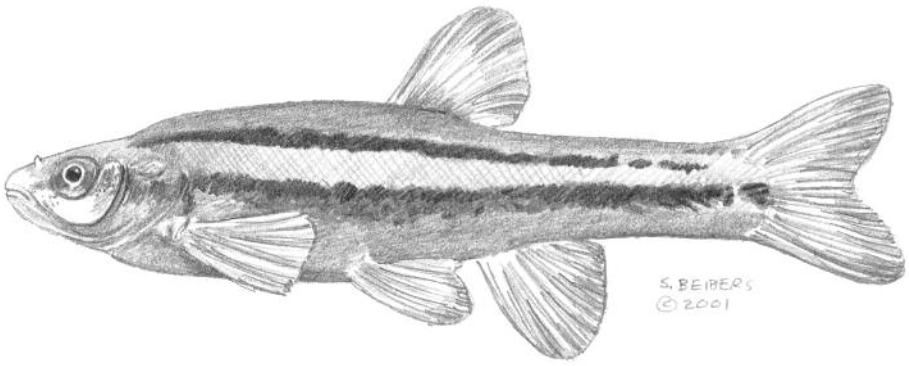
Southern Redbelly Dace

Phoxinus erythrogaster (Rafinesque)
Family Cyprinidae
Order Cypriniformes

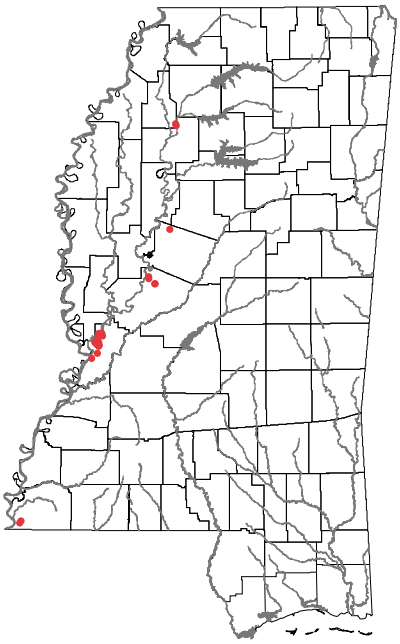


DESCRIPTION:

The southern redbelly dace is a small minnow averaging 55-65 mm (2.1-2.6 in.) total length with a maximum size of 90 mm (3.5 in.) total length. It has two black stripes along its sides which are separated by a larger light-green to yellow stripe. The back is greenish-brown with scattered dark spots or chevron markings. The belly is white. In breeding males, the undersurface of the head and belly become vivid red, the lower fins are bright yellow and the base of the dorsal fin is red or yellow.

RANGE:

Phoxinus erythrogaster occurs from Minnesota and western Pennsylvania south to Arkansas, Mississippi and Alabama. In Mississippi, the southern redbelly dace occurs in the Tennessee River drainage of Tishomingo County and in small tributaries of the Mississippi and Yazoo Rivers in Wilkinson, Warren, Tallahatchie, and Yazoo counties.



HABITAT:

The southern redbelly dace occurs in small, upland creeks which have permanent cool water, clean gravel bottoms and a well developed overhead riparian canopy. These areas typically consist of narrow stream reaches meandering primarily over gravel, pebble and sand substrata with plunge pools and chutes located at the base of shallow riffles and runs.

LIFE HISTORY AND ECOLOGY:

Phoxinus erythrogaster is usually found near the bottom of small streams where it forages over rocks and other objects. It appears to feed primarily on algae and plant materials. Spawning occurs in the spring, when females lay their eggs in the nests of other minnow species on clean gravel sections of riffles. This species matures when it reaches approximately 45-55 mm (1.75-2.17 in.) in total length. Maximum life span is three to four years for individuals in the southern United States.

BASIS FOR CLASSIFICATION:

The populations of the southern redbelly dace occurring in western Mississippi are considered to be endangered while those in Tishomingo County are not. The latter are part of a much larger population occurring throughout the Tennessee River drainage in Alabama, Tennessee and Kentucky. Those in western Mississippi are disjunct from the main population and thus are of great scientific interest. Because of their habitat specificity, disjunct populations of southern redbelly dace are extremely susceptible to local environmental impacts. Sedimentation resulting from industrial activities, improper agricultural or forestry practices, and increased urban development appears to be the principal threat to western populations of this species.

RECOMMENDATIONS:

Areas within the loess bluff region along the Mississippi River with viable populations should be preserved through conservation easements.

SELECTED REFERENCES:

Clay, W.M. 1975. The Fishes of Kentucky. Kentucky Department of Fish and Wildlife Resources, Lexington, Kentucky. 416 pp.

Slack, W.T., M.T. O'Connell, T.L. Peterson, J.A. Ewing, III and S.T. Ross. 1995. Status of the southern redbelly dace, *Phoxinus erythrogaster*, in Hatcher Bayou and streams of the Yazoo drainage, Mississippi. Southeastern Fishes Council Proceedings 32:1-9.

Slack, W.T., M.T. O'Connell, T.L. Peterson, J.A. Ewing, III and S.T. Ross. 1997. Ichthyofaunal and habitat associations of disjunct populations of southern redbelly dace, *Phoxinus erythrogaster* (Teleostei: Cyprinidae), in Mississippi. American Midland Naturalist 137(2):251-265.

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American Burying Beetle

Nicrophorus americanus Olivier
Family Silphidae
Order Coleoptera

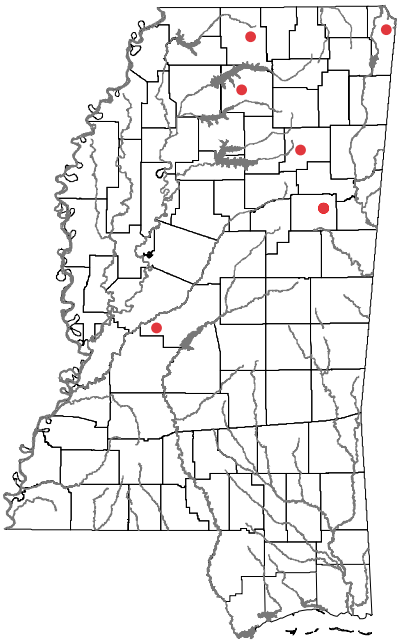
DESCRIPTION:

Ranging from 25-45 mm (1-1.8 in.) in length, these are the largest beetles in their genus. They also can be readily distinguished from other members of the genus by the large orange-red spot on the upper back (pronotal disc). The front of the head (frons), antennal clubs, and wing covers also sport orange-red markings, contrasting sharply with the black background color. Males have an orange-red rectangle below the head; females have a small triangle in the same spot.

RANGE:

Once widely distributed across North America, this beetle was reported from 32 states, the District of Columbia, and three Canadian provinces. It is now known to be present in Block Island, Rhode Island, Arkansas, South Dakota, Nebraska, Kansas, and a site in eastern Oklahoma.

In Mississippi there are small, historical collections of this species from six counties (Chickasaw, Madison, Marshall, Oktibbeha, Lafayette, and Tishomingo), with the most recent collection in 1950.



HABITAT:

Little is known of the American burying beetle's habitat requirements, but the soil cannot be too wet, sandy or rocky, as this would prevent proper burying of carrion and/or compromise preservation of the buried carcass until consumed by the beetle larvae.

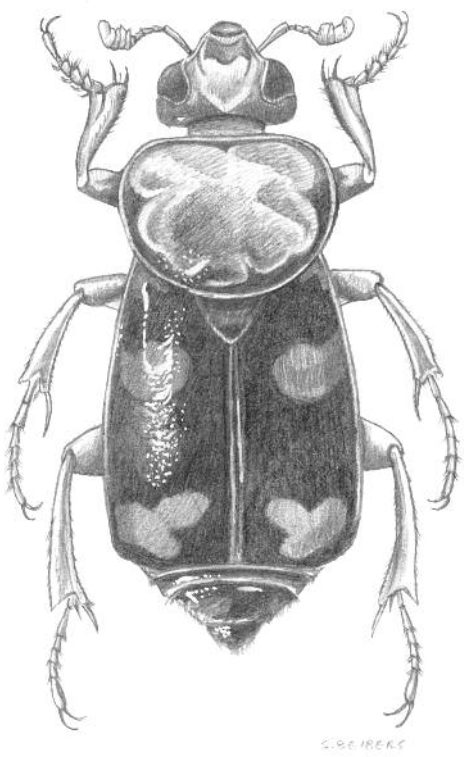
LIFE HISTORY AND ECOLOGY:

This beetle depends upon vertebrate carrion in the 50-200 g (1.0-7.1 oz.) range, with larger sized items preferred, as brood size is correlated with carrion mass. The weak link in its life history is a requirement for high concentrations of carrion in this size class. Furthermore, predators and scavenging mammals, competitors for dead animal material, must be scarce. Bird rookeries seem to be favorable candidates for burying beetle populations, as they have concentrations of suitable food items, and are often on islands without mammalian predators. Unfavorable soil conditions, however, exclude many of these sites. The Block Island site has a very large concentration of woodcocks, and it has been suggested that prairie chickens may have previously filled this niche in other areas.

Numbers of beetles of both sexes arrive at a carcass soon after dark, and fight among themselves for possession of the carcass until a dominant pair (one male and one female) remain. Working together, the pair excavate a chamber for the carcass and an adjacent tunnel for the eggs. Excavation is accomplished by removal of dirt from beneath the body. Fur or feathers are removed from the carcass and it is cleaned of fly larvae and other organisms. After coating the carcass with secretions to slow decomposition, the beetles mate and eggs are laid.

BASIS FOR CLASSIFICATION:

The American burying beetle was listed as endangered in 1989. For unknown reasons, it has undergone a catastrophic



decline. The decline is probably related to a scarcity of natural communities in which concentrations of vertebrate carrion of the appropriate size classes are available, coupled with a surge in numbers of scavenging mammals.

RECOMMENDATIONS:

More research is needed to identify specific reasons for the decline of the American burying beetle. If the problems identified can be solved locally, reintroduction of beetles can be attempted. A survey for additional existing populations is needed, and should be focused upon areas with favorable concentrations of carrion of appropriate size on appropriate substrate.

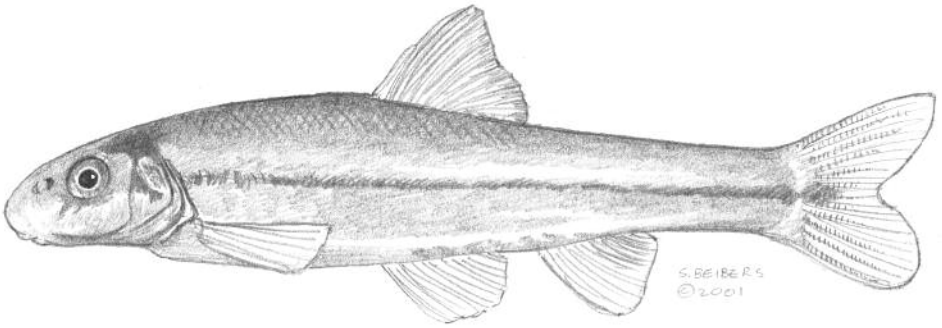
SELECTED REFERENCES:

Amaral, A. and L. Morse. 1990. Reintroducing the American Burying Beetle. Endangered Species Technical Bulletin. Vol. 15(10):3.

Anonymous. 1989. Final Listing Rules, American Burying Beetle (*Nicrophorus americanus*). Endangered Species Technical Bulletin. Vol. 14(8):8.

Suckermouth Minnow

Phenacobius mirabilis (Girard)
Family Cyprinidae
Order Cypriniformes

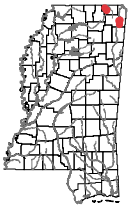


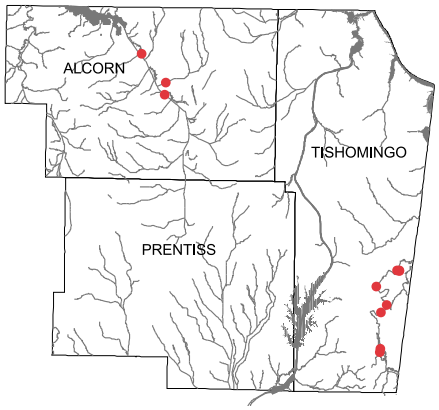
DESCRIPTION:

Phenacobius mirabilis is a long, cylindrical minnow with small eyes and bluntly rounded snout. The small sucker-like mouth is distinctive with large fleshy lips and enlarged fleshy lobes distinctly noticeable at the rear corners of the mouth. The back is dusky olive-brown, becoming silvery white on the undersides. The sides are marked by a dusky lateral band that encircles the snout and terminates at the caudal fin as a conspicuous horizontal, elongate black spot.

RANGE:

The suckermouth minnow is primarily a species of the upper and central portions of the Mississippi River basin from Ohio and West Virginia to Minnesota, South Dakota, Wyoming and Colorado, south to northern Mississippi, and Alabama. It is also found in some western Gulf of Mexico drainages of New Mexico, Texas and Louisiana. In Mississippi the occurrence of this species is limited to two sites from the Tuscumbia River in Alcorn County and four localities from Bear Creek in Tishomingo County.





HABITAT:

It may be found in small creeks and large rivers with sand or gravel substratum. Although more abundant in riffles and shallow raceways, it is not restricted to fast current. *Phenacobius mirabilis* is moderately tolerant of turbidity and siltation provided there is sufficient current to keep gravel riffles somewhat free of silt.

LIFE HISTORY AND ECOLOGY:

The suckermouth minnow feeds upon aquatic insects and organic detritus by using its sensitive snout and lips to root for prey in the substratum. Spawning occurs from April through August with females containing up to 1640 mature eggs. Individuals likely reach maturity at age two. The life span is four to five years with a maximum size of 122 mm (4.8 in.) total length.

BASIS FOR CLASSIFICATION:

No collections have yielded this species since 1985 which is surprising in light of the wide habitat tolerance exhibited elsewhere by the species and its apparent eastward range extension from Illinois through Indiana to Ohio in response to increased stream siltation.

RECOMMENDATIONS:

A status survey is needed to determine whether this species still occurs in Mississippi, as are studies of its natural history. Restrictions on water quality degradation and habitat alterations should be implemented for those streams known to harbor suckermouth minnows.

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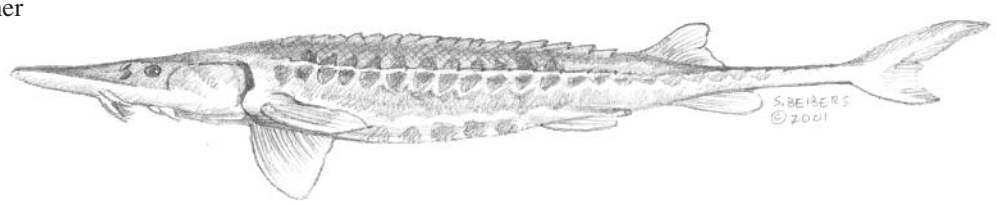
Alabama Sturgeon

Scaphirhynchus suttkusi Williams and Clemmer
Family Acipenseridae
Order Acipenseriformes

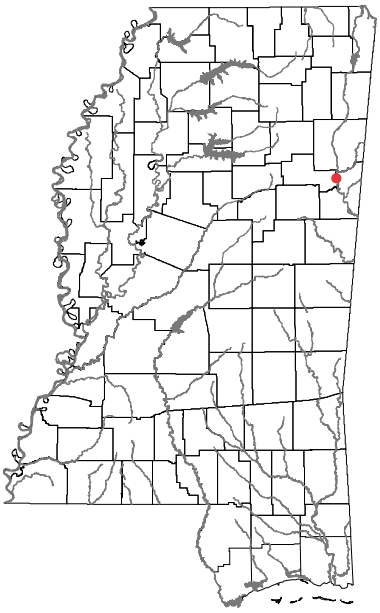


DESCRIPTION:

This species is similar to the more common shovelnose sturgeon, *Scaphirhynchus platorynchus*. The Alabama sturgeon attains an adult size of approximately 72 cm (2.4 ft.) and weighs 0.75-1.12 kg (2-3 lbs.). The body is golden-yellow in color and covered by five rows of bony plates. It has a flattened, shovel-shaped snout, a long slender stalk between the body and tail (peduncle), and the upper lobe of the caudal fin is larger than the lower lobe. The mouth is set far back on the underside of the snout and has large, fleshy lips. Four elongated fleshy projections, or barbels, hang down from the lower surface of the snout. The Alabama sturgeon differs from the shovelnose sturgeon in a number of ways, including having larger eyes.

RANGE:

The Alabama sturgeon is found only in the Mobile Bay drainage of Mississippi and Alabama. In Mississippi, it is known only from the main channel of the Tombigbee River. The common shovelnose sturgeon occurs only in the Mississippi and Rio Grande River drainages, so these species occupy mutually exclusive ranges.



HABITAT:

Little is known of the habitat requirements of this species. All known specimens have been collected from either the main channel or from oxbow lakes of large rivers.

LIFE HISTORY AND ECOLOGY:

The biology of this species is poorly understood. It inhabits the main channel of large coastal plain rivers in swift to moderate current. Stomach contents of several individuals examined contained aquatic insect larvae, worms, and fragments of mollusk shells. Females with ripe eggs have been captured in March, April, and May. Spawning sites have not been identified.

BASIS FOR CLASSIFICATION:

The Alabama sturgeon may already have been extirpated from Mississippi. It is known to have been collected only twice in Mississippi; once near West Point and once near Columbus. It has declined because of alterations to its big river habitats by dredging, channelization and the construction of dams. This has not only directly destroyed essential habitat but has also led to increased siltation that degrades both feeding and spawning areas. The Alabama sturgeon is classified as endangered by the U.S. Fish and Wildlife Service.

RECOMMENDATIONS:

A status survey is needed to determine whether this species still occurs in Mississippi. The construction of the Tenn-Tom Waterway on the Tombigbee River probably destroyed the last suitable habitat for this species in Mississippi, but if a remnant population is discovered, conservation measures should be implemented immediately.

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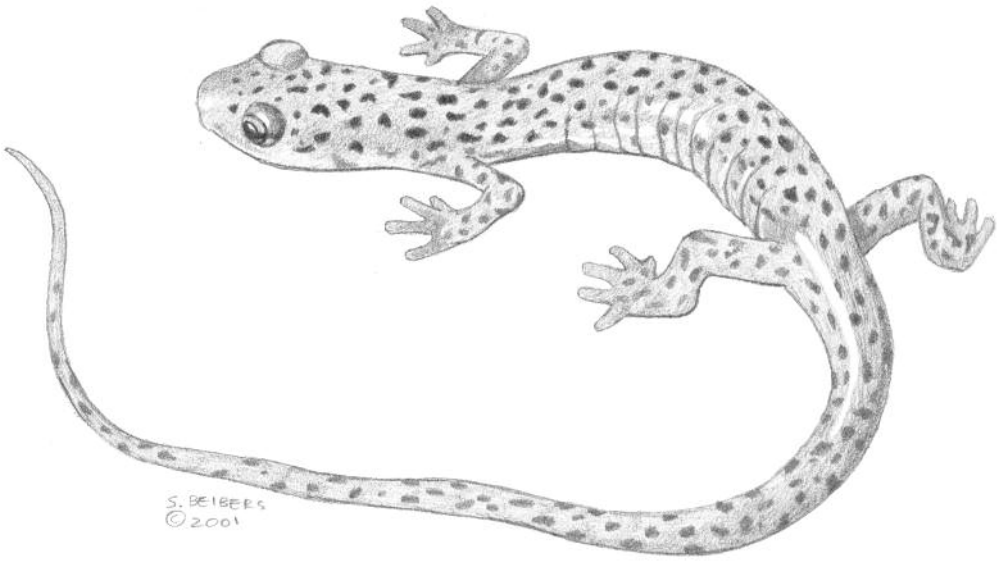
Cave Salamander

Eurycea lucifuga (Rafinesque)
Family Plethodontidae
Order Caudata

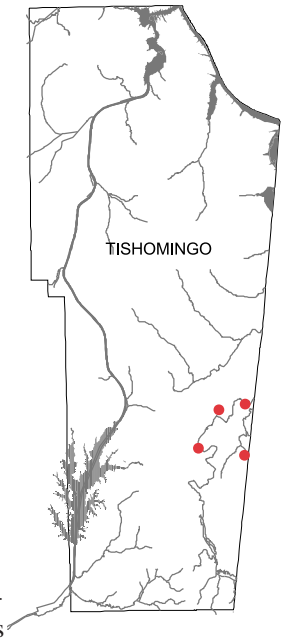


DESCRIPTION:

Adult cave salamanders grow to a total length of 12-18 cm (4.75-7.1 in.), are slender, and have relatively long tails. They are yellow to orange to orange-red with scattered black spots on the tail and body. The belly is yellowish and usually unmarked.

RANGE:

Eurycea lucifuga is limited to limestone areas from western Virginia and southeastern West Virginia south to central Alabama and northeastern Mississippi, north to southern Ohio, Indiana and Illinois, and west to Missouri and northern Arkansas. In Mississippi, this species is known from only a few localities in Tishomingo County.



HABITAT:

The cave salamander occurs around the mouth and the twilight zones of caves, in crevices, and beneath rocks and litter in limestone areas. They have also been found in bottomland areas adjacent to such habitats.

LIFE HISTORY AND ECOLOGY:

Eurycea lucifuga lays clutches of 50-90 eggs from autumn to early spring. The eggs are usually attached to the undersides of rocks in cave pools or in nearby seepage areas and are attended by the female until they hatch. The aquatic larvae transform into the adult stage in about two years. This species feeds primarily on small invertebrates.

BASIS FOR CLASSIFICATION:

The cave salamander is listed as an endangered species in Mississippi because of the limited habitat available for it within the state and the small number of known populations. It is threatened by habitat destruction (primarily development), lime mining, and by overcollecting.

RECOMMENDATIONS:

A survey of this species is needed to determine its current status in Tishomingo County. Areas with limestone outcrops and/or caves that have populations of cave salamanders should be preserved.

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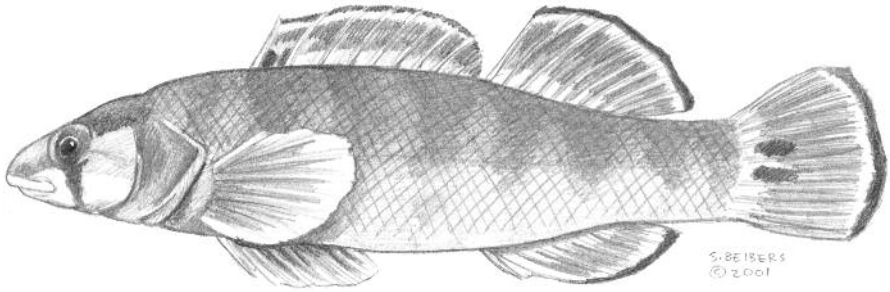
Bayou Darter

Etheostoma rubrum Raney and Suttkus
Family Percidae
Order Perciformes



DESCRIPTION:

The bayou darter is a small fish attaining a maximum total length of about 63 mm (2.5 in.). The back and upper sides are brown to olive-green and the belly is light green to white. The breast of breeding males is turquoise-blue while that of the female is light blue to white. There are small, bright-red spots and dark, somewhat indistinct horizontal lines along the sides of the body. The dorsal, caudal, and anal fins of males are light brown at the base, have a broad red band in the middle, and have a narrow light band below the outer margin. The pectoral and pelvic fins are light red to reddish orange at the base and clear toward the outer margin. All fins of female bayou darters have rows of black spots and lack the red pigmentation.

RANGE:

Etheostoma rubrum, a Mississippi endemic, occurs only in Bayou Pierre and its larger tributaries (White Oak, Foster and Turkey creeks) in Copiah, Claiborne and Hinds counties in southwestern Mississippi.

HABITAT:

The bayou darter normally prefers swift, shallow water flowing over coarse gravel, but during the winter it occupies areas with large cover objects such as logs and boulders which are used for shelter during floods. Occasionally, large individuals are found in areas of swift current in aquatic vegetation along steep banks. The bayou darter seems to prefer larger streams within its limited range and is not found in small tributaries.

LIFE HISTORY AND ECOLOGY:

Bayou darters reach densities of three fish per square meter in good habitat. Spawning occurs from late March to early June at water temperatures between 21 and 29 ΔC (70 to 80 F). Females are thought to spawn at least twice per breeding season and may produce as many as 80 eggs during each spawning season. Most bayou darters mature at one year of age and do not live more than four years. Bayou darters feed primarily on aquatic insect larvae and water mites.

BASIS FOR CLASSIFICATION:

Etheostoma rubrum is listed as a threatened species by the U.S. Fish and Wildlife Service. Its habitat is threatened by gravel mining in the Bayou Pierre watershed, which directly impacts the stable gravel riffles it prefers. Clearing of vegetation along stream banks and bridge and road construction have contributed to siltation within the watershed, resulting in riffle areas becoming unsuitable for bayou darter use.

RECOMMENDATIONS:

In a few cases, landowner cooperation has been obtained in maintaining the integrity of bank areas along Foster Creek, one of the tributaries of Bayou Pierre inhabited by the bayou darter. Restrictions on gravel mining in or near Bayou Pierre should be implemented and enforced. Stream banks within this watershed which have been cleared should have their natural vegetation restored.

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Burris, J. and F. Bagley. 1983. Recovery Plan for the Bayou Darter *Etheostoma rubrum*. U.S. Fish and Wildlife Service, Atlanta. 56 pp.

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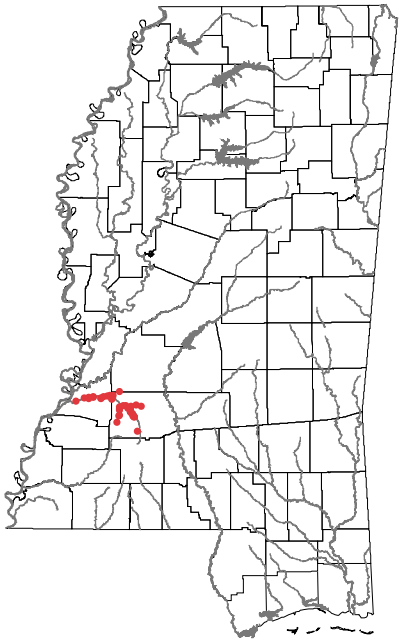
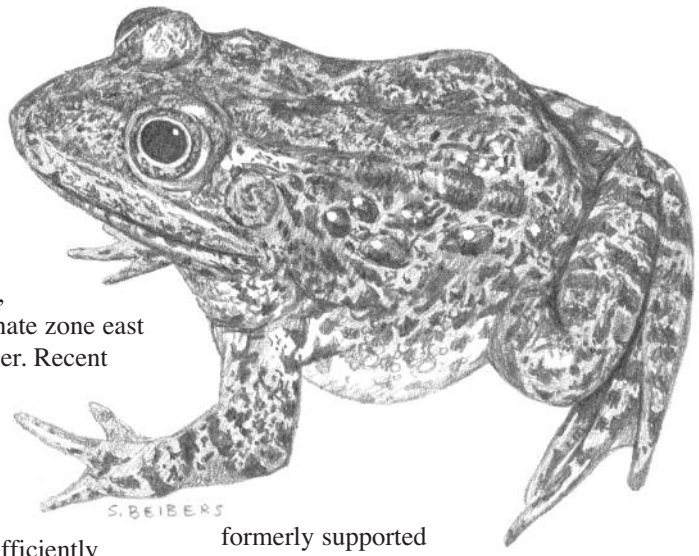


Mississippi Gopher Frog

Rana sevosa Goin and Netting
Family Ranidae
Order Salientia

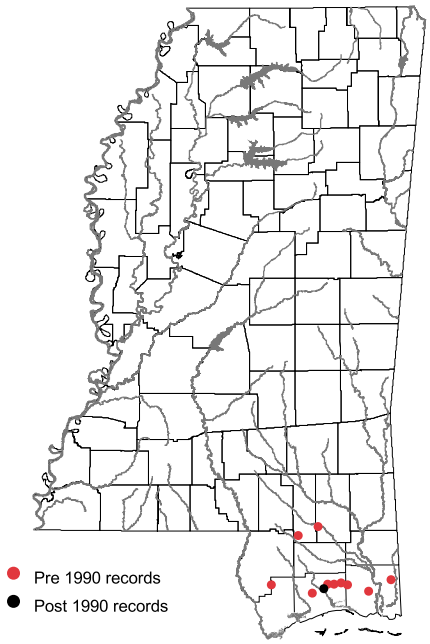


DESCRIPTION:

This is a medium-sized, large-headed frog. Snout to vent (i.e. not counting the legs) length of adults ranges from 105-113 mm (4.1-4.3 in.). The tympanum is smaller than the eye, the ridges down the sides of the back are conspicuous, there is a prominent hump at the hips (sacral hump), and the back is often quite warty, although this feature may vary, even on an individual frog, depending upon moisture and temperature. The back is marked with large brown spots on a dark gray to almost black ground color. In Mississippi, it can easily be confused with the crawfish frog (*Rana areolata circulosa*), but can generally be distinguished from the latter by the absence of light borders around the dark dorsal spots and by a darkly mottled or speckled venter. The two species are not found together, because the crawfish frog is not found in southeastern Mississippi. This species is sometimes referred to as the dark or dusky gopher frog.

RANGE:

The Mississippi gopher frog's range extends along the coastal plains region from the Florida Parishes of Louisiana to the Mobile River in Alabama.



Overlap with the Florida gopher frog, *Rana capito*, occurs over an indeterminate zone east of the Chattahoochee River. Recent research indicates that the gopher frog in Mississippi is genetically distinct from its nearest remaining relatives in Alabama, and that it is sufficiently unique to merit placement in its own species: *Rana sevosa*, the Mississippi gopher frog.

The Mississippi gopher frog has been recorded in Harrison, Jackson, and Forrest counties, and there is a record in the literature from Pearl River County. However, Glen's Pond in Harrison County supports the last known population of the Mississippi gopher frog.

HABITAT:

Gopher frogs require two distinct habitats: temporary pools for breeding and upland foraging sites with a subterranean refuge (tortoise burrows, crawfish burrows, or stumpholes). The fact that breeding pools periodically dry minimizes the likelihood that fish or large predacious insects will be present, thus enhancing survival prospects of tadpoles. Ponds may not fill each year, or may not remain full long enough to permit tadpoles to transform, so survival is likely to vary considerably from season to season.

Adults live in droughty, sandy uplands, but can do so only with access to cool, moist, subterranean refuges. Florida populations of gopher frogs are known only from sites which support gopher tortoises, and if tortoise colonies are farther than 1.6 km (1 mi.) from potential breeding pools, the pools rarely support the gopher frog. However, in Louisiana, tortoises were scarce in the areas which formerly supported gopher frog colonies. It has been suggested that the frog may utilize crawfish burrows in these areas.

LIFE HISTORY AND ECOLOGY:

During the winter, in mild, wet weather the frogs migrate to temporary pools to breed. Egg masses are roughly spherical, and are attached to stems of aquatic vegetation or woody debris just beneath the water surface in the deeper zones of the pool. Other species typically produce more irregularly shaped, less spherical, egg masses, and these are often deposited in very shallow water, and are often highly clustered. Young gopher frogs transform and exit the ponds in 3-4 months.

Adults live in or near subterranean refuges in uplands the remainder of the year, feeding on arthropods and other frogs.

BASIS FOR CLASSIFICATION:

Populations of this frog are in catastrophic decline throughout their range. No gopher frogs have been seen in Louisiana in over 20 years. Although a closely related subspecies or species of gopher frog is known historically from 11 localities in Alabama, only five breeding ponds are known to be in use at present, and these may represent only 3 populations. Once described as abundant in Harrison County, Mississippi, intensive surveys since 1989 have revealed only one breeding population, although isolat-

ed animals have been encountered at a scattering of other sites. In at least 6 of the 13 breeding seasons since 1988, there was no production of juvenile frogs. Exact reasons for the rangewide decline are unknown, but there are a number of factors of probable importance. Some historical breeding sites have been destroyed (drained and/or filled) or degraded. Sunfish, which are voracious tadpole predators, have been introduced at some sites. Growing season fires have been rigorously suppressed, and these may be essential to maintenance of community structure in temporary pools (often dry during the growing season) and upland habitat. If burning is allowed or purposely employed at all, it is typically winter burning, which will do nothing to the vegetation or bottom muds in a flooded pool, and may favor an unnatural species set in the uplands.

Mismanagement of upland habitats has resulted in a decline in the number of gopher tortoises, and thus a decline in the number of burrows available for use by gopher frogs. Consumption of tortoises may also have decimated local populations. Stump pulling in some areas has eliminated this alternative gopher frog retreat, as well. Although illegal, rattlesnake hunters often introduce gasoline into tortoise burrows via hoses to force the snakes to the surface. This practice can kill gopher frogs.

The remaining gopher frog population in Mississippi faces a number of new threats. A 4600 acre development adjacent to the pond is now in the planning stages. Two new roads, Traditions Parkway and Cowan-Lorraine Road Extension, respectively, will pose direct threats to residual tortoise populations in the area and will make it more difficult for the U.S. Forest Service to conduct prescribed burning programs. A third road, Hwy 67, will be widened from two to four lanes and will be rerouted in a few areas. This road, in combination with those previously mentioned, will permanently divide the ancient range of the gopher frog, preventing movement of frogs from one pond to another and greatly reducing the chances of recovery. The droughts of 1999 and 2000 resulted in a total failure of gopher frog reproduction at Glen's Pond. Tanker trucks have been used to provide water to the pond, however, and two wells have been drilled at the site in an attempt to provide a permanent water source.

RECOMMENDATIONS:

Since Glen's Pond supports the last known population of the Mississippi gopher frog, proper management of the pond and adjacent upland habitat should be a high priority. The pond basin and adjacent uplands must be regularly burned during the growing season.

A thorough search should be undertaken for possible remaining breeding ponds and for potentially suitable ponds which could have supported the species historically. There are several intermittent upland pool sites on or near U.S. Forest Service land that could be rehabilitated with prescribed burning. If it is determined that their hydroperiods (timing and duration of seasonal flooding) are satisfactory but that they no longer support the species, egg masses from Glen's Pond should be transferred on an experimental and monitored basis to these auxiliary pools. In addition, one or more shallow ponds may need to be created in areas of otherwise suitable gopher frog habitat. Each of these sites should be managed for gopher frogs and gopher tortoises with frequent growing season prescribed burns. Ideally, stands at all sites should be stocked with longleaf pine, preferably naturally regenerated, and averaging no more than 60% canopy closure. Broad scale application of herbicide should be avoided. Given the tenuous survival prospects of this species, small samples of eggs have been removed for captive propagation programs.

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Suttkus, R.D. and G.H. Clemmer. 1977. A status report on the bayou darter, *Etheostoma rubrum* and the Bayou Pierre system. Southeastern Fishes Council Proceedings. 1:1-2.

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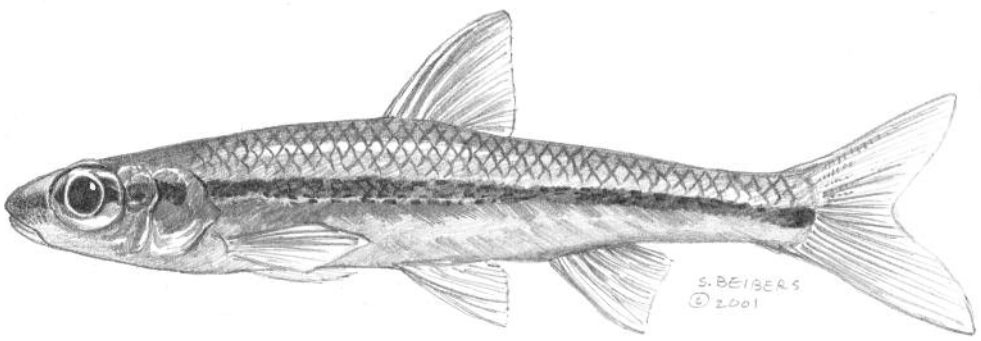
Bigeye Shiner

Notropis boops Gilbert
Family Cyprinidae
Order Cypriniformes

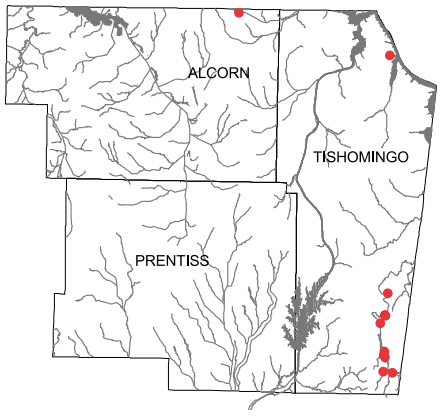


DESCRIPTION:

The bigeye shiner is a medium-sized minnow with distinctly large eyes and a short, rounded snout. The back and upper sides of the body are greenish to olive-yellow. Scales in this region are strongly outlined with dark pigment and the midline of the back has a thin but distinct stripe. The sides of the body are marked with a distinct dark lateral band that encircles the snout and continues posteriorly to the caudal fin base. The lateral band is bordered above by a pale, faintly pigmented zone. The lateral line is punctulate, with the anterior lateral line pores distinctly bordered above and below by dark dots. The body below the lateral band is generally white. Adults are typically smaller than 66 mm (2.6 in.) while the maximum reported length is 91 mm (3.6 in.) total length.

RANGE:

Notropis boops occurs mostly in upland streams of the Mississippi River Basin from Illinois, Indiana, and Ohio south to the Tennessee River drainage of northern Mississippi and Alabama. It is found in western Mississippi River tributaries in Missouri, Arkansas, Oklahoma, Kansas, Texas, and Louisiana. In Mississippi, the bigeye shiner is found only in the Tennessee drainage in Tishomingo and Alcorn Counties.



HABITAT:

The bigeye shiner generally occurs in pools of cool, clear flowing creeks and streams with clean sand or gravel substrata.

LIFE HISTORY AND ECOLOGY:

Notropis boops feeds primarily on terrestrial and aquatic insects, organic detritus, and algae. Spawning occurs from April through August, with activity peaking in early July. Most fish live only to their second year, with very few surviving to their third year.

BASIS FOR CLASSIFICATION:

The bigeye shiner still occurs in Mississippi although recent survey efforts suggest low population size. It is intolerant of siltation and continuous high turbidity. Throughout its range declines in populations of bigeye shiner have been associated with increased stream turbidity resulting from poor land management practices.

RECOMMENDATIONS:

A survey of the current status of this species in Mississippi is needed, as are studies of its natural history. Restrictions on water quality degradation and habitat alterations should be implemented for those streams known to harbor bigeye shiners.

SELECTED REFERENCES:

Burr, B.M. and W.W. Dimmick. 1983. Redescription of the bigeye shiner, *Notropis boops* (Pisces: Cyprinidae). Proceedings of the Biological Society of Washington 96(1):50-58.

Lehtinen, S. and A.A. Echelle. 1979. Reproductive cycle of *Notropis boops* (Pisces: Cyprinidae) in Brier Creek, Marshall County, Oklahoma. American Midland Naturalist 102(2):237-243.

Smith, P.W. 1979. The fishes of Illinois. University of Illinois Press, Urbana. 314 pp.

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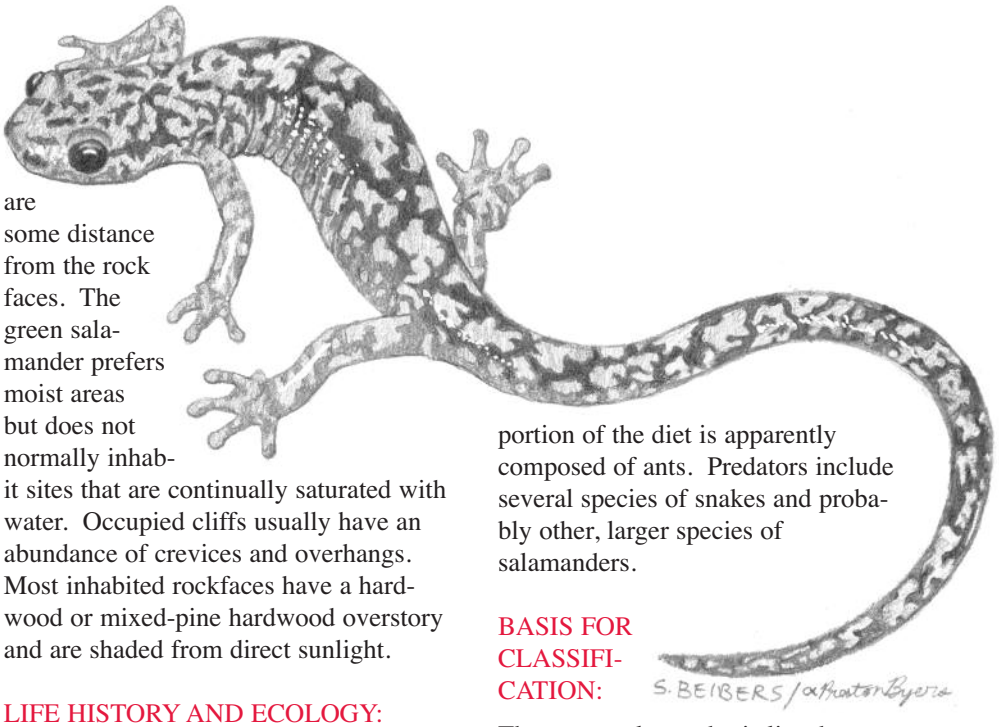
Green Salamander

Aneides aeneus (Cope and Packard)
Family Plethodontidae
Order Caudata

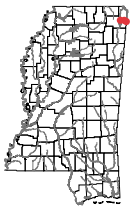


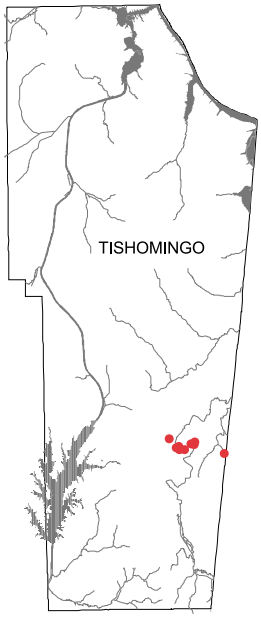
DESCRIPTION:

The green salamander is black with large light-green to greenish-yellow mottled blotches. The belly is gray to light yellow and may be unmarked or flecked with yellow. The toes, except for the greatly reduced innermost toe on each foot, end in flattened disks. The tail is rounded and is slightly longer than the body. Adult size (including the tail) is slightly over 10 cm (4 in.). The green salamander has four toes on the front foot and five on the rear foot.

RANGE:

The green salamander is found from southwestern Pennsylvania and western Maryland south through eastern Tennessee, northwestern Georgia, and northern Alabama to extreme northeastern Mississippi. Isolated populations occur in southwestern North Carolina, western South Carolina, and southern Ohio. In Mississippi, populations are known only from a small area in Tishomingo County.





HABITAT:

The green salamander is primarily an inhabitant of sandstone cliffs, although it is occasionally found under logs or beneath the bark of dead trees, usually in the vicinity of such cliffs. In some cases it occurs in crevices or indentations on boulders that have become detached and are some distance from the rock faces. The green salamander prefers moist areas but does not normally inhabit sites that are continually saturated with water. Occupied cliffs usually have an abundance of crevices and overhangs. Most inhabited rockfaces have a hardwood or mixed-pine hardwood overstory and are shaded from direct sunlight.

LIFE HISTORY AND ECOLOGY:

Courtship in Mississippi populations of the green salamander has been reported in late May and June. Clutch size ranges from 10-20 eggs, which are suspended from the ceiling of a crevice and are attended by the female. Hatching dates in Mississippi are from August 28 to October 14. There is no aquatic larval stage in this species, and hatchlings resemble miniature adults.

Mississippi populations use crevices for reproduction, as shelters from predators or adverse environmental conditions, and as overwintering areas. Hibernation takes place from late November to March, although green salamanders may be active in warm periods during this time. In Mississippi, the green salamander prefers horizontal crevices during dry weather and vertical crevices during periods of high humidity and during cold weather. Mississippi populations are most active when the temperature is 70 F or above and the relative humidity is high.

On cool or dry nights they are not active on the rockfaces but remain at the entrances to their home crevices. Diurnal activity has been noted in November during a light rain. Dietary items include insects and other invertebrates. In Mississippi, a high proportion of the diet is apparently composed of ants. Predators include several species of snakes and probably other, larger species of salamanders.

BASIS FOR CLASSIFICATION:

The green salamander is listed as an endangered species in Mississippi because of the limited habitat available for it within the state and the small number of known populations. Sandstone rockface habitat suitable for this species in Mississippi is apparently present only within a small part of Tishomingo County. Declines have been noted in green salamander populations in other parts of its range, although reasons for these are unknown.

RECOMMENDATIONS:

One of the two known populations within Mississippi is in public ownership. The second should be preserved either through direct purchase or through a conservation easement. All suitable habitat in Tishomingo and surrounding counties should be searched for evidence of the green salamander.

SELECTED REFERENCES:

Gordon, R.E. 1952. A contribution of the life history and ecology of the plethodontid salamander, *Aneides aeneus* (Cope and Packard). American Midland Naturalist 47:666-701.

Petranka, J.W. 1998. Salamanders of the United State and Canada. Smithsonian Institution Press, Washington D.C. 587 pp.

Woods, J.E. 1968. The Ecology and Natural History of Mississippi Populations of *Aneides aeneus* and Associated Salamanders. Unpublished Ph.D. dissertation, University Southern Mississippi, Hattiesburg. 91 pp.

Woods, J.E. and W.M. Cliburn. 1967. Ecological observations on *Aneides aeneus* in Mississippi. Journal of the Mississippi Academy of Sciences 13-129-131.

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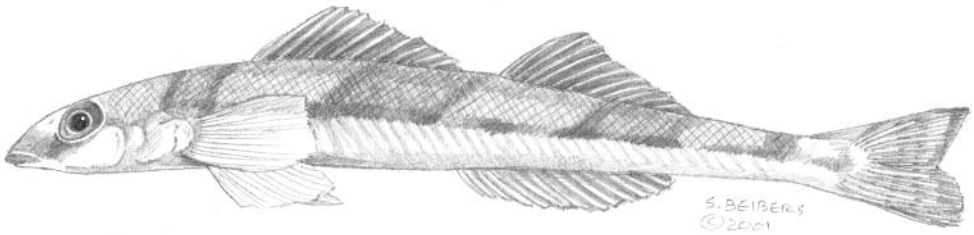
Crystal Darter

Crystallaria asprella (Jordan)
Family Percidae
Order Perciformes

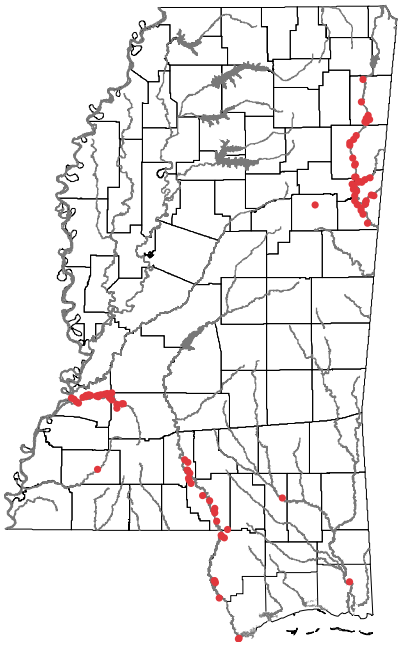


DESCRIPTION:

The crystal darter is an elongate, slender species which reaches a maximum total length of about 150 mm (6 in.). The body is light-olive in color with a dark lateral band composed of confluent dark blotches extending along each side. There are four brown saddles on the back which angle downward to join the lateral band. The area between the saddles is patterned with dark brown mottling. The belly is silvery white, and a dark brown stripe extends from eye to eye around the snout.

RANGE:

Crystallaria asprella once occurred from Wisconsin east to Ohio and south to Oklahoma, Louisiana and Florida. Its current range is considerably reduced and it is absent from all of Ohio, Indiana and Illinois. In Mississippi, the crystal darter occurs in the Bayou Pierre, Homochitto, Pearl, Pascagoula and Tombigbee watersheds. Its range has been considerably reduced in the Tombigbee because of habitat alterations.



HABITAT:

The crystal darter inhabits clean sand and gravel raceways of larger creeks and rivers. It is usually found in water deeper than 60 cm (ca. 2 ft.) with moderate to strong current.

LIFE HISTORY AND ECOLOGY:

The crystal darter buries itself in sand with only its eyes protruding, and darts out in pursuit of passing prey. Its diet is composed primarily of aquatic insect larvae. It moves to deeper water during the day and into shallower water at night. Within the Southeast, the crystal darter breeds from late January through mid-April. The life span for southern populations is less than three years.

BASIS FOR CLASSIFICATION:

Crystallaria asprella has apparently disappeared from much of its former range because of pollution and habitat alteration. In Mississippi, the crystal darter does not appear to be especially abundant but it still occurs in Bayou Pierre, the Pearl River system and sections of the Buttahatchee and Tombigbee rivers that were not directly impacted by the construction of the Tenn-Tom Waterway. Its status in the Homochitto River is undetermined and its existence there is based on one collection record. The last documented occurrence of crystal darters in the Pascagoula drainage was 1933.

RECOMMENDATIONS:

A survey of the current status of this species in Mississippi is needed, as are studies of its natural history. Restrictions on water quality degradation and habitat alterations should be implemented for those streams known to harbor crystal darters.

SELECTED REFERENCES:

Ramsey, J.S. 1986. Crystal Darter, *Ammocrypta asprella* (Jordan). Pages 15-16 *in* Mount, R.H. (ed.), Vertebrate Animals of Alabama in Need of Special Attention. Alabama Agricultural Experiment Station, Auburn University. 124 pp.

Simons, A.M. 1991. Phylogenetic relationships of the crystal darter, *Crystallaria asprella* (Teleostei: Percidae). Copeia 1991(4):927-936.

George, S.G., W.T. Slack and N.H. Douglas. 1996. Demography, habitat, reproduction and sexual dimorphism of the crystal darter, *Crystallaria asprella* (Jordan), from south-central Arkansas. Copeia 1996(1): 68-78.

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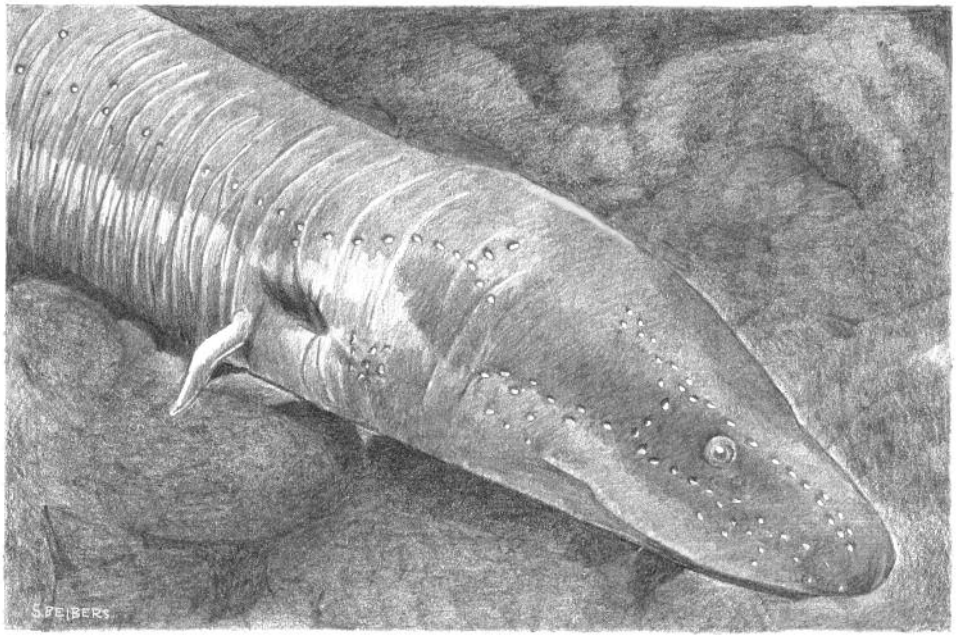
One-toed Amphiuma

Amphiuma pholeter Neill
Family Amphiumidae
Order Caudata



DESCRIPTION:

This is a slender aquatic salamander with 4 tiny legs, each terminating with one toe. The legs may not be readily observed upon casual inspection. The total length of this dark, reddish brown salamander ranges from 89.3-314.2 mm (3.5-12.4 in.).

RANGE:

This is a patchily distributed species of the east Gulf coastal plain in the southeastern United States. It is known from the panhandle of Florida, extreme southwestern Georgia, extreme southwestern Alabama, and from one collection in Mississippi, on the Mississippi Sandhill Crane National Wildlife Refuge.

HABITAT:

Preferred habitat of the one-toed amphiuma is deep, organic, liquid muck in floodplain terrace streams and in alluvial swamps of low gradient streams. It has been collected on dried stream banks, in creeks, and on muck-bottomed intermittent pools and streams.

LIFE HISTORY AND ECOLOGY:

Little is known of the life history of this species. It is known to eat sphaerid clams, earthworms, and insects and their larvae.

BASIS FOR CLASSIFICATION:

The species merits a high priority for protection because of its small range and general rarity. The coastal counties in Mississippi are undergoing a surge in development. Many small wetlands which could potentially support this species have been filled and destroyed, particularly south of Interstate 10.

RECOMMENDATIONS:

Additional survey work for this species is needed. Preservation of existing wetlands should be paramount. Mitigation for wetlands filling in the coastal counties is typically off-site and distant, which does not contribute to the conservation of this species.

SELECTED REFERENCES:

Floyd, P.S., Sr., P.S. Floyd, Jr., and J.D. Floyd. 1998. Geographic Distribution. *Amphiuma pholeter* (One-toed Amphiuma). Herpetological Review 29(4):244.

Means, D. Bruce. 1996. *Amphiuma pholeter*. Catalog of American Amphibians and Reptiles. 622.1-622.2.

Petranka, J.W. 1998. Salamanders of the United States and Canada. Smithsonian Institution Press, Washington and London. 587 pp.

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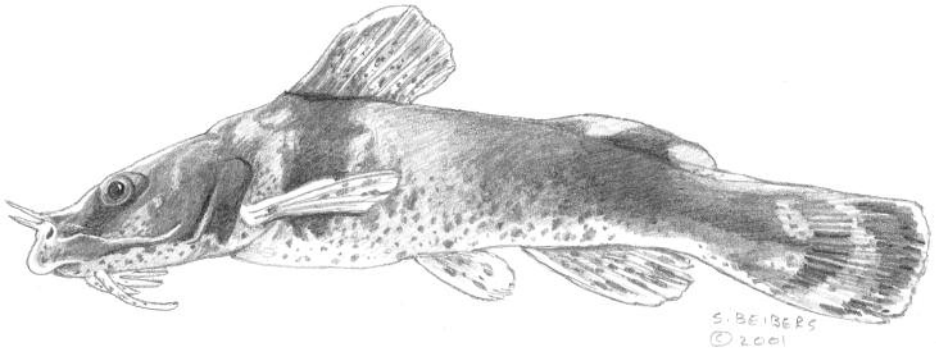
Frecklebelly Madtom

Noturus munitus (Suttkus and Taylor)
Family Ictaluridae
Order Siluriformes

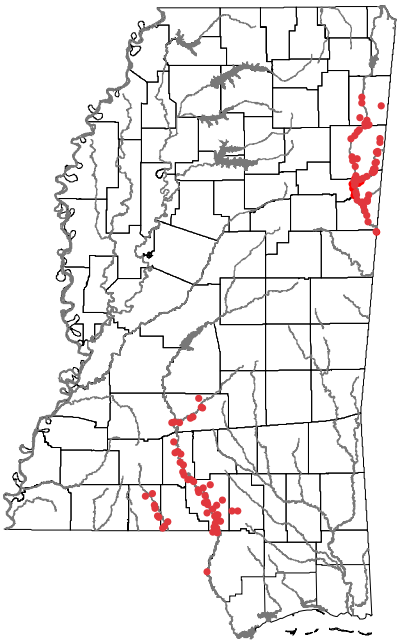


DESCRIPTION:

The frecklebelly madtom is a small member of the catfish family reaching an adult length of 40-90 mm (1.5-3.5 in.). It has four dark brown, saddle-shaped blotches over a mottled light-brown ground color, and the abdomen is speckled with widely spaced brown spots. The adipose fin is continuous with the caudal fin and has a dark brown blotch that extends to its outer margin.

RANGE:

This species was formerly widely distributed in the Pearl and Mobile drainages of Mississippi, Alabama, Louisiana, Tennessee, and Georgia. In Mississippi, it occurs (or formerly occurred) in the Tombigbee River system of Lowndes, Monroe, Clay, and Itawamba counties, and in the Pearl River system of Pike, Lawrence, Marion, Simpson, and Walthall counties.



HABITAT:

The frecklebelly madtom typically occurs in firm, stable gravel or rubble riffles with swift current in both the main river channels and in their larger tributaries. In addition, they are often associated with instream cover such as logs, sticks and leaf packs.

LIFE HISTORY AND ECOLOGY:

Reproduction is thought to occur in June and July, with adult females laying 50 - 75 eggs per season. *Noturus munitus* feeds primarily on aquatic insects.

BASIS FOR CLASSIFICATION:

Noturus munitus is intolerant of siltation and sedimentation, and apparently cannot withstand disturbance of its gravel bar habitat by gravel mining. Its low mobility and low reproductive potential make it extremely sensitive to any form of habitat alteration, resulting in its absence from large parts of its former range. The construction of the Tenn-Tom Waterway has eliminated much of its former habitat in the Tombigbee River system.

RECOMMENDATIONS:

The status of the frecklebelly madtom should be determined in those parts of the Tombigbee watershed that are still in a relatively undisturbed state. Life history studies should be initiated in the Pearl River watershed where this species is still relatively common. Any watershed alteration projects planned for the Pearl River should be implemented so as to cause minimal impacts to this species.

SELECTED REFERENCES:

Miller, G.L. 1984. Trophic ecology of the frecklebelly madtom *Noturus munitus* in the Tombigbee River, Mississippi. American Midland Naturalist 111(1):8-15.

Piller, K.R., J.A. Tipton, and H.L. Bart, Jr. 1999. Status survey of the frecklebelly madtom, *Noturus munitus*, in the Pearl and Upper Tombigbee River systems, Mississippi. Mississippi Department of Wildlife, Fisheries and Parks, Museum of Natural Science, Jackson, Mississippi. Museum Technical Report No. 83.

Ramsey, J.S. 1986. Frecklebelly Madtom *Noturus munitus* Suttkus and Taylor. Pages 13-14 *in* Mount, R.H. (ed.), Vertebrate Animals of Alabama in Need of Special Attention. Alabama Agricultural Experiment Station, Auburn University. 124 pp.

Shepard, T.E., S.W. McGregor, P.E. O'Neil and M.F. Mettee. 1997. Status survey of the frecklebelly madtom (*Noturus munitus*) in the Mobile River basin 1995-1997. Final Report: Alabama Department of Conservation and Natural Resources.

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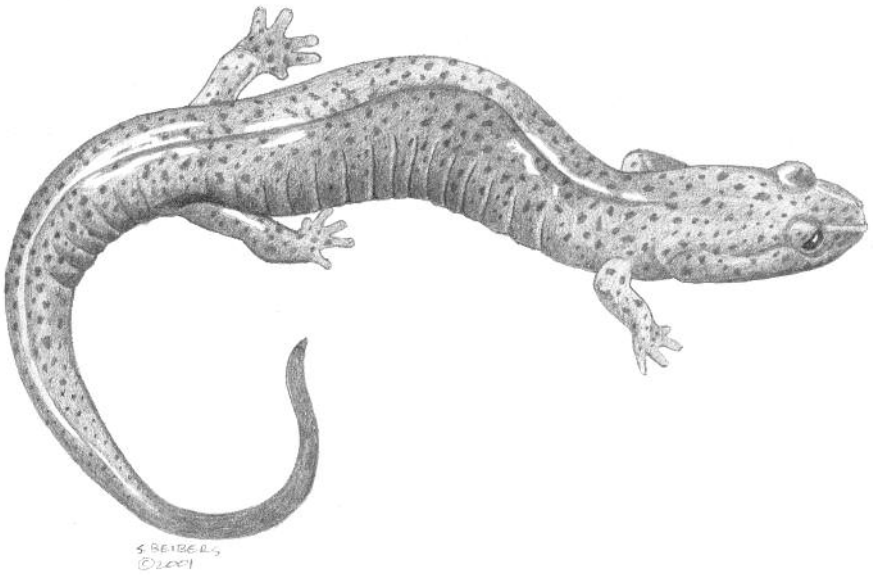
Spring Salamander

Gyrinophilus porphyriticus (Green)
Family Plethodontidae
Order Caudata



DESCRIPTION:

The spring salamander is a relatively large species attaining an adult length of 11.5-22.5 cm (4.5-8.75 in.). It has a small, light-colored ridge, the canthus rostralis, extending from the nostril to the eye. *Gyrinophilus porphyriticus* may be reddish-brown, orange, or salmon colored and have variable, small dark markings on the back. The undersurface may or may not be flecked with dark pigment.

RANGE:

The spring salamander occurs from southern Canada and southern Maine south to northern Georgia and west to extreme northeastern Mississippi. In Mississippi, it is known to occur at only a few localities in Tishomingo County.

HABITAT:

Gyrinophilus porphyriticus occurs in springs, seepage areas, small streams and in and around wet caves.

LIFE HISTORY AND ECOLOGY:

The spring salamander lays from 20-100 eggs during the summer, usually attaching them to the undersurface of partially submerged rocks in springs or seepage areas. The eggs are attended by the female until they hatch, usually in late fall. The aquatic larvae transform into the adult form in two to three years.

BASIS FOR CLASSIFICATION:

This species is listed as endangered in Mississippi because of the limited habitat available for it within the state and because of the small number of known populations. It is threatened by habitat destruction from development and from overcollecting.

RECOMMENDATIONS:

A status survey to determine the size and distribution of the spring salamander population in Mississippi is needed.

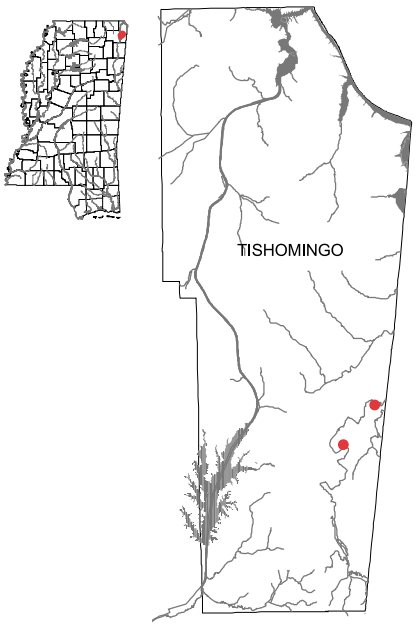
Habitat determined to be essential to this species should be preserved.

SELECTED REFERENCES:

Conant R., and J.T. Collins. 1998. Reptiles and Amphibians of Eastern and Central North America (Peterson Field Guides). Houghton Mifflin Company, Boston. 616 pp.

Mount, R.H. 1975. The Reptiles and Amphibians of Alabama, Alabama Agricultural Experiment Station, Auburn University. 347 pp.

Petranka, J.W. 1998. Salamanders of the United State and Canada. Smithsonian Institution Press, Washington D.C. 587 pp.



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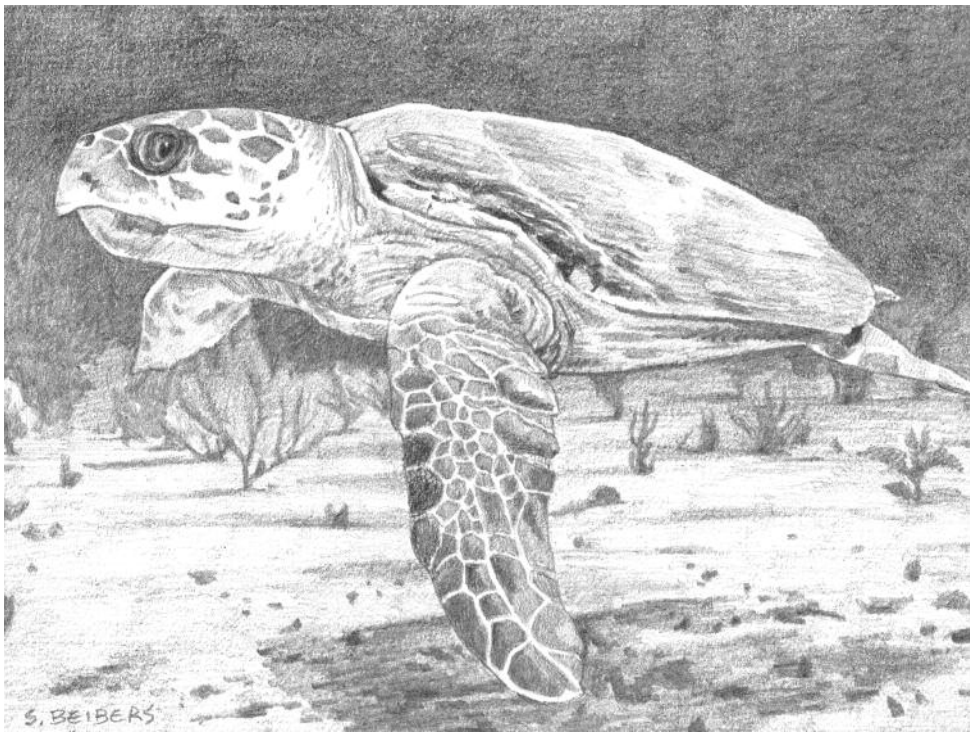
Sea Turtles

LEATHERBACK
Dermochelys coriacea (Linnaeus)
LOGGERHEAD
Caretta caretta (Linnaeus)
GREEN TURTLE
Chelonia mydas (Linnaeus)
HAWKSBILL
Eretmochelys imbricata (Linnaeus)
ATLANTIC RIDLEY
Lepidochelys kempi (Garman)
Families Cheloniidae and Dermochelyidae
Order Testudines

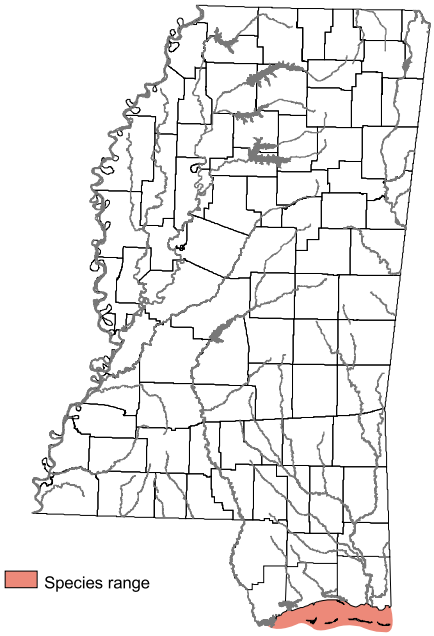


DESCRIPTION:

Mississippi lists five species of marine turtles as endangered. The leatherback is the largest turtle in the world, attaining a carapace (upper part of the shell) length of up to 2.5 m (8 ft.) and a weight of from 273-727 kg (650-1300 lbs.). This species has a shell covered with a layer of black, rubbery skin rather than the hard scutes (scales) characteristic of most turtles. The loggerhead averages between 77-159 kg (170-350 lbs.) in weight with a carapace length of 79-144 cm (31-45 in.). It has a relatively large head, a reddish brown carapace, and a yellow plastron. The slightly larger green turtle 91-122 cm (36-48 in.) carapace length and 113-204 kg (250-450 lbs.) in weight has a relatively small head and a carapace that is brownish with light and dark spots and streaks and a white plastron. The hawksbill 76-89 cm (30-35 in.) carapace length, 43- 75 kg (95-165 lbs.) in weight has a greenish brown, mottled, shield-shaped carapace and a yellow plastron. The smallest of these five species is the Atlantic ridley which averages 60-75 cm (23- 29 in.) carapace length and 36-45 kg (80-100 lbs.) in weight. Its carapace is nearly circular in outline and olive green to black to gray brown. The plastron is white. All five of these species have the front limbs modified as flippers.

RANGE:

The loggerhead, green, leatherback, and hawksbill are found world-wide in warm temperate and tropical oceans and the leatherback also forages in cool temperate waters. The Atlantic ridley is found in the Gulf of Mexico and the Atlantic seaboard of eastern North America, sometimes ranging as far north as southern Canada during the summer. In Mississippi, the leatherback is observed sporadically. A group of at least six was observed feeding on jellyfish near Petit Bois Island in 2000. Observations of green turtles and hawksbills in state coastal water are very rare. The loggerhead occasionally nests on Mississippi's offshore barrier islands. They are regularly seen around offshore oil rigs, and are occasionally hooked on fishing lines by individuals fishing in the vicinity of these platforms. One nest was documented on Round Island at the mouth of the Pascagoula River in 1999, and rarely a nest will be placed on the mainland beach. The rarest species of sea turtle globally, the Atlantic (or Kemp's) ridley is the sea turtle most frequently encountered in Mississippi's coastal water. Ridleys do not nest in Mississippi but juveniles are regularly seen in both the Mississippi Sound and around the barrier islands, and a number have been accidentally captured in recent years by recreational fisherman on mainland piers.



HABITAT:

All five of these species spend most of their life cycle in marine environments, coming ashore only to lay their eggs. The leatherback is most highly adapted to life on the open sea, while the other four species are most often encountered in relatively shallow coastal water in bays, lagoons, or estuaries. Nesting beaches are typically on shorelines with big surf in the tropics, with ready access to offshore currents important for transport of hatchlings to juvenile habitat.

Although habitat of young juveniles will vary somewhat by species and geographic zone, in general offshore algae beds (Sargasso Sea) and convergence zones seem critical. Long distance migrations between adult feeding grounds and breeding grounds are exhibited by each of these species, although not necessarily by all populations of a particular species.

LIFE HISTORY AND ECOLOGY:

In general, sea turtles mate in shallow water off the nesting beaches. Females come to shore one or more times per nesting season and deposit eggs in cavities that they have excavated in the sand with their rear feet. Most females lay eggs once every two to five years. Many clutches are destroyed by predators and the young turtles that do manage to leave the nest face a great number of predators before they reach maturity. At least some of these species do not mature until they are 15-20 years old.

Loggerheads nest at night from May to September along Atlantic and Gulf Coast beaches. Females deposit approximately 115 eggs per nesting attempt, and a female may nest from 1 to 7 times at roughly 12 day intervals within one season. Loggerheads eat a wide variety of marine invertebrates.

A comparatively small but increasing number of green turtles nest along the southeastern coast of Florida. Females nest at night one to eight times per year, depositing about 100 eggs per nesting attempt. This species feeds primarily on algae and sea grasses, but occasionally takes marine invertebrates as well. Green turtles make long migrations from their feeding grounds to specific nesting beaches, to which an individual green turtle will return year after year.

Hawksbills occasionally nest on Florida beaches, usually laying 50-200 eggs. They feed mainly on marine invertebrates, and recent evidence suggests that a major component of the diet is marine sponges.

Atlantic ridleys nest from April to July, only along a stretch of beach in Mexico. Females come ashore during the day and lay about 100 eggs in cavities they dig with their rear feet. Atlantic ridleys may nest two to three times per season. This species eats primarily marine invertebrates.

The leatherback occasionally nests at night on Florida beaches between April and November. Females may lay several clutches of 50-170 eggs per season. Leatherbacks are carnivorous, eating primarily jellyfish.

BASIS FOR CLASSIFICATION:

The leatherback, Atlantic ridley, and hawksbill are listed as endangered and the green and loggerhead turtles are listed as threatened by the U.S. Fish and Wildlife Service. The eggs of all of these species have been over-collected for food by humans throughout their ranges. The green, Atlantic ridley, and hawksbill have historically been in great demand for their meat, which is eaten or was formerly eaten by the local human population in the areas where they nest and which is or was exported to gourmet food markets around the world. The green and ridley are used for leather products, and the hawksbill is also exploited for its strikingly marked shell, which is used to make “tortoise shell” jewelry.

In addition to direct exploitation of sea turtles and their eggs, these species have declined because many nesting beaches have been developed for hotels and vacation homes. Human activity and artificial lighting on developed beaches may deter nesting females, and artificial lighting attracts emerging hatchlings away from the sea. But the most significant impact of beach development is that it usually leads to erosion of nesting beaches, denying turtles nesting habitat safe from high tides and storms. Although eroded beaches are frequently replaced with sand obtained elsewhere, the physical characteristics of such beaches may differ significantly from the natural beach and may not be as satisfactory as a nesting or incubation medium. Prior to the mandatory use of turtle excluder devices (TEDs) in their nets, shrimp trawlers were by far the major single source of incidental mortality of adult and large juvenile sea turtles. In U.S. waters alone, an estimated 5,000 to 50,000 loggerheads and 500 to 1,000 Atlantic ridleys were killed each year following entrapment in shrimp nets. Today an estimated 500 to 5,000 loggerheads and 50 to 500 Atlantic ridleys are killed annually due to entrapment within or entanglement by other fishing gear, including purse seines, float lines attached to lobster and crab pots, unattended pompano and shark gill nets, drift nets, various long line fisheries, pound nets, recreational hook and line fishing, and discarded monofilament line. Other sea turtle species are killed incidental to the fishing activities referenced above, particularly green turtles and leatherbacks, but in U.S. waters loggerheads and Atlantic ridleys comprise the preponderance of incidental mortality. Many sea turtles die from intestinal blockage following ingestion of inedible objects such as plastic bags, balloons, and even tar balls, and an undetermined number may sicken or die because of the toxic components of some ingested petroleum based debris. In some states sea turtles have been incidentally captured and killed within dredging apparatus, and explosives used during demolition of inoperative oil or gas drilling platforms. With a growing population in the southeastern United States, increasing numbers of sea turtles are injured or killed by collisions with boat hulls and boat propellers.

RECOMMENDATIONS:

Surveys to determine when and how often any of these species (particularly juvenile Atlantic ridleys) use Mississippi waters are needed. The preponderance of the limited sea turtle nesting occurring in Mississippi is on islands within the Gulf Island National Seashore, thus the nests and their habitat are protected. Commercial shrimp trawlers and certain other fisheries are required to use TEDs within trawl nets. TEDs allow many inadvertently captured turtles to escape, and strict compliance with this regulation must be enforced. However, many turtles are still captured within shrimp nets; TEDs are far from perfect and more research on improved designs is needed. If sea turtles are incidentally captured within nets they should be freed if vigorous and able to swim, or placed overboard if certain to be dead. However, if a captured turtle is comatose (heartbeat and/or breathing may be temporarily stopped or virtually undetectable) or

inactive, it should be kept in a shaded place on deck to allow for the possibility of recovery, and authorities should be promptly notified, if possible. Such turtles should be oriented with the rear of the shell higher than the forequarters to facilitate drainage of liquid, if present, from the lungs. They may also be turned upside down briefly to depress the plastron (by foot if the turtle is large) to expel water from the lungs. Recovery to the point of swimming and breathing competence may require hours or days, but a turtle recovering on board must be returned to the water within 24 hours of its capture. Stringent enforcement of regulations prohibiting jettisoning of trash or discarding fishing gear from vessels is needed. Incidental oil pollution from tanker ballast discharge must be eliminated, as well. Given the scale of channel maintenance dredging which occurs in Mississippi, the possibility that sea turtles may be seasonally interred in sediments within such channels, and thus vulnerable to incidental capture, should be investigated. To minimize injuries due to collisions with boats, speeds should be moderated where turtles are known or suspected to be present. Authorities at the Department of Marine Resources or the National Marine Fisheries Service should be contacted promptly if turtles are accidentally captured on hook and line. If hooks cannot be easily and safely (for both the turtle and fishermen) removed, veterinary assistance should be sought after contacting these agencies.

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Black-knobbed Sawback

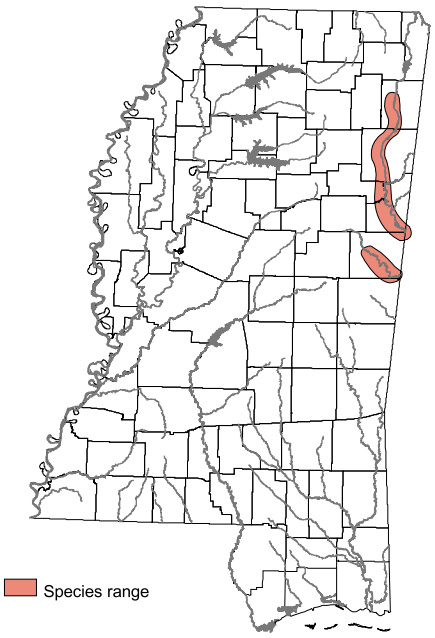
Graptemys nigrinoda Cagle
Family Emydidae
Order Testudines

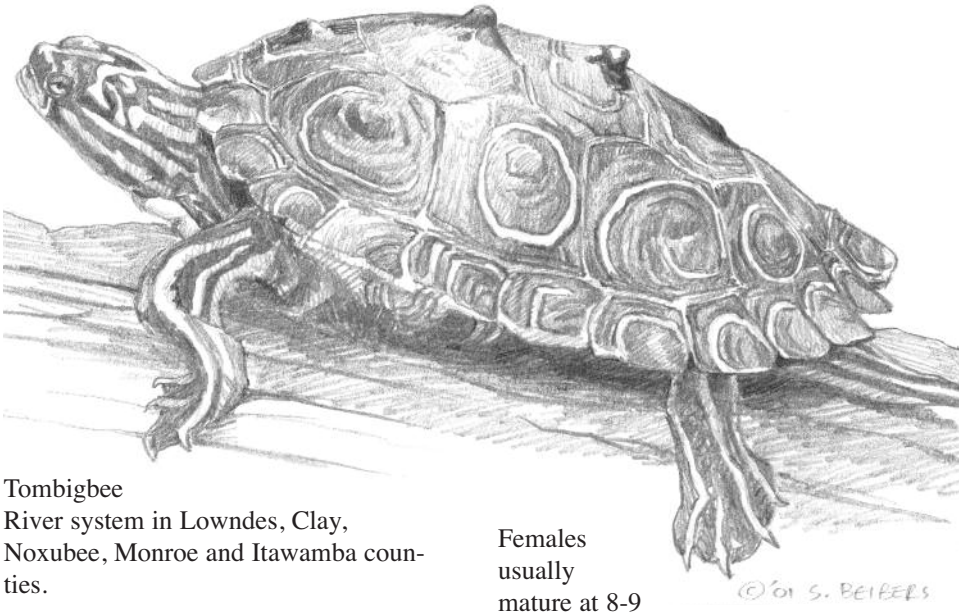
DESCRIPTION:

The black-knobbed sawback is a medium-sized aquatic turtle. Adult females average 102-109 mm (4-7.5 in.) in carapace length. Adult males are smaller, averaging 76-102 mm (3-4 in.). There are prominent, black, knob-like projections on the center ridge of the carapace. These knobs are usually more prominent on juveniles and adult males, and are often reduced to small points in old females. The carapace varies from greenish-olive to brown and has narrow, yellow or white circles on the costal scutes. The marginal scutes have narrow, semi-circular, yellow or white markings. The plastron is yellow with dark lines along the scute seams or with a dark, branching pattern. The skin is black with yellow stripes on the head, neck, tail, and legs. There is a pair of crescent-shaped yellow bars behind the eyes.

RANGE:

Graptemys nigrinoda occurs in the Alabama, Tombigbee, and Black Warrior River systems of Alabama and Mississippi. In Mississippi, the black-knobbed sawback occurs in the Tombigbee River system in Lowndes, Clay, Noxubee, Monroe and Itawamba counties.





HABITAT:

The black-knobbed sawback prefers large streams and rivers with relatively fast current, numerous basking logs, and abundant sandbar areas for nesting. The streams it inhabits must be wide enough to allow sunlight to reach the water level for several hours per day.

LIFE HISTORY AND ECOLOGY:

Female *Graptemys nigrinoda* nest at night from May to late July. Optimal nesting sites are in open, sunny situations with clean sand. Most nest sites are well above the water line, but within 50 m (137 ft.) of the water's edge. Nest cavities, dug with the hind limbs, are flask-shaped, and average about 15.2 cm (6 in.) in depth. Average clutch size is 5 to 6 eggs, and two to three clutches are laid by females nesting within a particular year (not all adult females nest each year). Predators destroy many of the nests before the eggs hatch. In those nests that do survive, hatching takes place about 62 days after the eggs are laid, usually in mid-August. Approximately two days are required for the hatchling turtles to burrow to the surface of the nest cavity. Emergence from the nest usually occurs at night.

Female black-knobbed sawbacks grow at a faster rate but mature at a later age than males. Females usually mature at 8-9 years of age while most males at 4-5 years are mature. The diet is composed of various types of aquatic invertebrates, but the turtles also feed on plants in some parts of the range.

BASIS FOR CLASSIFICATION:

The black-knobbed sawback requires both sandbars and basking logs. Construction of the Tenn-Tom Waterway eliminated these habitat features from much of the range of this species in Mississippi. Although there is some indication that the black-knobbed sawback can survive in severely modified habitats such as lakes, nothing is known of the effects of the waterway on this species in Mississippi. *Graptemys nigrinoda* is a striking animal and is much desired in the pet trade. Rampant collecting for commercial markets has not been reported from Mississippi but could become a problem if law enforcement efforts to protect this species are not continued. The shooting of basking turtles is an activity engaged in by many Mississippi residents, and has undoubtedly caused the deaths of numerous black-knobbed sawbacks.

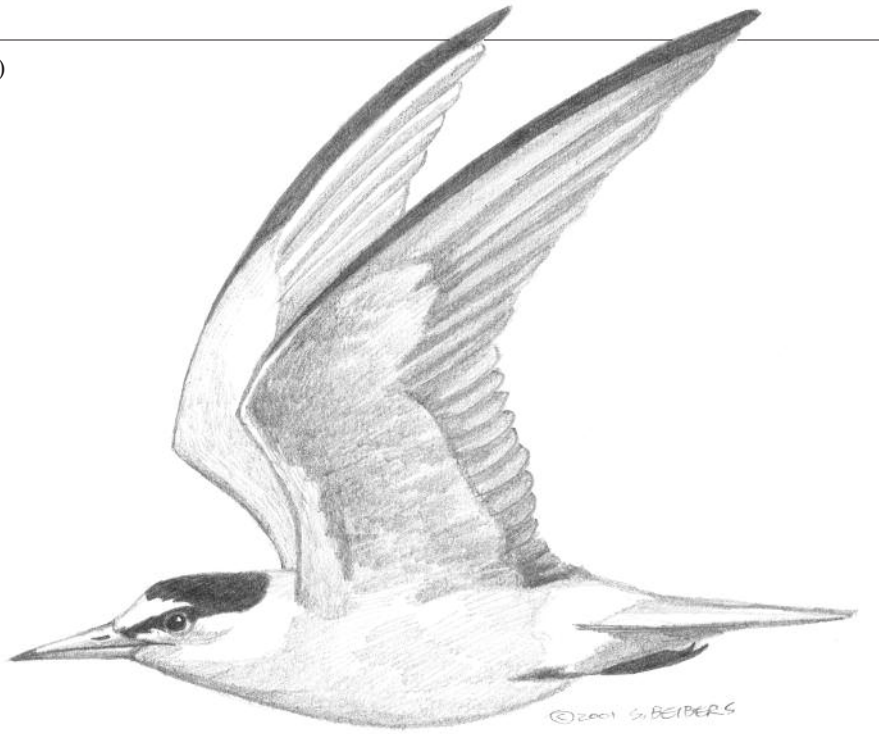
RECOMMENDATIONS:

A survey of the black-knobbed sawback is needed to determine its current status in Mississippi. If this species has been adversely affected by the construction of the Tenn-Tom Waterway, efforts should

Least Tern

Sterna antillarum athalassos (Burleigh and Lowery)
Family Laridae
Order Charadriiformes

Interior population nesting along Mississippi River



DESCRIPTION:

The Least Tern is one of the smallest terns, measuring 20-22 cm (7.8-8.6 in.) in length with a wingspread of 50 cm (20 in.). Breeding adults have gray backs and wings and are white underneath. The top of the head and back of the neck are black. The forehead is white, the bill is orange-yellow with a black tip, and the legs are orange. There is a black wedge on the top outer feathers of the wing that is noticeable when the birds are in flight. Juveniles are pinkish-buff with brown U-shaped markings on the back and have a dark shoulder bar. The top of the head and back of the neck are dusky and there is a black bar behind each eye. Birds approximately one year old have dark bills, legs, and shoulder bar, but are gray above like the adult. The tops of their heads are dusky but the back of the neck is black and connected to the dark bar behind the eye. The tail is deeply forked (noticeable when the birds are in flight) in all age groups. The sounds made by the Least Tern include high-pitched kip notes and a lower "chir-ee-eep" or "kil-lich".

RANGE:

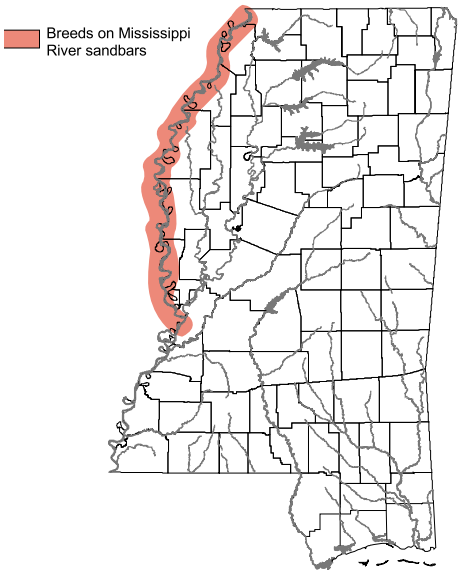
The Least Tern occurs from Maine south to Venezuela, along rivers of the Mississippi River drainage in the interior of the United States, and in southern California. This species winters from the Gulf Coast southward. The coastal population of the Least Tern breeds in the three coastal counties of Mississippi on mainland beaches and on the barrier islands. The interior populations nest (or formerly nested) on sandbars in the Mississippi River from about Vicksburg north to the Cape Girardeau, Missouri. The interior population is considered to be endangered; the coastal population is not.

HABITAT:

The interior Least Tern's nesting habitat is dry, unvegetated sand bars in the Mississippi River basin. The majority of the bars chosen for nesting in Mississippi are not connected to the shore and can be considered islands.

LIFE HISTORY AND ECOLOGY:

The interior Least Tern is a colonial species which nests on flat, unvegetated to sparsely vegetated sandbars near shallow-water feeding areas. The nest is a small depression in sand or gravel, usually located close to debris such as logs or brush. Time of nesting is dependent upon when water levels are low enough to expose sandbars in the Mississippi River, but usually occurs between late May and June. Normally two eggs are laid, but as many as five eggs have been observed in a single nest. The eggs hatch in about three weeks and the chicks are able to wander from the nest within a day. The young begin to fly about three weeks after hatching although they remain partially dependent upon the parents for some time after they learn to fly. Least Terns apparently begin breeding when they are two or three years old and may live for 20 years.



Least Terns hunt for food by slowly flying 10-15 m (30-50 ft.) above the water with the bill pointed downward. When prey is seen, the terns dive downward and plunge into the water to capture it. The diet of the Least Tern is composed primarily of small fish, but crustaceans and insects are occasionally eaten as well.

BASIS FOR CLASSIFICATION:

The interior population of the Least Tern is listed as an endangered species by the U.S. Fish and Wildlife Service. It has declined throughout the central part of the United States because of the elimination of sandbar nesting habitat due to the

construction of reservoirs and channelization of rivers. Least Terns have also been prevented from using formerly suitable habitat by the artificial, regulated flows of rivers modified by construction. The release of water from dams may flood sandbars downstream, destroying both eggs and chicks. Recreational use of sandbars during the breeding season has also affected nesting success of the Least Tern.

RECOMMENDATIONS:

Regular surveys should be continued along the Mississippi River during the Least Tern nesting season to discover which islands and sandbars are being used. Colony sites should be protected to minimize disturbance by humans. Sand and gravel mining on or adjacent to sandbars used for nesting should not be permitted.

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be made to find and preserve any remaining populations in tributaries of the Tombigbee River. The shooting of basking turtles is an indefensible and dangerous practice which should be prohibited.

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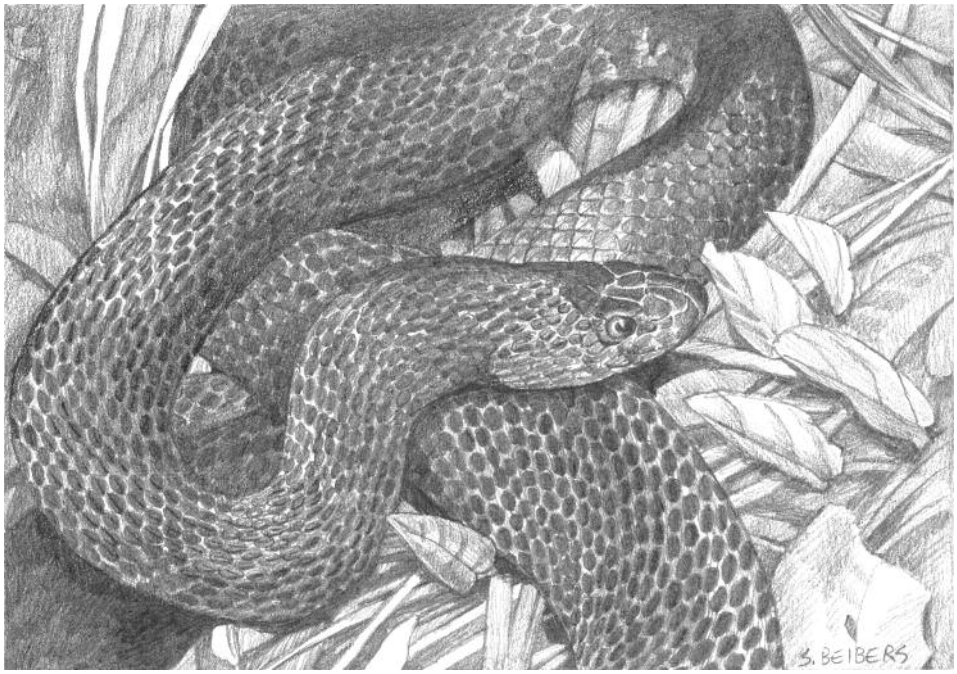
Black Pine Snake

Pituophis melanoleucus lodingi (Blanchard)
Family Colubridae
Order Squamata

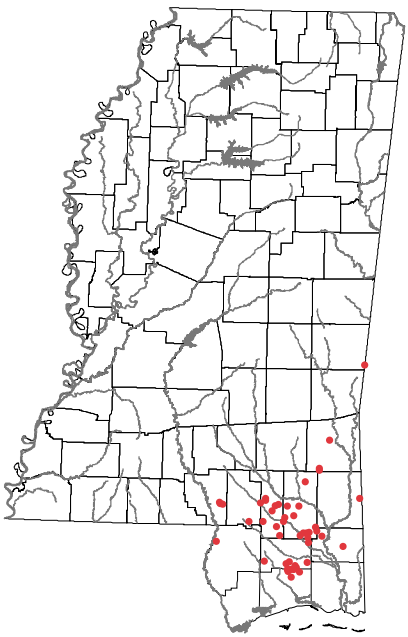


DESCRIPTION:

The black pine snake is a large, relatively stout species attaining a maximum adult size of approximately 2 m (76 in.). Adults are dark brown to black, sometimes with a vague pattern of blotches toward the tail or occasionally exhibiting a few white scales. The venter is dark brown to black, but there may be a few white spots on the belly or throat. Young individuals tend to have more light scales than do adults. The rostral scale is relatively large and curves slightly backward, ending in a point between the nostrils. The scales on the sides and back are keeled.

RANGE:

The subspecies has been recorded from 14 counties in southern Mississippi, and 6 counties in southwestern Alabama, Escambia County in Florida and Washington Parish in Louisiana. However, the form found east of the Alabama River (in Baldwin, Escambia, and Covington Counties, Alabama and in Escambia County, Florida), though traditionally called a black pine snake, is distinctly different in appearance and habits from the form found west of this drainage. The eastern form, usually referred to as an "intergrade", is apparently a relic of historical hybridization between the black pine snake and the Florida pine snake (*Pituophis melanoleucus mugitus*). Significant ecological barriers now widely separate the Florida pine snake and the intermediate form from the "true" black pine snake. It is not clear how the intermediate form should be classified, but for conservation and management purposes it should not be considered together with the black pine snake.



HABITAT:

Black pine snakes, like gopher tortoises and other upland inhabitants of the Longleaf Pine Region, prefer mature longleaf pine forest with sandy soil, an open canopy, moderately fire- suppressed midstory, and thick, grassy understory. Like many other animals adapted to the longleaf pine habitat, they avoid closed-canopy pine plantations, pastures, and urban areas. Because the black pine snake (called "gopher snake" by locals) and the federally threatened gopher tortoise (*Gopherus polyphemus*) have similar habitat requirements and are often found in the same general area, some herpetologists have hypothesized that black pine snakes spend a great deal of time in tortoise burrows. However, during a recent three-year telemetry study co- sponsored by the Mississippi Natural Heritage Program, transmittered black pine snakes were never found in active tortoise burrows. Snakes in that study were usually found in rotting pine stumps and were underground two-thirds of the time. Black pine snakes have been observed in abandoned tortoise burrows.

LIFE HISTORY AND ECOLOGY:

Little is known of the reproductive habits of the black pine snake. In captivity they lay 7-24 eggs. The incubation period is approximately 65 days. Gravid animals have been captured in July and August. Scat analysis, field observations, and small mammal trappings within pine snake home ranges indicate that the hispid cotton rat (*Sigmodon hispidus*) and the cotton mouse (*Peromyscus gossypinus*) are the most important prey species. However, black pine snakes will readily eat birds in captivity and probably do so opportunistically in the wild. One black pine snake was observed to climb 5 m (15 ft.) into a young oak tree, but there are no other reports of black pine snakes climbing trees.

Transmittered black pine snakes had an average home range size of 47.5 ha (125

Mississippi Sandhill Crane

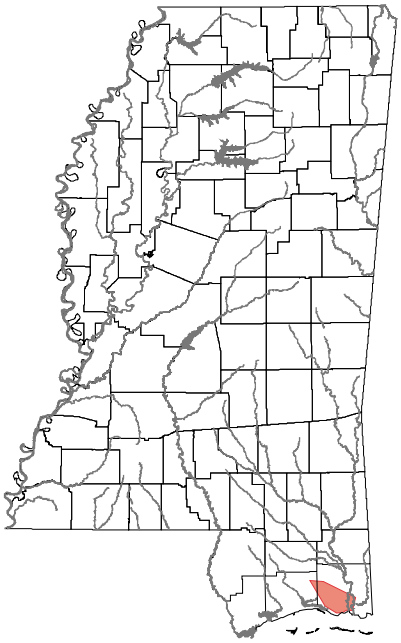
Grus canadensis pulla (Aldrich)
Family Gruidae
Order Gruiformes

DESCRIPTION:

The Mississippi Sandhill Crane is a large, relatively slender, gray to brownish-gray bird with long neck and legs. It is about 120 cm (4 ft.) tall with a wingspread of 160 cm (5.5 ft.). This species has a red forehead and, when at rest, its back feathers droop over the tail in a "bustle". It flies with both its neck and legs outstretched. The voice of the Mississippi Sandhill Crane has been described as a loud, rattling "kar-r-r-o-o-o".

RANGE:

Sandhill Cranes nest from Siberia and Alaska south to Michigan, Minnesota, and California, and winter in Texas, Mexico, and California. Two subspecies, neither of which is migratory, are native to the southeastern United States. One of these, the Mississippi Sandhill Crane, was once an inhabitant of the Gulf Coastal Plain of Louisiana, Mississippi, and Alabama. At present, it is found only in a small area west of the Pascagoula River in Jackson County, Mississippi.

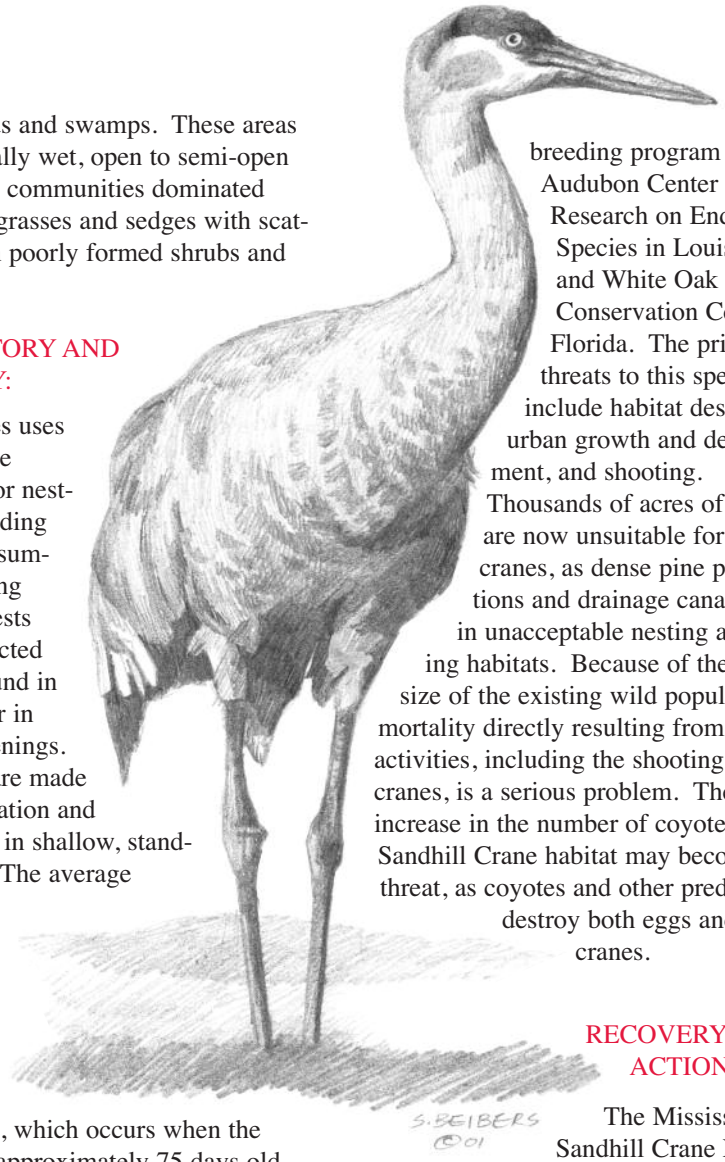


HABITAT:

The Mississippi Sandhill Crane inhabits coastal pine savannas as well as associated bayheads and swamps. These areas are seasonally wet, open to semi-open herbaceous communities dominated mainly by grasses and sedges with scattered, often poorly formed shrubs and trees.

LIFE HISTORY AND ECOLOGY:

This species uses the wet pine savannas for nesting and feeding during the summer breeding season. Nests are constructed on the ground in savannas or in swamp openings. The nests are made from vegetation and usually are in shallow, standing water. The average clutch size is two eggs, but rarely does more than one chick survive to flight stage, which occurs when the chicks are approximately 75 days old.



The diet of the Mississippi Sandhill Crane includes adult and larval insects, earthworms, crayfish, frogs, rodents, seeds, roots, tubers, nuts, fruits, and leafy materials. During the summer, most feeding occurs on the nesting grounds. In fall, winter, and early spring, cranes feed in cornfields and pastures near their summer range, and many roost in marshy areas along the Pascagoula River.

BASIS FOR CLASSIFICATION:

The Mississippi Sandhill Crane is listed as endangered by the U.S. Fish and Wildlife Service. As of 2000, there were only 110-120 cranes in the wild population. About 40 individuals are maintained in captivity as part of a captive breeding program at the Audubon Center for Research on Endangered Species in Louisiana and White Oak Conservation Center in Florida. The principal threats to this species include habitat destruction, urban growth and development, and shooting. Thousands of acres of savanna are now unsuitable for the cranes, as dense pine plantations and drainage canals result in unacceptable nesting and feeding habitats. Because of the small size of the existing wild population, mortality directly resulting from human activities, including the shooting of cranes, is a serious problem. The recent increase in the number of coyotes in Sandhill Crane habitat may become a threat, as coyotes and other predators destroy both eggs and young cranes.

RECOVERY ACTIONS:

The Mississippi Sandhill Crane National Wildlife Refuge was established in 1975 to provide protection and management for the cranes and to preserve the unique savanna plant communities which they require. The refuge consists of three separate land units containing approximately 18,000 acres. Sandhill Crane habitat on the refuge is being restored to savanna, as much of the refuge is on lands that were planted with pine trees in 1950. This process includes land clearing, timber thinning, prescribed burning to maintain savanna vegetation, and water control.

The U.S. Fish and Wildlife Service has a captive breeding/restocking program designed to enhance natural production of the Mississippi Sandhill Crane. Since 1965, eggs from wild cranes have been

sent to the Patuxent Wildlife Research Center to be incubated and hatched. More recently, these eggs have been sent to the Audubon Center for Research on Endangered Species in Louisiana and White Oak Conservation Center in Florida. These eggs have enabled the U.S. Fish and Wildlife Service to establish a captive flock of Sandhill Cranes to supplement the wild populations at the Mississippi Sandhill Crane National Wildlife Refuge. Offspring from this flock have been released on the refuge since 1981. Of the birds living in the wild, only 20 were actually hatched and fledged in the wild. Most of the offspring are fledged in captivity, with 95% of hatched young originating from eggs laid by the captive population and approximately 5% hatched in captivity from eggs laid in wild nests and later removed to the Patuxent facility. Hatching and fledging success in wild nests has been dismal. In 1991, for example, only 12 nesting efforts are known to have occurred in the wild, and only one fledgling survived. A drought coincided with the nesting season in 1992, severely depressing nesting attempts, and no fledglings resulted from the two nesting efforts known. There were 9 active nests in 1993 and 8 active nests in 1994. Three young successfully fledged from the nests in both years. In 2000, about 20 active nests were located but no young were produced from these nests.

RECOMMENDATIONS

A more aggressive controlled burning program is needed.

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acres). There was little overlap in black pine snake home ranges, perhaps an indication of territoriality.

BASIS FOR CLASSIFICATION:

The Mississippi population of *Pituophis melanoleucus lodingi* appears to have declined since 1930, when they were relatively common in the cutover "stump forests" in the southeastern part of the state. The subspecies is now extremely rare over most of the historic range and has apparently been extirpated from Louisiana and Lauderdale County, Mississippi, but is still relatively common within the DeSoto National Forest. A recent study commissioned by the U.S. Fish and Wildlife Service found that 31% of historical black pine snake population segments have been extirpated and that another 26% are in serious jeopardy. The main reason for the decline is habitat destruction/fragmentation due to changes in forest management practices (particularly on industrial forest stands) and due to urbanization. In the past, periodic fires created excellent black pine snake habitat in pine forest by killing competing shrubs and hardwoods, and by maintaining openings with adequate sunlight for the food plants important to the mammals and birds eaten by the black pine snake. In recent years, fire has been excluded from formerly suitable habitat in Mississippi, resulting in a dense understory of hardwoods and shrubs that reduce sunlight reaching the forest floor, shading out food plants of these prey species. Shading also results when sandy ridges are clear-cut and planted to form dense pine plantations.

Black pine snakes are particularly susceptible to road mortality, intentional killing, and illegal collecting for the pet trade. Road building in south Mississippi is permanently breaking the historic range of these species into small fragments. This has a number of negative consequences. The U.S. Fish and Wildlife Service considers the black pine snake a "Candidate Species" for federal listing.

RECOMMENDATIONS:

Black pine snakes are difficult to detect, even when present in relative abundance. Reports of road-kills and other sightings should be actively solicited from the public to better determine the status of this species.

More public education is needed to prevent intentional killing of black pine snakes and to advise the public of the penalties for so doing. Federal threatened or endangered status may be necessary to protect this subspecies. Effort should be made to avoid or minimize new road construction occupied across habitat. Proper management of comparatively large land parcels is probably the best hope for the long-term presence of black pine snakes, gopher tortoises, gopher frogs and red-cockaded woodpeckers in Mississippi.

While recent telemetry studies have provided some information about black pine snake ecology, there is still little known of black pine snake daily activity patterns or reproductive ecology. More telemetry study is needed to fill in these gaps.

Studies are needed to differentiate more accurately the black pine snake from the intermediate form found east of the Alabama River.

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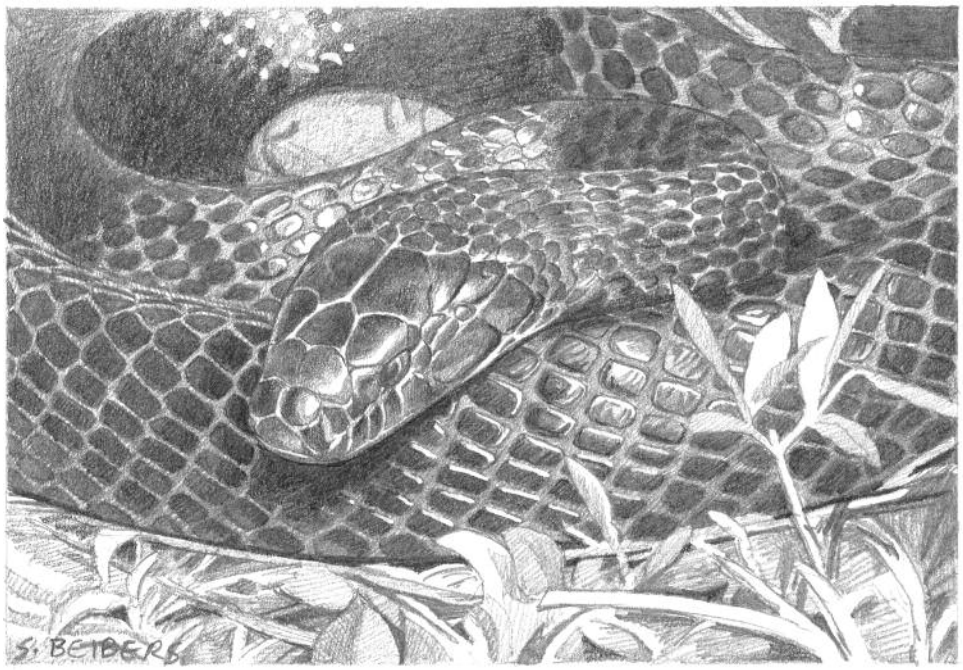
Eastern Indigo Snake

Drymarchon corais couperi (Holbrook)
Family Colubridae
Order Squamata

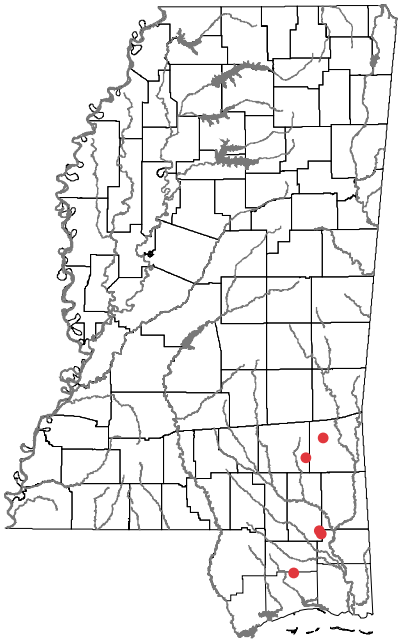


DESCRIPTION:

The longest snake in North America, the indigo snake may grow to a maximum length of approximately 2.6 m (8.5 ft.), although adults usually average about 2 m (6.5 ft.) in length. The indigo snake is heavy-bodied and almost uniformly a glossy blue-black in color except for the throat, chin, and sides of the head which may be cream, orange or red. The latter is more prominent in snakes from the eastern part of the range. The scales are not keeled and appear to be large in size relative to the size of the snake.

RANGE:

Drymarchon corais couperi formerly occurred from southern Mississippi eastward to southwestern South Carolina and throughout Florida. Its present range is considerably reduced. It was last reported in Alabama and South Carolina in 1954. The only existing specimen from Mississippi was collected in the southern part of Wayne County in 1939. However, there have been several unconfirmed sightings of the indigo snake in southern Mississippi during early 1980, and in April of 1985, an area manager for the Mississippi Department of Wildlife Fisheries and Parks caught and released one of these snakes in southern Jones County. There have been two experimental restockings of this species in Mississippi, one in Harrison County in 1981 and a second in Marion County in 1986.



HABITAT:

The indigo snake is found associated with dry sand ridges and pine uplands, at least in the northern parts of its range outside of Florida. These areas are dominated by a mixture of pines, primarily longleaf, and oaks. Recent studies have indicated that indigo snakes move from the upland sites during the summer and utilize bottomlands along streams as well as agricultural areas.

LIFE HISTORY AND ECOLOGY:

Drymarchon corais couperi apparently breeds from October to February. There are usually 9 eggs laid in late spring and early summer which hatch 3 to 4 months later. The indigo snake is active during the day and eats a wide variety of other animals, including snakes, turtles, frogs, lizards, birds, and small mammals. It appears to especially relish eating other snakes, including poisonous species. The indigo snake is often associated with the gopher tortoise (*Gopherus polyphemus*), whose burrows it uses for both refuges and winter denning sites. A Georgia study indicated that 94 percent of the snakes being monitored used gopher tortoise burrows as overwintering locations.

BASIS FOR CLASSIFICATION:

The eastern indigo snake is classified as a threatened species throughout its range by the U.S. Fish and Wildlife Service. This species has declined throughout the southeastern United States because of habitat destruction by urban and suburban development and habitat alteration caused by agricultural and forestry practices. In the past, periodic growing season fires created excellent upland habitat for the gopher tortoise, the presence of which is important to the indigo snake in Mississippi. In recent years, fire has been excluded from formerly suitable habitat. In parts of its range, this species has been adversely affected by the "gassing" of gopher tortoise burrows. This practice, which involves introducing gasoline into tortoise burrows to drive out wintering snakes, is illegal in Mississippi. Indigo snakes, like the black pine snake, are susceptible to road mortality, intentional killing, and illegal collecting for the pet trade.

RECOMMENDATIONS:

A survey is needed to determine the status of the native indigo snake population

Peregrine Falcon

Falco peregrinus (Tunstall)
Family Falconidae
Order Falconiformes

DESCRIPTION:

The Peregrine Falcon is a crow-sized bird 41-51 cm (16-20 in.) in length with a wingspreadof approximately 91-112 cm (36-44 in.). Adults have a black crown with a black wedge extending downward below the eye along the side of the head. The nape (back of the neck) is also black. The back and wings are pale to slate gray. The undersides of the wings and tail and the breast are light gray to white with numerous black spots and bars. Immature birds are dark brown above with a pale brown forehead and heavily streaked underparts. The wings are long and pointed.

RANGE:

The Peregrine Falcon formerly bred from Alaska and Greenland south to Georgia and Baja California, southern South America, Eurasia, Africa, and Australia. It was at one time absent from much of the eastern United States and Europe, although populations in eastern North American have rebounded. There are no breeding records of the Peregrine Falcon from Mississippi. However, it may have once nested along the Tennessee River in Tishomingo County prior to impoundment of Pickwick Reservoir, as evidenced by an active nest on the Tennessee River in Alabama during 1950. Today, the Peregrine Falcon migrates along the Gulf Coast of Mississippi and may occasionally winter on some of the offshore barrier islands.

HABITAT:

Peregrine Falcons formerly occurred in a wide variety of habitats including Arctic tundra, relatively densely forested areas, and coastal cliffs. Eastern populations were concentrated in mountainous areas and along major river valleys.

LIFE HISTORY AND ECOLOGY:

Nest sites were most often located on cliffs in the eastern United States. Nests have also been noted in trees in a few states, and peregrines have nested on bridges and high window ledges in some metropolitan areas.

Peregrine Falcons usually reach maturity and attempt to nest when they are three years old. Two to four eggs are laid in late March or April and hatch in about 33 days. Most incubation and brooding is done by the female.

The diet of the Peregrine Falcon is composed primarily of birds, including common species such as blue jays, meadowlarks, and flickers. Shorebirds and waterfowl are occasionally taken on the wintering grounds. The peregrine captures its prey by diving at it from great heights and striking it in mid-air.

BASIS FOR CLASSIFICATION:

The Peregrine Falcon population in much of North America and Europe began a rapid decline in late 1940 through 1950. Chemical pesticides (chlorinated hydrocarbons - specifically DDT) caused eggshell thinning which reduced the breeding success of this species. Thin shells made it almost impossible for adult birds to hatch eggs, as even normal brooding activities resulted in crushed shells. Pesticides are used to kill insects, which are then eaten by birds that are preyed upon by peregrines. Large doses of the compounds are thus transferred up the food chain to the falcons. The use of DDT and related pesticides has been severely restricted in the U.S. in recent years. However, peregrines can still be exposed to these compounds because many of their prey species are migratory, and winter in Mexico and Central America where DDT is still commonly used.

The Peregrine Falcon was listed in 1970 as an endangered species by the U.S. Fish and Wildlife Service over most of the United States. A success for the endangered species act, the peregrine was removed from the endangered species list in 1999 because the number of breeding pairs exceeded recovery population goals over most of its North American range.

RECOMMENDATIONS:

Coastal habitat in Mississippi should be regularly surveyed to determine the extent of Peregrine Falcon usage. If peregrines are determined to winter regularly on the barrier islands, efforts should be made to insure that they are not disturbed during their stay, and that essential wintering habitat is preserved.

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in Mississippi. The two areas where indigo snakes were restocked in the early 1980's should be monitored to determine whether this species has become reestablished. Areas that have indigo snake populations, whether introduced or native, should be managed to support gopher tortoises, because in Mississippi, the indigo snake is dependent upon the burrows of this turtle. Range fragmentation due to road building programs is a threat to the survival and recovery of the indigo snake and other listed species adapted to longleaf pine uplands. Whenever possible efforts should be made to minimize effects of road construction across habitat occupied by listed species. It is particularly important to avoid further fragmentation of the U.S. Forest Service lands. Proper management of these comparatively large parcels is probably the best hope for the long-term presence of indigo snakes, black pine snakes, gopher tortoises, gopher frogs and red-cockaded woodpeckers in Mississippi.

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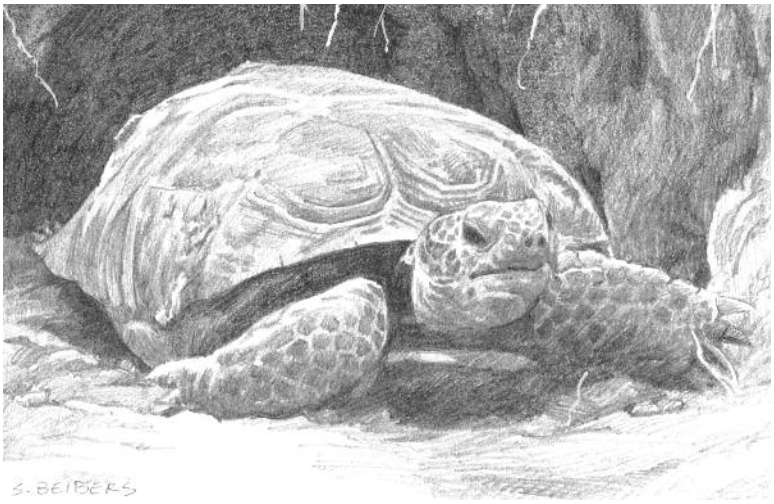
Gopher Tortoise

Gopherus polyphemus (Daudin)
Family Testudinidae
Order Testudines



DESCRIPTION:

The gopher tortoise is a large, terrestrial turtle which attains an average carapace length of 23.5-37.8 cm (9.25-14.9 in.). The domed carapace of adults is uniformly colored, ranging from yellowish-brown to dark gray. The plastron is yellowish. Juveniles have a considerable amount of yellow on the carapace. The front limbs are flattened for digging and have large, thick scales and prominent toenails. The rear feet are relatively small and stump-like, resembling an elephant's foot in shape.

RANGE:

Gopherus polyphemus is known from extreme southern South Carolina, south over most of Florida, and west to extreme southeastern Louisiana. In Mississippi, tortoises are found in all of the counties south of an imaginary line arching through Walthall, Marion, Jeff Davis, Covington, Jasper, and Clark counties. Most colonies occur east of the Pearl River, but a few small colonies have recently been discovered in Marion and Walthall counties on the west side of the Pearl River.

HABITAT:

Gopher tortoises generally inhabit well-drained to excessively well-drained upland soils. Tortoises require soils that are sandy enough to permit construction of burrows, and open canopies that allow sufficient herbaceous plant growth and sunny areas in which to nest. In Mississippi, these areas often support a mixture of longleaf pine and scrub oaks.

LIFE HISTORY AND ECOLOGY:

In Florida, gopher tortoises usually live in loose colonies averaging about 11 individuals. Mississippi colonies are usually considerably smaller. Tortoises are sedentary and rarely move from one locality to another. An individual far removed from others of its species might not come into contact with tortoises of the opposite sex and thus does not have much chance of reproducing. Tortoises dig unbranched burrows which average approximately 4.1 m (13.5 ft.) in length. Burrows can be much longer in deeper sand; one Mississippi burrow was 9.9 m (32.4 ft) long, and burrows may be as deep as 3 m (10 ft.) A tortoise digs its burrow using its flattened front limbs, and may construct two or more burrows which are used regularly. The burrow is approximately as wide as the tortoise is long, which enables the tortoise to turn around anywhere inside the burrow. Temperatures at the bottom of the burrow remain fairly constant throughout the year. The burrow provides shelter from extremes of heat and cold.

The gopher tortoise eats a wide variety of plants, with various species of grasses comprising the bulk of the diet. Wild legumes, fruit, and broadleaf plants also are eaten when available.

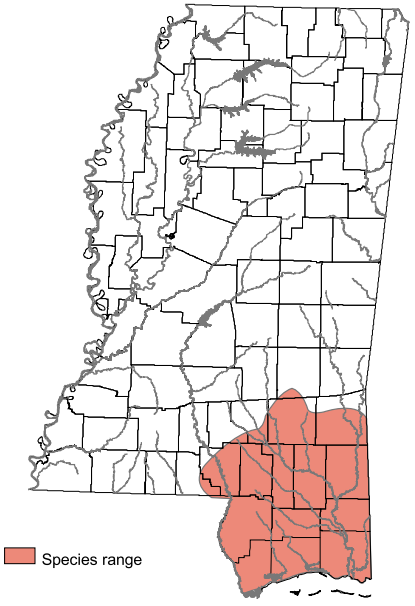
Gopher tortoises begin mating in April, and most nesting activity takes place in mid-May through mid-June. In open, sunny habitat, most nests are dug in the mound of excavated dirt (the burrow apron) at the mouth of the burrow. The average clutch size is 5, and ranges from 1-12 eggs. A female tortoise will lay, on the average, two clutches of eggs every three years. The eggs hatch in approximately 102 days. However, almost 90% of the clutches are destroyed by predators prior to hatching. It has been estimated that, because of the high predation rate on nests, the infrequent nesting, and the small number of eggs produced per nesting attempt, a female gopher tortoise only succeeds in producing hatchlings once every 10 years.

Hatchlings have soft shells and are very vulnerable to predation. Most do not survive the first year. A long period of growth is required before the tortoise reaches maturity. Research in Georgia has indicated that male tortoises mature at 16-18 years of age and females mature slightly later when they are 19-21 years old. Gopher tortoises are thought to live for 40-60 years or longer.

BASIS FOR CLASSIFICATION:

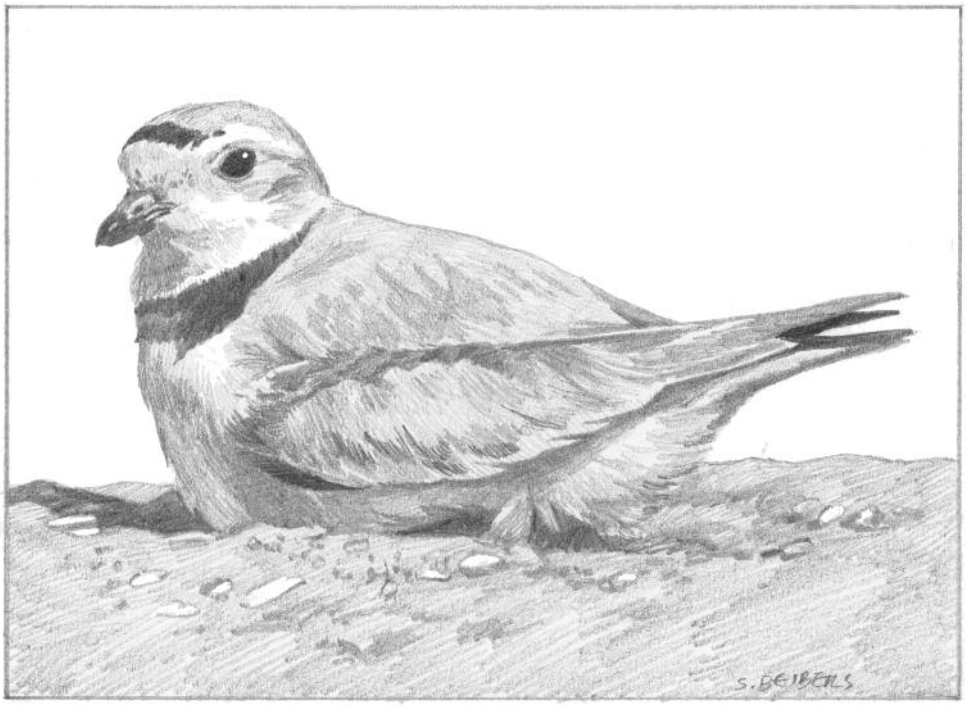
The gopher tortoise is declining in Mississippi and throughout its range. In 1987 the U.S Fish and Wildlife Service designated tortoises within the western portion of the range of the species as threatened. This includes all tortoises west of Alabama's Mobile River, and thus all of Mississippi's tortoises.

In the past, periodic fires created excel-



Piping Plover

Charadrius melodus (Ord)
Family Charadriidae
Order Charadriiformes



DESCRIPTION:

The Piping Plover is a small shorebird with an overall body length of 17 cm (6.7 in.). Adults have a pale, sandy-colored upper body and white undersides. The legs are orange. Breeding adults have a black forehead and breast bands and black-tipped orange bills. Males usually have more complete head and breast bands than do females. Juveniles and nonbreeding adults have neither the forehead nor breast bands, and their bills are entirely dark. The voice of the Piping Plover has been described as a clear, whistled "peep-lo."

RANGE:

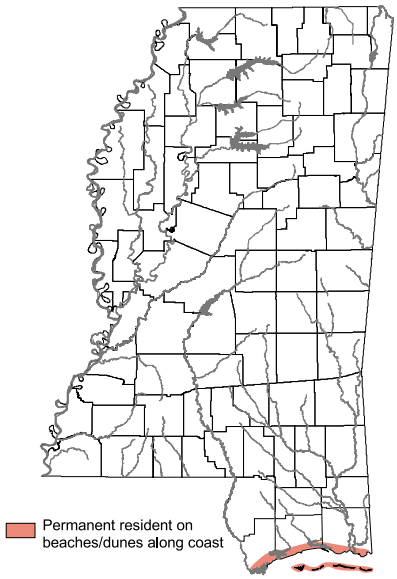
The Piping Plover breeds from central Canada south to Nebraska and Iowa, east along the Great Lakes and Newfoundland, and south along the Atlantic Coast to Virginia. It winters on the Atlantic and Gulf coasts, in the West Indies, and in Mexico. The Piping Plover does not nest in Mississippi but is seen fairly commonly during the winter on coastal beaches and barrier islands.

LIFE HISTORY AND ECOLOGY:

Piping Plovers arrive on their breeding grounds from mid-April to mid-May. They may nest singly or in loose colonies of 30 or more pairs. Piping Plovers may also nest in colonies of least terns, Arctic terns, common terns, or American avocets. Nests, which are shallow depressions usually lined with small pebbles or shell fragments, are constructed on sparsely vegetated sand or gravel shorelines of the ocean and large lakes or on sandbars of large rivers. Usually four eggs are laid during mid to late May. The eggs hatch in mid-June and the young are able to leave the nest and feed themselves within a few hours. The chicks are usually able to fly in 30 to 35 days. Adults usually leave the breeding grounds by early August, and juveniles leave a few weeks later. Juveniles mature and begin breeding in one year. Piping Plovers may live to be five years old or older.

BASIS FOR CLASSIFICATION:

The Piping Plover is listed as an endangered species by the U.S. Fish and Wildlife Service in the Great Lakes area and as threatened in the remainder of its range, which includes Mississippi. Piping Plovers were extensively hunted in mid-1800, which considerably reduced their numbers. After hunting for them was prohibited in 1913, their populations started to increase but never attained earlier levels. Today Piping Plovers are threatened by human disturbance during their breeding season when eggs and young are destroyed by both trampling and recreational vehicles. The presence of humans on the breeding grounds can also interrupt incubation, increasing the chances for predation on the eggs or chicks. Habitat alteration and development has resulted in fewer acceptable nesting beaches for Piping Plovers. Water development projects along major western rivers has led to increased flooding of the nesting sandbars during the breeding season, as well as to permanent inundation of former nesting habitat. Alteration of normal river flows by these projects has resulted in increased woody plant growth on riverine islands and sandbars, which makes such areas less desirable to Piping Plovers for nesting habitat. Winter habitat of the Piping Plover is threatened primarily by urban and industrial development.



RECOMMENDATIONS:

Winter habitat use by Piping Plovers should be studied to determine the types of areas occupied and the extent to which Piping Plovers use different areas. If important winter habitat is found to be limited or threatened by development, appropriate management techniques should be developed and implemented to insure that adequate wintering areas for Piping Plovers are always available in Mississippi.

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lent gopher tortoise habitat in pine forests by killing shrubs and competing hardwoods thus maintaining openings with adequate sunlight for the food plants required by tortoises. In recent years, fire has been excluded from formerly suitable habitat in Mississippi, resulting in a dense understory of hardwoods and shrubs that reduce sunlight reaching the forest floor. Shading also results when sandy ridges are clear-cut and planted to form dense pine plantations. In both situations, the habitat becomes unsuitable for tortoises, which are forced to move. Tortoises are then susceptible to increased predation and to being run over by automobiles. Another threat to gopher tortoise survival is urban and suburban development, which usually occurs on the same well-drained ridges that are preferred by tortoises. Two introduced species, the fire ant and cogon grass, pose significant threats to gopher tortoises. Fire ants are significant predators of young tortoises, at least for the first few years of their lives, beginning with the moment that the hard eggshells are cracked open (pipped) during the hatching process. Cogon grass, originally from southeastern Asia, is inedible to tortoises and rapidly forms thick mats which exclude vegetation that tortoises do eat. It quickly invades disturbed areas such as road-sides, clear-cuts, and all-terrain vehicle trails, but can also invade good habitat in relatively undisturbed areas. It arrives via airborne seeds or by seeds or rhizomes carried by vehicle tires. Prescribed burning alone cannot eradicate it.

In the past, tortoise populations were threatened by capture for both the pet trade and for food. These illegal activities are no longer regarded as significant sources of tortoise mortality, but there still may be local pockets of such depredations, which can quickly extirpate a population.

An upper respiratory tract disease (URTD) has been observed in desert tortoises in the western U.S. and in gopher tortoises in Florida, Georgia, and Mississippi. The disease is highly contagious and is transmitted by close contact between tortoises. Large die-offs of tortoises in the west and in Florida are thought to be linked to this disease. It has been suggested that the disease may have been introduced to wild desert tortoise populations by the release of sick captive tortoises; some tortoise die-offs in Florida have occurred in areas known to be used as sites for relocated tortoises.

Gopher tortoise burrows are essential to the survival of a wide variety of vertebrates and invertebrates, including some that are found nowhere else. These species, including the endangered indigo and black pine snakes, may use tortoise burrows as both summer refuges and as overwintering sites. The extinction of the gopher tortoise could result in the decline or extinction of many of the species that depend upon its burrows for survival.

RECOMMENDATIONS:

Trees should be widely spaced, and regular controlled burning should be conducted in habitats with gopher tortoises. Burning should be conducted in the growing season whenever possible. Where possible, sandhill communities inhabited by tortoises should be set aside as gopher tortoise preserves. If tracts planned for development support gopher tortoises, the U.S. Fish and Wildlife Service and the Mississippi Department of Wildlife, Fisheries, and Parks should be contacted regarding the best procedure for accommodating both the tortoise and the development. Relocation of tortoises is generally viewed as an unsatisfactory resolution to tortoise/development conflicts (see discussion above of upper respiratory tract disease in tortoises). Sometimes it is possible to set aside a portion of the tract to be developed which is sufficiently large to support the tortoises present, and which can be permanently managed. Range fragmentation due to road building programs is a threat to the survival and recovery of several listed species adapted to longleaf pine uplands. This threat should be considered seriously by state and federal agencies with regulatory oversight responsibilities. Wherever possible every effort should be made to avoid construction of new roads across habitat occupied by listed species, and to minimize the impact of road projects that are undertaken. It is particularly important to avoid further fragmentation of U.S. Forest Service lands. Proper management of these comparatively large parcels is probably the best hope for the long-term presence of gopher tortoises, black pine snakes, gopher frogs and red-cockaded woodpeckers in Mississippi. Control of fire ants, mammals, and crows that feed on gopher tortoise eggs may be necessary in some areas. Regulations prohibiting capture of tortoises should be rigorously enforced. Tortoises should not be moved without testing for URTD. A few tortoises in Mississippi have tested positive for exposure to the disease, but to date no mortality is known to have been caused by URTD in Mississippi.

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Alabama Red-bellied Turtle

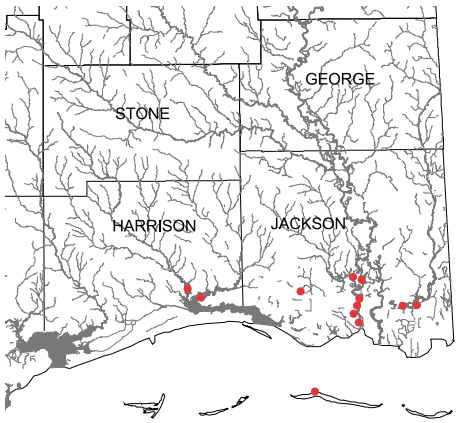
Pseudemys alabamensis Baur, 1893
Family Emydidae
Order Testudinidae

DESCRIPTION:

This large basking turtle with yellow stripes on the limbs, neck, and head is one of a group of turtle species commonly called cooters. The carapace of females may attain 364 mm (14.3 in.) in length, and that of males may reach 312 mm (12.2 in.). Despite its common name, the color of the plastron is typically reddish only in hatchlings and some adult males. Other plastron colors may be cream, yellow, orange, or coral. The plastrons of hatchlings and older juveniles usually have dark markings along the seams between the gular and humeral scute pairs and there may be dark blotches, often hollow and somewhat asymmetrical, elsewhere. The dark plastral pattern typically fades with age, and may completely disappear, but a hint of the gular and humeral seam markings generally persists. The carapace exhibits a network of yellowish stripes on a green, olive, brown, or black background. In larger juveniles and adults the most prominent aspect of the carapace striping pattern is the presence of a single, relatively broad transverse bar in each of the costal scutes. This species, as with other species in the red-bellied turtle complex, has a pair of tooth-like cusps located on either side of a notch in the middle of the upper jaw, and an arrow- shaped stripe pattern on top of the snout. The point of the arrow is directed anteriorly, with its tip just posterior to the nostrils. Red-bellied turtles in Mississippi are somewhat different from those in Alabama, having fewer or less conspicuous head-stripes, a narrower head, less-conspicuous cusps (particularly on hatchlings), darker background color on the carapace and skin, and a relatively longer, narrower shell.

RANGE:

The Alabama red-bellied turtle was first reported in Mississippi by Allen in 1932. From then until 1990, only a few turtles identified as red-bellied turtles were collected in Mississippi. When the Alabama red-bellied turtle was listed as federally endangered in 1987, the species was reported to occur only in Alabama. Since 1990, Dr. James Dobie and Mississippi Museum of Natural Science researchers have established that red-bellied turtles occur in several coastal Mississippi streams. Recent surveys of marshes associated with the mouths of most of the rivers along the Mississippi Gulf Coast confirmed the presence of this species in the lower Pascagoula River and its tributaries (Bluff Creek, the Escatawpa River) and in three coastal rivers entering Back Bay of Biloxi: Old Fort Bayou, the Tchoutacabouffa River, and the Biloxi River. Adults and hatchlings have also been found on the beach at Horn Island, and one hatchling was found on the beach at South Rigolets Island in 1994. It is not known whether sightings on these beaches represent the permanent presence of the species in these areas.



HABITAT:

This species is found in fresh and brackish water with submerged and emergent vegetation, typically in channels with little current bordered by extensive marshes comprised principally of black needle rush (*Juncus roemerianus*). The only nesting areas known are at sites disturbed by man (marinas, campgrounds, road embankments and homesties) with close proximity to streams or canals. Females use streams and canals to move from foraging areas in the marsh to upland nesting sites. Nests are made in loamy sand and in a heavier, siltier substrate. Some nests are placed in open, grassy areas but many are found in shaded areas beneath trees, sometimes immediately adjacent to the trunk.

LIFE HISTORY AND ECOLOGY:

Red-bellied turtles are primarily herbivorous as adults, feeding on submerged aquatic vegetation. Tape grass (*Vallisneria americana*) beds are often extensive where red-bellied turtles are captured, and may compose a significant component of the diet. Some are incidentally captured by anglers using shrimp for bait, indicating that they may scavenge available animal matter. Nesting has been documented from 18 May through 17 July, and may occur at any time of the day or night, although most nesting is between late afternoon and midnight. Clutch sizes of six nests ranged from 11-14 eggs. Several

Red-Cockaded Woodpecker

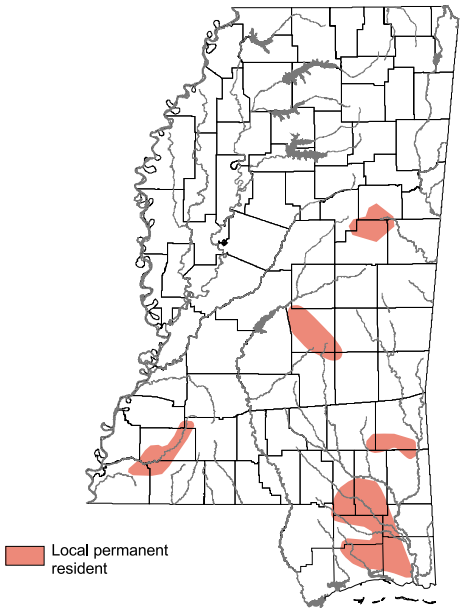
Picoides borealis (Vieillot)
Family Picidae
Order Piciformes

DESCRIPTION:

The Red-cockaded Woodpecker is a relatively small woodpecker about 20 cm (8 in.) in length. The top of the head and back of the neck are black. There are large white patches on the sides of the head beginning at the base of the bill and extending to the black patch on the rear of the neck. A narrow black streak extends from behind each eye to the top of the head. The throat and belly are white. The back and wings are barred black and white and the flanks have black streaks and bars. The tail is black with white on the outer feathers. Adult males have a few red feathers (the red cockade) behind and above the eye. These are not usually visible unless the bird is in hand. The Red-cockaded Woodpecker makes a raspy "sripp"or "tiick" note and a longer, wavering "shirrt".

RANGE:

The Red-cockaded Woodpecker once occurred from Maryland and Kentucky west to Missouri and south to eastern Texas and southern Florida. In Mississippi, this species has been recorded primarily from the southern two-thirds of the state. It has not been found in the Delta and only sporadically occurs in the northern counties.



HABITAT:

The Red-cockaded Woodpecker is a species of southern pine forests. The preferred nesting habitat is open, park-like, mature pine woodlands with few or no hardwood trees present. Preferred feeding habitats are pine stands with trees 23 cm (9 in.) and greater in diameter. These may or may not include a significant hardwood component.

LIFE HISTORY AND ECOLOGY:

The Red-cockaded Woodpecker excavates nesting and roosting cavities in living trees and is the only species known to do so exclusively. Cavities have been found in most species of southern pines, but longleaf pine (*Pinus palustris*) appears to be the preferred species. Older, mature trees are selected for cavity excavation. The reported ages of cavity trees range from 63-176 years for longleaf pine, 70-101 years for loblolly pine, 75-149 years for shortleaf pine, 62-130 years for pond pine, and 70-76 years for slash pine. Occasionally, however, cavities have been found in trees as young as 30 to 40 years old. A high percentage of trees with cavities have been found to be infected with red heart fungus which decays and softens the normally hard heartwood. It is thought that woodpeckers actively select infected pines because excavation of the heartwood in such trees will be easier.

Cavity excavation may take several months. Most cavities are between 6-15 m (20-50 ft.) above the ground and are usually located on the trunk below the level of the first live limb. The completed cavity is 15-25 cm (6-10 in.) deep and 7.5 -12.5 cm (3-5 in.) wide. Prior to the completion of the cavity, bark is flaked away from the trunk for several feet above and below the entrance, presumably to make it more difficult for snakes to reach the cavity. Several small holes called resin wells are chipped through the bark near the cavity. The resin from these wells eventually covers the trunk with pitch which may also discourage

predators, especially snakes, from approaching the cavity. The resin wells are pecked regularly to maintain resin flow. A wide area around the entrance hole has the bark chipped away exposing the sapwood. This area, called the plate, prevents the cavity entrance from growing shut. As long as a cavity is being used for roosting or nesting, the bark is chipped around it, the plate is continually enlarged, and the resin wells are worked to provide a flow of resin.

Red-cockaded Woodpeckers are non-migratory and maintain territories throughout the year around their nesting and roost trees. They live in family groups or clans which may consist of only an adult male and female, a mated pair of adults with their current year's offspring, or a mated pair of adults, their current year's offspring, and a few helpers, which are usually male offspring of one or both of the breeding adults

from previous years. Helpers assist the mated pair in rearing the young. Most clans have only one helper, but some have two, and one clan in South Carolina had three. Although a clan may consist of two to five adult birds, only one of these is an adult female and there is only one breeding pair.

Red-cockaded Woodpeckers may use the same cavity trees for years or even decades. The cavity trees used by a clan of woodpeckers are referred to as a colony or colony site. Colony sites may have from one to 30 cavity trees, including trees with completed cavities, trees with cavities under construction, and trees with abandoned cavities. In most colonies, cavity trees are within 500 m (1500 ft.) of one another.

Red-cockaded Woodpeckers lay from two to five eggs in late April through early May or later. The eggs hatch in about 10 days, and the young are able to fly in 24 to 29 days. In general, clans with helpers are able to successfully rear more offspring than those composed of only a mated pair. Juvenile birds remain on their parent's territory through the remainder of the summer and early fall. Juvenile females leave the territory between late fall and the next spring. Usually some of the juvenile males remain on the territory and become helpers during the following nesting season.

Red-cockaded Woodpeckers prefer to look for food in stands of living pine trees, although they occasionally forage on hardwoods within a mixed pine-hardwood forest. They also prefer larger over smaller pine trees. Most foraging is concentrated on the trunks and limbs of the trees where bark is scaled off to uncover the invertebrate prey. Spiders, centipedes, insects, and insect larvae appear to be the primary food items, although occasionally fruits of blueberry, sweetbay, wild cherry, and wax myrtle are eaten. Foraging by members of a clan may cover from two to four hundred acres or more depending upon the season and quality of the habitat.

BASIS FOR CLASSIFICATION:

The Red-cockaded Woodpecker was formerly widely distributed and relatively abundant over the southeastern United States. Its decline began with the widespread cutting of the virgin pine forests in late 1800's and continues today. Populations have become fragmented and isolated as suitable habitat continues to disappear. There were estimated to be only 4,800 to 10,000 Red- cockaded Woodpeckers left in 1978. There have been many documented losses of known colonies since that time, and little evidence of the colonization of any new areas. The Red- cockaded Woodpecker is listed as an endangered species by the U.S. Fish and Wildlife Service.
The Red-cockaded Woodpecker has become an endangered species because of its dependence upon mature pine forests with an open understory. This type of habitat was maintained in the past by recurring wildfires, and is uncommon today because modern forestry practices emphasize the growth and cutting of young to middle-aged trees on both public and private lands and because fire has been excluded from many pine woodlands. Without the large, mature pine trees, woodpeckers have no suitable trees in which to excavate nesting cavities, and the absence of periodic fires encourages the encroachment and growth of hardwood trees. Colonies in areas with a substantial number of hardwoods are soon abandoned by the Red-cockaded Woodpecker. It is thought that these hardwoods lead to increased numbers of other cavity-using species, such as the Red-bellied Woodpecker (*Melanerpes carolinus*), the Pileated Woodpecker (*Dryocopus pileatus*), and the flying squirrel, which often compete for and ultimately evict the Red-cockaded Woodpeckers from their cavity trees.

RECOMMENDATIONS:

Survival of the Red-cockaded Woodpecker is dependent on wise management of publicly owned lands because of the economic value of timber precludes the maintenance of mature forests on most private lands. In order to guarantee the survival of this species, a number of things should be done. Accurate censuses should be conducted periodically for all populations of Red-cockaded Woodpeckers because the current status of this species is poorly known. Legally mandated management procedures for Red-cockaded Woodpeckers on publicly owned forests should be immediately implemented and enforced. Mature pine trees should be maintained along major highway corridors to provide habitat for displaced woodpeckers and to link isolated stands of suitable habitat. Publicly owned forest lands should be managed to produce old-growth timber. Further research is also needed on foraging habitat requirements and the characteristics of trees selected by Red-cockaded Woodpeckers for cavity construction.

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females are known to have deposited two clutches within a nesting season, and it is likely that some nest three times within a season.

BASIS FOR CLASSIFICATION:

The Alabama red-bellied turtle was listed as endangered by the U. S. Fish and Wildlife Service in 1987. Reasons for listing include losses attributed to human activities on nesting sites, incidental capture by commercial fishing gear, capture for the pet trade, nest predation by species such as pigs and fish crows, and limited state statutory protection. Populations of this species in Mississippi are only known from the lower portions of the coastal streams between the Escatawpa River and the Biloxi River. The global range of the species only extends from the eastern side of Mobile Bay to the Biloxi River, exclusively in waters under tidal influence.

Not all factors responsible for its scarcity in Mississippi are known, but a number of potential problems have been identified. Although no longer legal, there was formerly an occasional commercial fishery for cooters in the lower Pascagoula River and in the Back Bay of Biloxi that probably caused local depletion of Alabama red-bellied turtle populations. Incidental and intentional take on fishing lines results in injury or death to an undetermined number of these animals. Hook injuries have been documented on captured turtles. Some turtles are probably killed by boat propellers. Some that have been captured have propeller-caused shell wounds.

Incidental entrapment within crabpots and possibly hoop nets may result in mortality, but the extent of this has not been documented in Mississippi. Occasional shooting of basking animals may occur, but the significance of this is difficult to determine.

Alteration and destruction of habitat have probably reduced the area available to this species. The shallow-water beds of aquatic vegetation which provide habitat for this species have declined significantly in the Mississippi Sound, the inshore bays, and in the rivers themselves. General degradation of water quality due to coastal development, dredging and filling projects, and certain trawling methods are probably responsible for much of this habitat destruction. Dredging and water pollution have greatly altered the lower Escatawpa River. Bulkheading along bays, bayous, and canals blocks access to upland nesting sites. Additionally, desnagging projects remove basking platforms from foraging habitat.

The significance of natural predation on red-bellied turtles is unknown. Shells of a majority of the large adults which have been captured during surveys bear scars from alligator teeth.

Predation upon nests and young by fire ants causes significant losses to the Alabama red-bellied turtle in Alabama and may to red-bellied turtles in Mississippi as well.

RECOMMENDATIONS:

Identification of factors limiting population size and distribution is necessary. Water quality deterioration may harm the species directly, or indirectly as it affects the existence and health of the submerged vegetation beds upon which this species feeds. The significance of this potential problem should be addressed. Identification and protection of essential foraging, basking, and nesting habitat are needed. Bulkheading of channel banks in red-bellied turtle habitat should be restricted. Further survey work for this species should be undertaken in fresh water habitat on Horn and Petit Bois Islands and in Big Lake and Bernard Bayou at the western end of Back Bay.

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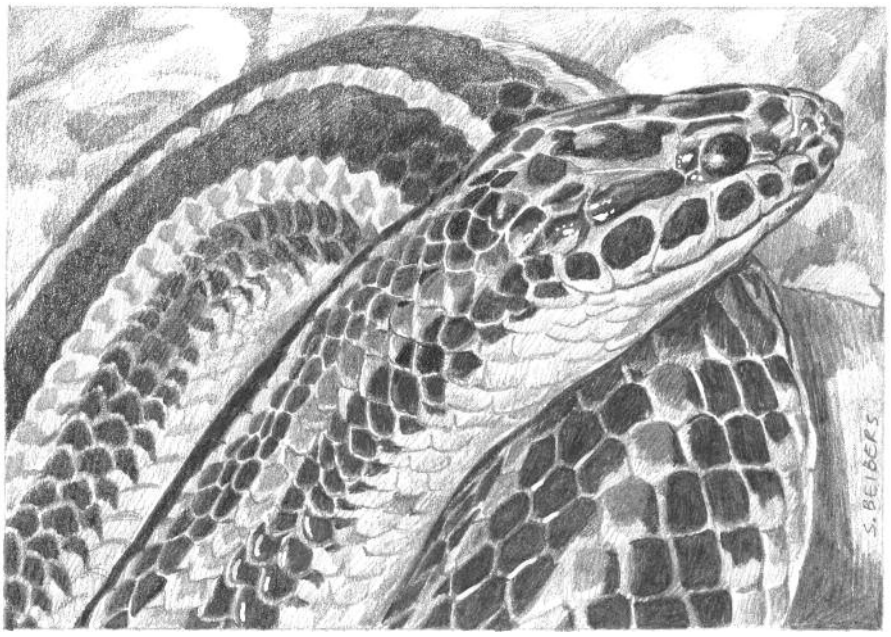
Rainbow Snake

Farancia erytrogramma (Palisoot de Beauvois)
Family Colubridae
Order Squamata

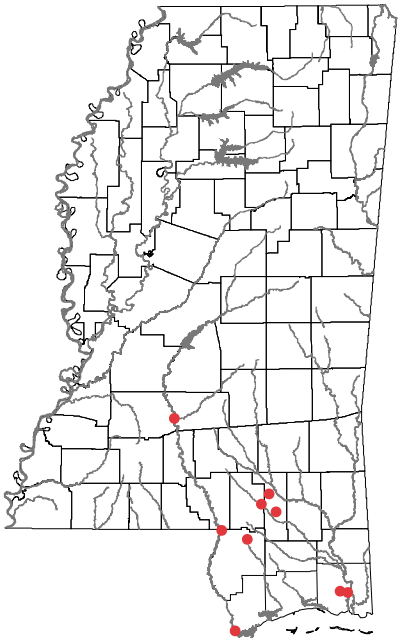


DESCRIPTION:

The rainbow snake is a relatively large species attaining a maximum length of approximately 1.5 m (5 ft.). Its upper surface is shiny blue or blue-black with three narrow, red stripes running the length of the body. The belly is red with two rows of black spots running lengthwise down the body and a row of smaller spots between them. The neck region and the area between the ventral (bottom) and dorsal (top) coloration is yellow. The scales are large and smooth (no ridge-like structure running lengthwise through the center of the scale), and there is a spine-like scale at the tip of the tail.

RANGE:

Farancia erytrogramma is found from southern Maryland south to central Florida and west to the Mississippi River. In Mississippi, it has been recorded from Forrest, Jackson, Hancock, Lamar, Pearl River, and Copiah counties. There are published records of this species from Oktibbeha and Lowndes counties but the validity of these records has been questioned.



HABITAT:

The rainbow snake is found in rivers, streams, springs, ponds, and lakes associated with soils which are sandy enough to allow it to burrow.

LIFE HISTORY AND ECOLOGY:

This species breeds in early summer. Clutch sizes range from 20-52, and the eggs are deposited in cavities in sandy soils. The rainbow snake is most active at night but has occasionally been seen foraging during the day. Eels appear to be the preferred prey, although other fish, tadpoles, and salamanders are also occasionally eaten. This species is presumed to burrow in sandy soils or mats of aquatic vegetation when not actively foraging.

BASIS FOR CLASSIFICATION:

The rainbow snake is seldom encountered anywhere within its range, which could mean that it is a relatively rare species. However, because it apparently spends much time burrowed into vegetation or sandy soil, this species may appear to be much less common than it actually is. In either case, the habitat required by the rainbow snake is suffering widespread alteration through channelization, siltation, and water pollution.

RECOMMENDATIONS:

A detailed survey is needed to determine the status and distribution of the rainbow snake in Mississippi. Water quality and stream channel integrity in areas that are found to contain populations of this species should be maintained to ensure the survival of the rainbow snake.

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Snowy Plover

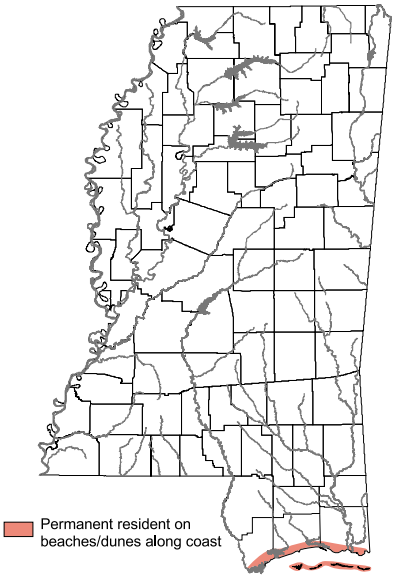
Charadrius alexandrinus (Linnaeus)
Family Charadriidae
Order Charadriiformes

DESCRIPTION:

Snowy Plovers are small shorebirds 13-17 cm (5-7 in.) in length and are sandy-whitish above and white below. Adults have a black patch on the forehead, an incomplete black breast band, and a dark ear patch. Juveniles lack the forehead patch, the breast band, and the ear patches. The bill is thin and dark and the legs are dark gray. The call of the Snowy Plover has been described as "chu-we" and as soft, whistled "ku-wheet."

RANGE:

Snowy Plovers breed in Eurasia, North Africa, Central America, and in South America. In North America, this species breeds locally along the Pacific Coast from Washington south to Baja California, along the Gulf Coast from western Florida to Mexico, and in arid parts of California, Nevada, Oregon, Colorado, New Mexico, Utah, Arizona, Kansas, Oklahoma, and Texas. In Mississippi, the Snowy Plover nests on the barrier islands and occasionally on mainland beaches in Harrison County. North American Snowy Plovers winter from California and the Gulf Coast south.



HABITAT:

Snowy Plovers inhabit expanses of flat, dry sand along seacoast beaches or alkaline interior lakes. This species forages at the edge of the water or on sand flats of tidal creeks.

LIFE HISTORY AND ECOLOGY:

The Snowy Plover usually lays 2 or 3 eggs in the sand within a small depression lined with broken shells and other bits of debris. Eggs are normally laid from early April to as late as July in some parts of the range. Hatching occurs in about 24 days and the young are able to fly 22 to 31 days after hatching. The young leave the nest a few hours after hatching and can find food for themselves without the aid of the parents. Feeding usually occurs on the wet sand at the surf line or along the shores of inland ponds and lakes. Crustaceans, marine worms, mollusks, and aquatic insects comprise the bulk of the diet.

BASIS FOR CLASSIFICATION:

Even though the Snowy Plover occurs over a large area, it is a relatively uncommon species and appears to be declining. The sandy beach habitat it requires is increasingly used for recreation and urban development. These activities reduce the available foraging and nesting habitat.

RECOMMENDATIONS:

The Snowy Plover has attempted to nest on mainland beaches in Harrison County but has been disrupted by beach maintenance activities. These should be modified if at all possible in order to allow this species to nest. However, Snowy Plovers do nest successfully on barrier islands along the northern coast of the Gulf of Mexico, though in small numbers.

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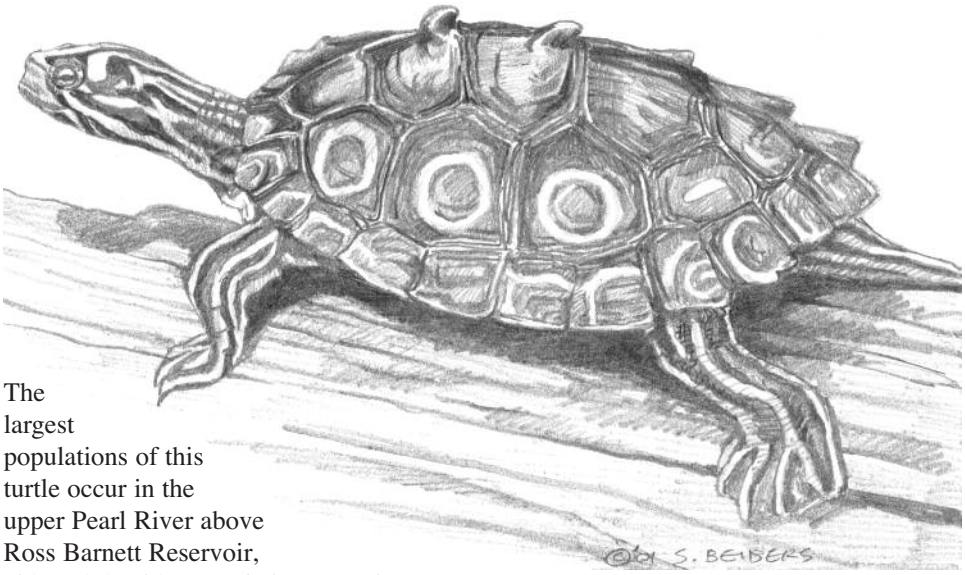
Ringed Sawback

Graptemys oculifera (Baur)
Family Emydidae
Order Testudines

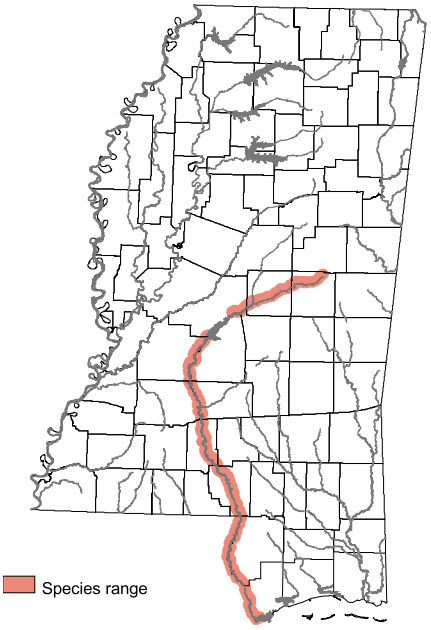


DESCRIPTION:

The ringed sawback is a medium-sized turtle with a dark, olive-green carapace which has conspicuous, black, spine-like projections on the dorsal keel. At maturity, the carapace length of males is 7-10 cm (3-4 in.), while females grow considerably larger (12-22 cm or 5-8 in.). Each costal scute has a relatively wide, black-bordered yellow or orange circle. Marginal scutes have bars or semicircular markings. The plastron is usually cream-colored, sometimes with black along the seams between the scutes, but sometimes may be almost entirely black. There is a large bar or spot behind each eye and yellow stripes down the neck. The dorsal keel is strongly evident in adult males and juveniles but small to obscure in adult females.

RANGE:

Graptemys oculifera occurs only in the Pearl River of Mississippi and Louisiana, and in the Bogue Chitto River, a tributary of the Pearl, as far upstream as Franklinton, Louisiana. In the Pearl, the ringed sawback can be found from Hancock County upstream to Neshoba County.



The largest populations of this turtle occur in the upper Pearl River above Ross Barnett Reservoir, although healthy populations are also found downstream near Monticello and Columbia.

HABITAT:

The ringed sawback prefers a riverine environment with moderate current, sandbars for nesting, and an abundance of logs, snags and downed treetops on which it can bask. Because of this need for basking, the river must be wide enough to allow sunlight to reach the water's surface for several hours per day.

LIFE HISTORY AND ECOLOGY:

Ringed sawbacks occur at densities of 85-341 turtles per kilometer (0 .62 miles) of river. Males mature at 3.5 years of age but females reach maturity much later when they are from 10-16 years of age. The nesting season occurs from mid-May until early July, with peak nesting in mid-June. Nests, which are flask-shaped cavities dug by the female, are usually constructed on sandbars or sand banks during the morning hours. Clutch size ranges from 1-10 eggs with an average of 3-4 eggs per clutch. Most females lay only one clutch per season, but some are able to produce two clutches, and very large females may produce up to three clutches in a season. It usually takes about 65 days for the eggs to hatch, and young turtles may remain in the nest chamber for another 10-12 days. About 86% of all ringed sawback nests are destroyed by predators, which include primarily fish crows, raccoons, and armadillos. Invertebrate predators, primarily ants and fly larvae, may also kill recently hatched turtles.

BASIS FOR CLASSIFICATION:

The ringed sawback is listed as endangered in Mississippi because of its limited distribution in the Pearl River watershed, and because it has a very low reproductive frequency, a very small clutch size, and very few nests that successfully produce hatchlings. The decline of this species in the Pearl and Bogue Chitto Rivers has been attributed to habitat modification and water quality degradation. Habitat modifications have included reservoir construction, which results in unsuitable habitat for the species, and channelization and de-snagging, which remove basking sites and destroy nesting beaches. Siltation and water pollution may adversely affect both the ringed sawback and its invertebrate food source. *Graptemys oculifera* is listed as a threatened species by the U.S. Fish and Wildlife Service.

RECOMMENDATIONS:

Ringed sawback populations in the Pearl River which have been studied in the past should be re-sampled periodically to determine whether they are increasing, decreasing, or remaining stable. Additional research is needed to determine the survival and habitat use of hatchling turtles, and to investigate what appears to be an abnormally low clutch

Wood Stork

Mycteria americana (Linnaeus)
Family Ciconiidae
Order Ciconiiformes

DESCRIPTION:

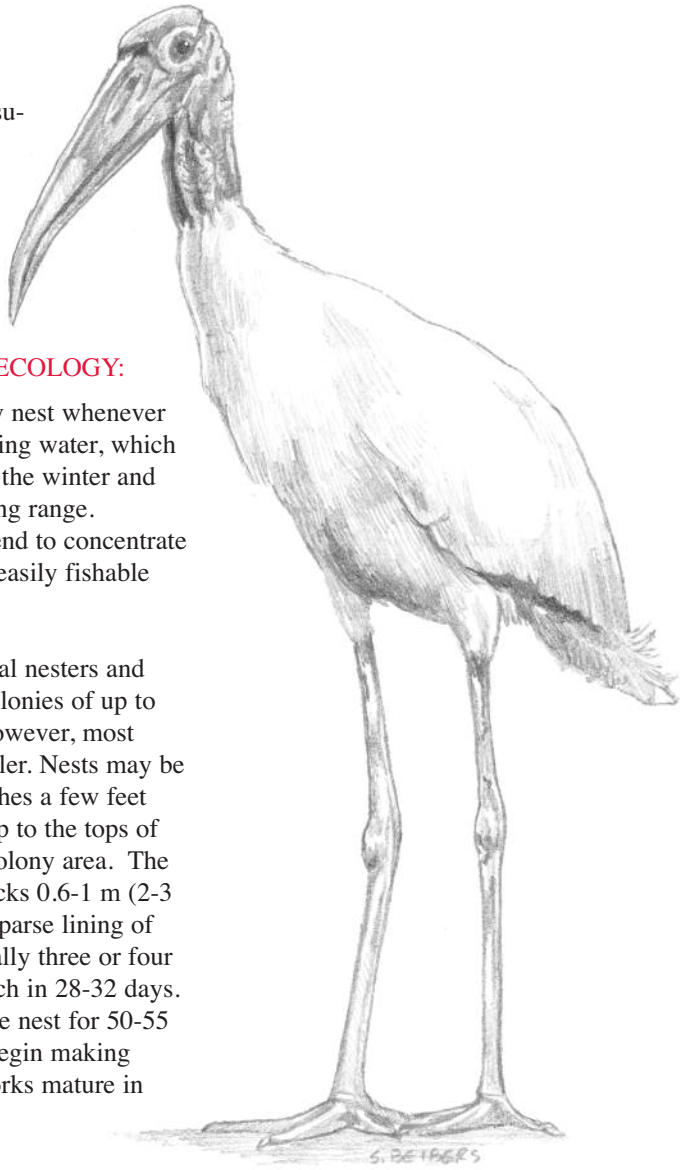
The Wood Stork is a large wading bird 102-112 cm (40-44 in.) in length with a wingspread of 1.5 m (5.5 ft.). Its body is white with black flight feathers and a black tail. The head is naked and blackish-gray in adults and the bill, which is thick and down-curved, is brownish-gray. Juveniles have a feathered, grayish head and a yellow bill. The Wood Stork flies with its neck extended.

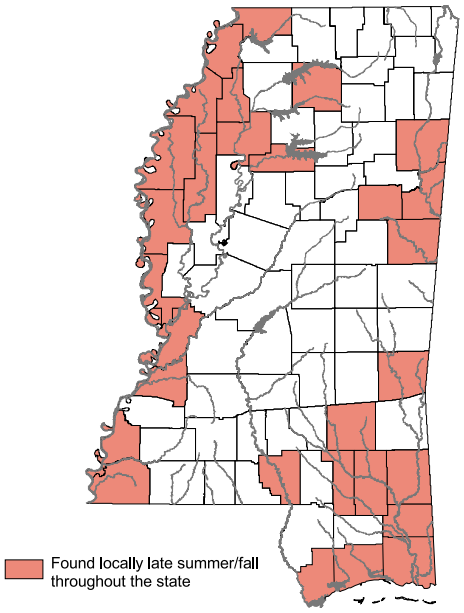
RANGE:

This species formerly bred from South Carolina south to Florida, west to Texas, and south to southern South America. In the United States, it now breeds only in South Carolina, Florida, and Georgia, but disperses throughout the southeast, east, and midwest after breeding activities have been concluded. Wood Storks have been observed most frequently in Mississippi along the western edge of the state in those counties bordering the Mississippi River, although they may occur almost anywhere there are sloughs or swamps to provide feeding habitat.

HABITAT:

The Wood Stork occurs primarily in freshwater wetlands, including ponds, bayheads, flooded pastures, oxbow lakes, and ditches. Nesting usually occurs in bald cypress trees in swamps, although breeding has also been observed in mangroves.





LIFE HISTORY AND ECOLOGY:

Wood Storks apparently nest whenever there are periods of falling water, which usually happens during the winter and spring within its breeding range. Reduced water levels tend to concentrate fish into smaller, more easily fishable areas.

Wood Storks are colonial nesters and formerly occurred in colonies of up to 10,000 pairs. Today, however, most colonies are much smaller. Nests may be built in the lower branches a few feet above the water level up to the tops of the tallest trees in the colony area. The nest is a platform of sticks 0.6-1 m (2-3 ft.) in diameter with a sparse lining of grasses or leaves. Usually three or four eggs are laid which hatch in 28-32 days. The young remain in the nest for 50-55 days after which they begin making short flights. Wood Storks mature in two to four years.

Wood Storks feed in fresh, brackish, or saltwater habitats both by day and at night. Fish comprise the bulk of the diet, but crayfish, mussels, small turtles, snakes, frogs, small mammals, insects, plants, and seeds are also eaten.

BASIS FOR CLASSIFICATION:

The Wood Stork is listed as an endangered species by the U.S. Fish and Wildlife Service in Florida, Georgia, Alabama, and South Carolina. Those storks observed in Mississippi are considered to be visitors from Mexico and Central America by the federal government and thus are not considered to be endangered. However, birds banded in Florida have been observed in Mississippi, and this state should probably be included in the Fish and Wildlife Service listing. The Wood Stork population in the United States has declined at least 75% in the last 50 years. In 1930 more than 150,000 birds were present in Florida alone. In 2000, the breeding population of Wood Storks in Florida, Georgia, and South Carolina was about 6,000 pairs. The Wood Stork population has declined throughout its range because of habitat alteration. The construction of canals, levees, and other such structures has interfered with normal water cycles upon which successful Wood Stork breeding depends. In a normal cycle, high water levels increase fish populations. This is followed by a drying period which concentrates the fish in shallow water where they become easy

prey for the storks. Falling water levels and concentrations of fish are necessary both to stimulate breeding activity in Wood Storks and to keep the adults feeding the young. Human disturbance at breeding colony sites has also contributed to the decline of this species.

RECOMMENDATIONS:

Nesting Wood Storks have not been confirmed in Mississippi although a recent observation of possible nesting was made along the Mississippi River north of Vicksburg. Given this observation, surveys should be conducted across the state to attempt to locate and document nesting in this species. Studies should also be undertaken to determine how important Mississippi habitats are to the overall status of this species in southeastern United States.

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frequency in the species. Stream alteration projects that result in the removal of snags or sandbars should be discouraged within the range of this species. Water quality and its effects on invertebrate species that serve as food of the ringed sawback should be closely monitored in the Pearl River and its tributaries.

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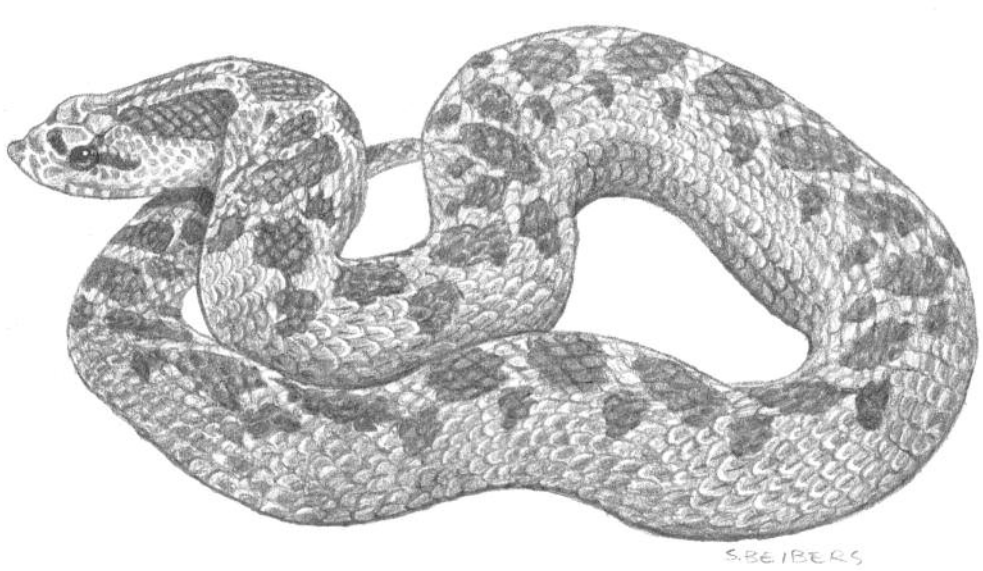
Southern Hognose Snake

Heterodon simus (Linnaeus)
Family Colubridae
Order Squamata



DESCRIPTION:

The southern hognose snake is a relatively short, stout species averaging 36-51 cm (14-20 in.) in length. The ground color is light brown, yellowish, or gray, sometimes with a reddish tinge. There is a row of dark blotches down the back that alternate with a row of smaller dark blotches on each side. The belly is mottled and the underside of the tail is about the same color as the belly. The rostral scale is pointed and sharply upturned. Scales are keeled. The closely related eastern hognose snake (*Heterodon platyrhinos*), which is found throughout Mississippi, has a rostral scale that is not upturned as sharply as in the southern hognose and a belly that is usually much darker than the underside of its tail.

RANGE:

Heterodon simus occurs from southeastern North Carolina south to central Florida and west to Mississippi. Within Mississippi, this species has been recorded from Forrest, Stone, Hancock, Harrison, and Pearl River counties.

HABITAT:

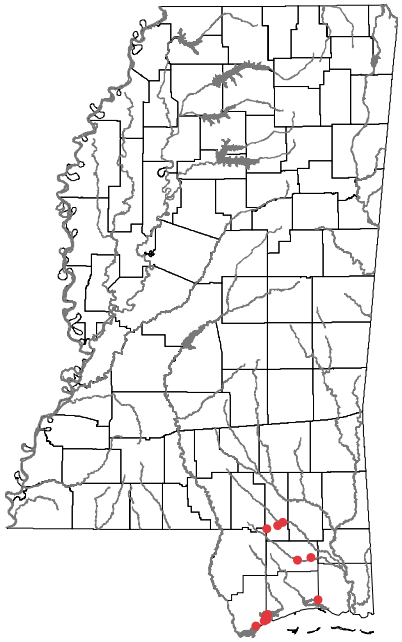
Like the gopher tortoise and the black pine snake, the southern hognose snake inhabits open or sparsely wooded dry areas with deep sandy or sandy-loam soils. Periodic growing season fire is necessary to maintain open habitat.

LIFE HISTORY AND ECOLOGY:

Very little is known about the life history of this species. It is suspected that it spends much of its time burrowing in the loose soils it seems to prefer, and that its diet is composed mostly of toads and perhaps frogs.

BASIS FOR CLASSIFICATION:

Throughout much of its range, the southern hognose snake is seldom encountered, and the sandy habitats it requires are of limited distribution in Mississippi. In recent decades a rangewide decline in this species has occurred. No confirmed specimen has been collected in Mississippi since 1976, despite intensive and extensive field surveys for gopher tortoises (in suitable habitat for the southern hognose snake) on large areas of federal and state land in southern Mississippi, and for snakes in particular, on appropriate habitat at Camp Shelby. The species may be extirpated from



Alabama and Mississippi, and is declining rapidly in Georgia, North Carolina and portions of South Carolina. The reasons for this decline are unclear, but it has been suggested that predation by the imported fire ant on eggs and/or young may be a contributing factor. Exclusion of fire, replacement of natural longleaf stands with dense stocking of other pine species, urbanization, and road-construction have caused extensive destruction, degradation, and fragmentation of habitat formally occupied by this species.

RECOMMENDATIONS:

Biologists and wildlife technicians working in potential habitat for this species should be alerted to the importance of documenting its presence, and should be able to distinguish it from the eastern hognose snake. Research should be undertaken to determine the cause or causes of its decline. If the southern hognose snake is demonstrated to be extirpated in Mississippi, and if the factors leading to its decline are reversible, perhaps one day the snake can be reintroduced into Mississippi. Wherever possible every effort should be made to avoid construction of new roads across habitat occupied by this and other listed species. It is particularly important to avoid further fragmentation of the U.S Forest Service lands. Proper management of these comparatively large parcels is probably the best hope for the long-term presence of southern hognose snakes, gopher tortoises, black pine snakes, gopher frogs and red-cockaded woodpeckers in Mississippi. If research demonstrates that depredation by fire ants is a significant factor in the decline of this snake, carefully conducted control of fire ants may be necessary in some areas.

Black Bear

Ursus americanus Pallas
Family Ursidae
Order Carnivora

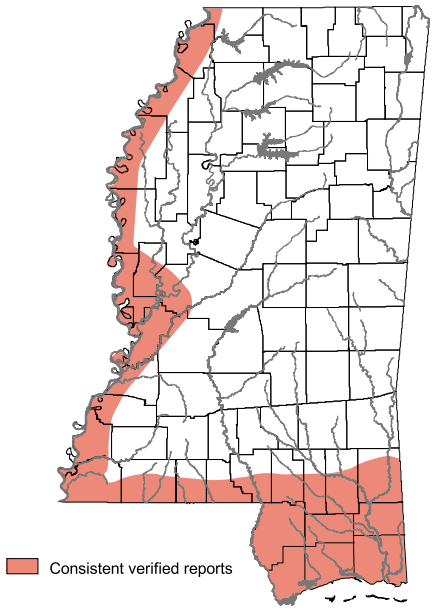
DESCRIPTION:

The black bear is large and stocky, with a short tail, brown muzzle and occasionally a white blaze on the chest. Adults usually stand from 90 to 105 cm (3 to 3.5 ft.) at the shoulder, are 137 to 188 cm (4.5 to 6.25 ft.) long, and weigh from about 90 to 182 kg (198 to 400 lbs.).

RANGE:

Ursus americanus formerly occurred over most of Canada, the United States, and the mountains of northern Mexico. In the eastern United States, it now occurs in northern Minnesota, Wisconsin, and Michigan, in New England, New York, and Pennsylvania south through the Appalachians to northern Georgia, in most of Florida, along the Gulf Coast to central Louisiana, and north to the Ozark Mountains of Missouri and Arkansas. Black bears probably lived throughout Mississippi in the past. Today, however, they appear to be restricted to the bottomlands along the Mississippi, lower Pearl, and Pascagoula rivers. Occasionally an individual is found apparently wandering in other parts of the state.

Two subspecies inhabit Mississippi. The Louisiana black bear (*U. americanus luteolus*) occupied the southern half of the state as well as Louisiana and eastern Texas. Declining populations led the U.S. Fish and Wildlife Service to list this subspecies as endangered in 1992. *Ursus americanus americanus* occurs in the northern half of the state and is considered endangered in the state.



LIFE HISTORY AND ECOLOGY:

Black bears mate in June or early July, and a litter of one to five young (usually two) are born in January or February of the following year. Females usually have a litter every other year. The cubs leave the den with their mother at about two months of age. They remain with her throughout the summer and apparently den with her the following winter. Female black bears mature and can have their first litter in three years, but most are five to seven years of age before having their first young.

Female black bears occupy a home range that may be as small as 640 acres in excellent habitat, to as large as 6400 acres in less suitable habitat. Home ranges of males usually are much larger and may overlap those of several females. A study in Louisiana indicated that the minimum home range of two adult males averaged 27,440 acres while that of two adult females was 4,866 acres.

Black bears eat a wide variety of foods, but the diet is primarily vegetable matter, including grasses, fruits, seeds, nuts, and roots. Insects, fish, amphibians, small rodents, birds' eggs, and carrion also are eaten. Most foraging takes place during the evening and early morning hours. Although black bears occasionally are active during the day, they often spend the day resting on soft ground or leaf litter.

It is not known whether Mississippi black bears become inactive for a long period of time during the winter as they do in colder parts of the range. A Louisiana study indicated that at least three of five black bears under observation became inactive for at least short periods of time. The winter sleep of black bears is not considered true hibernation because body temperature,

although reduced, is not maintained within 1C of environmental temperature as in true hibernators. In warmer parts of the range, black bears appear to sleep for only a few days at a time and then leave the den for short periods. In the south, dens may be in road culverts, hollow logs, or tree cavities. Tree cavities are in large, old trees and may have openings from near ground level to as high as 90 feet or more.

Bears benefit from management practices (such as shelterwood cuts and small clearcuts) that promote a diverse habitat. A diverse, productive habitat contains blackberries, hardwoods, and other food plants; shrubs and fallen logs that provide escape cover; and brushpiles and large trees that can serve as den sites. Bears require living areas where they can avoid human contact. Bears can coexist with humans if provided habitat where all their needs are met.

BASIS FOR CLASSIFICATION:

The black bear has almost been eliminated from Mississippi and has been on the state's endangered species list since 1984. It is estimated that only 25 to 50 black bears still remain in the state. The black bear has declined because of habitat destruction and over hunting. Collisions with automobiles kill a significant number of bears.

RECOMMENDATIONS:

Efforts should be made to preserve bear habitat, especially bottomland hardwoods along some of the major river systems. Forest management activities in these habitats should include leaving some large, old-growth timber, which may be important denning sites for females. Black bears are highly adaptable and can survive in a variety of situations. Ultimately, acceptance of black bears and restoration depends on the attitudes of the citizens of Mississippi. New highways should be routed carefully to minimize the likelihood that bears will be struck by cars while moving between available habitat patches in the region.

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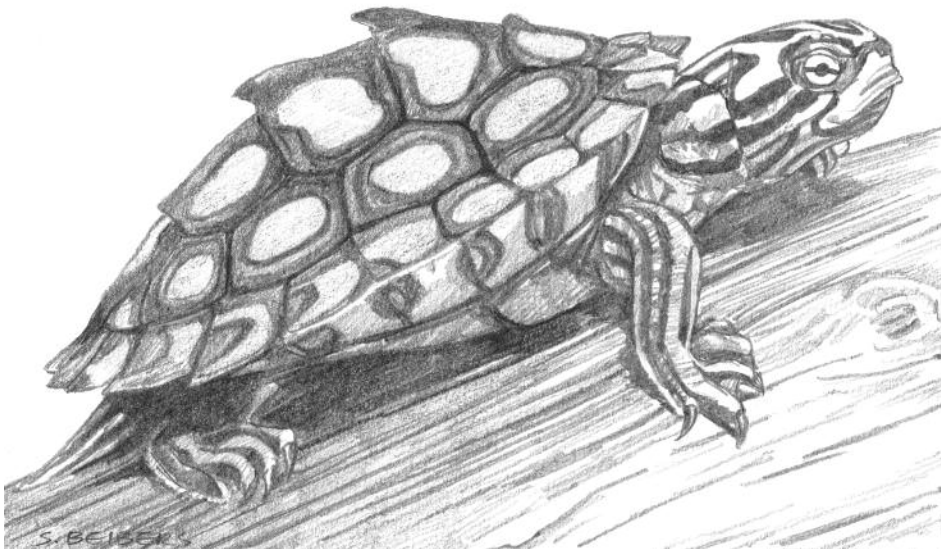
Yellow-blotched Sawback

Graptemys flavimaculata Cagle
Family Emydidae
Order Testudines

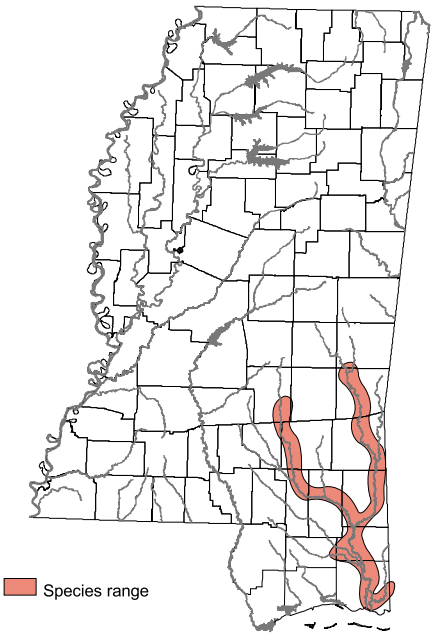


DESCRIPTION:

The yellow-blotched sawback is a medium-sized turtle with males reaching 7-10 cm (3-4 in.) carapace length as adults and females growing to 10-18 cm (4-7 in.). The carapace is olive to brown with large, yellow to orange blotches on the costal scutes and vertebral scutes. Marginal scutes have variously shaped yellow bars. The plastron is usually cream-colored, sometimes with black along the seams between the scutes. There is a large, variable bar or spot behind each eye and two broad yellow stripes extending from behind each eye down the neck. The dorsal keel of the carapace has conspicuous black, spine-like projections which are best developed in adult males and juveniles.

RANGE:

A Mississippi endemic, the yellow-blotched sawback occurs only in the Pascagoula River and its larger tributaries, including the Escatawpa River, the Leaf River, and the Chickasawhay River. It occasionally is found in smaller tributaries of the Pascagoula, such as Red Creek, but never far from the confluence of the tributary and the main river. *Graptemys flavimaculata* occurs in the Pascagoula from Jackson County upriver to the confluence of the Leaf and Chickasawhay rivers in George County. It is sporadically distributed up the Leaf River to Covington County and as far upstream as Clarke County in the Chickasawhay River. The largest and most viable population appears to occur in the lower Pascagoula River from Wade downstream to the beginning of the brackish marshes at the mouth of the Pascagoula River.



HABITAT:

The yellow-blotched sawback requires streams with strong, consistent current and large sandbars for nesting. It spends much of the day basking, so it needs streams which are wide enough to receive several hours of direct sunlight per day and which have abundant snags and logs on which to bask.

LIFE HISTORY AND ECOLOGY:

Female *Graptemys flavimaculata* are found in deeper and faster waters at a greater distance from shore in areas with fewer emergent snags than are males. Average home range area and length for male yellow-blotched sawbacks is 1.12 ha (2.77 acres) and 1.8 km (1.11 miles), respectively, and 5.42 ha (13.39 acres) and 1.5 km (0.93 miles) for females. Females may move seasonally from their home ranges to suitable nesting areas.

The yellow-blotched sawback nests from mid-May through early August. Most nests are built on sandbars, but a significant number are located on non-sandbar areas along river banks. Clutch sizes range from 3-9 eggs with an average of 4-5 eggs per clutch. Most females lay one clutch per season, although a few individuals produce two clutches and some may produce as many as three. However, some females may not reproduce every year. Most nests in the lower Pascagoula River are destroyed either by predators or by flood waters during the nesting season. Fish crows and fire ants are the major predators of yellow-blotched sawback nests along the lower Pascagoula River.

BASIS FOR CLASSIFICATION:

Graptemys flavimaculata is listed as endangered in Mississippi because of its limited distribution in the Pascagoula River watershed. Additionally, it has a very low reproductive frequency, a relatively low clutch size, and a very small proportion of nests that successfully produce offspring. Human occupation of nesting beaches for recreational purposes may interfere with the use of these beaches by female yellow-blotched sawbacks. As a result, many females are now nesting along the riverbanks in locations that are not conducive to the successful production of hatchlings. Many of the sandbars in the lower Pascagoula

Florida Panther

Puma concolor coryi Linnaeus, 1771
Family Felidae
Order Carnivora

DESCRIPTION:

The Florida panther is a large, long-tailed cat which is pale brown to rusty on the back and sides and buff-colored underneath. The sides of the nose, backs of the ears, and tip of the tail are dark brown to black. Until they are six months old, juveniles are buff-colored with black spots. An adult may range from 1.8 to 2.1 m (6 to 7 ft.) from the tip of the nose to the end of the tail and weigh 27 to 72 kg (60 to 158 lbs.). The Florida panther is one of 27 subspecies of *Puma concolor*, and can be distinguished from the other subspecies by several skull characteristics and by the right-angle crook at the tip of the tail, a whorl of hair (cowlick) in the middle of the back, and irregular white flecking on the head, back of the neck, and shoulders. The white flecking may be the result of tick bites. There are no records of black panthers from North America, and only a few from South America. A panther track consists of four toe marks in a semi-circle in front of an imprint of a three-lobed heel pad. Claw marks normally are not apparent.

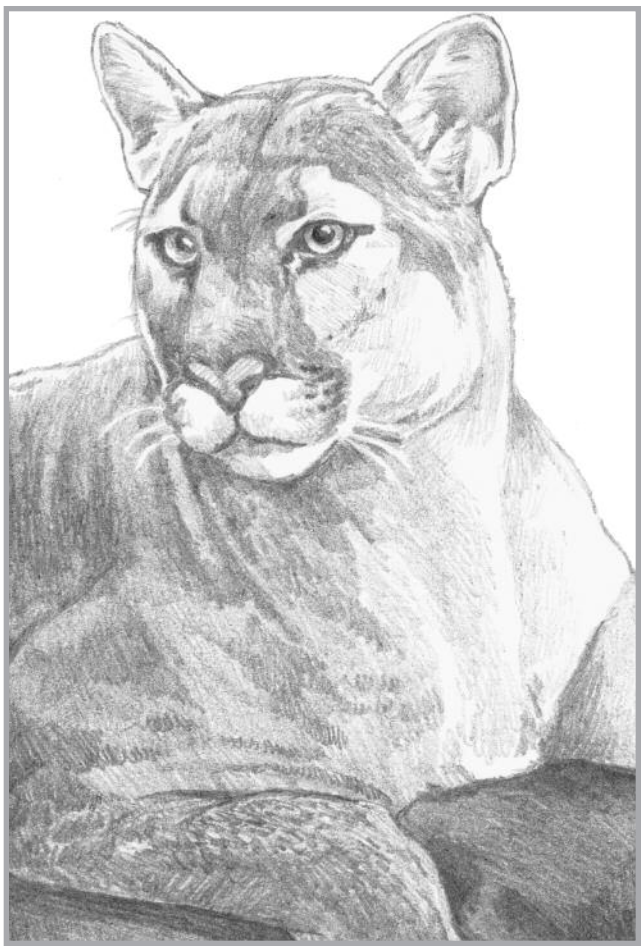
RANGE:

The Florida panther formerly occurred from eastern Texas and the lower Mississippi River Valley east to Florida and north to parts of South Carolina and Tennessee. This range included Arkansas, Louisiana, Mississippi, Alabama, Georgia and Florida. At present it is known only in parts of southwest Florida, although there are many unconfirmed reports from other parts of its former range. The Florida panther probably once ranged over most of Mississippi.

HABITAT:

The Florida panther, based on data from the only population remaining in existence in Florida, primarily inhabits mixed swamp forests and hardwood hammocks. It less frequently occurs in upland pine forests and pine savannas.

The other subspecies of *Puma concolor* live in almost any type of habitat with adequate food and cover.



LIFE HISTORY AND ECOLOGY:

Studies of Florida panthers have indicated that the home ranges of males vary from 181 to 583 km^2 (44,726 to 144,062 acres) and those of females from 103 to 286 km^2 (25,452 to 70,672 acres). These animals moved only at night during the summer, but were active both day and night during the winter months. Individual Florida panthers have been recorded moving as much as 30 km (18.6 mi.) overnight, but at other times have remained in the same general area for as much as a week. The home ranges of panthers overlapped considerably, but they rarely were found together except during the mating season.

Females reach sexual maturity at 1 to 2 years of age, and males at three years of age.

Studies of panthers in Florida indicate that the breeding season occurs from October through March. The young are born 92 to 96 days after breeding, usually during late spring. There is little information on litter size in the Florida panther, but other subspecies of panther usually average from one to four per litter. Kittens nurse for two to three months and may remain with the mother for as much as two years. The kittens may remain together for a few months even after leaving their mother. Panthers can live up to 12 years in the wild and one female was still alive after 16 years.

Ninety percent of panther diet in Florida consisted of feral hog, white tailed deer, raccoon and armadillo and occasionally rabbits, rats, birds and rarely alligators. Deer are the most consistent prey item for *Puma concolor* throughout North America. In order to maintain health, one deer, one hog, or ten raccoons per week are needed. After killing larger prey, panthers drag the carcass to a secluded place before feeding. After feeding, the panther covers the prey remnants with grass, leaf litter, or other debris. The panther often returns later to continue feeding on the carcass.

BASIS FOR CLASSIFICATION:

The Florida panther began decreasing shortly after the first European settlers arrived and has disappeared from most of its former range. It is now known only from southern Florida, where only 60 to 70 were estimated to occur in 2000. It was listed as endangered by the

U.S. Fish and Wildlife Service in 1967.

The Florida panther has been eliminated over most of its range by hunting and trapping. Early settlers killed them because of fear of these large cats and because panthers were potential threats to livestock. As a result, the Florida panther was gone from much of its range prior to 1900. The small population in Florida now suffers from habitat destruction and alteration, mortality from collisions with automobiles (20 were struck and killed by cars between 1978 and 1994), problems with diseases and parasites, inbreeding, and the generally poor condition of the deer and hog populations.

RECOMMENDATIONS:

Because there is no substantiated evidence that Florida panthers still occur in Mississippi, nothing can be done for this species except to investigate seemingly reliable reports of its presence.

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are being colonized by non-native vegetation such as cogon grass, which reduces their usefulness as nesting sites. In addition, chemical pollutants in the Pascagoula River may be disrupting the hormonal regimes and thus interfering with the reproductive cycles of both male and female turtles. The yellow-blotched sawback is listed as threatened by the U.S. Fish and Wildlife Service.

RECOMMENDATIONS:

The yellow-blotched sawback population of the lower Pascagoula River should be re-sampled periodically to determine whether that population, which appears to be the largest and most viable within the entire watershed, is increasing, decreasing, or is stable. A program should be established to inform the public about the plight of this turtle, specifically focusing on the effects of random shooting of basking turtles and the disturbance of nesting beaches. Exotic vegetation on sandbars along the lower Pascagoula River should be controlled to enhance nesting areas, but this should be coupled with efforts to reduce the impact of recreational users on nesting turtles. Additional research is needed to understand the effects of incidental take on yellow-blotched sawback populations, the survival and success of nests in non-sandbar areas, and the survival and habitat use of hatchling turtles.

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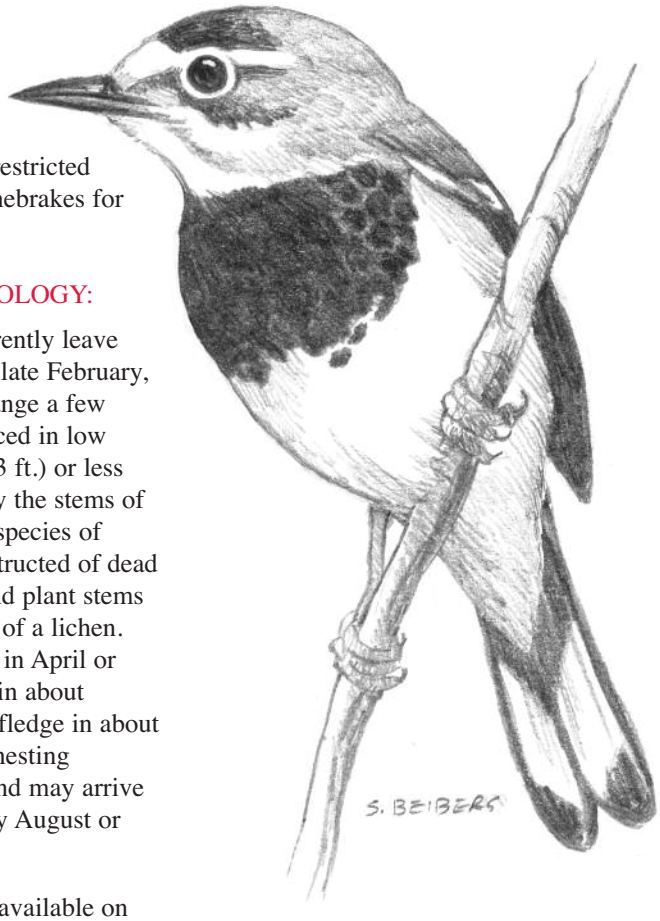
Bachman's Warbler

Vermivora bachmanii (Audubon)
Family Parulidae
Order Passeriformes



DESCRIPTION:

Bachman's Warbler is a small bird 11-11.5 cm (4.25-4.5 in.) in length. The adult male has a bright yellow forehead, chin, and eye ring. The front part of the top of the head and the throat are black. The rear part of the top of the head, the sides of the head, and the back of the neck are gray. The belly and bend of the wing are bright yellow. The rest of the upper part of the body is olive-green and the feathers underneath the tail have white markings. The adult female lacks the black markings and has less yellow in the plumage. The top and sides of the head and back of the neck are gray. Females also have indistinct dark streaks on the breast and yellow or white eye rings. Immatures appear to be duller versions of the adults. The song of Bachman's Warbler is an eight-note buzzy trill on the same pitch that has been described as "bzz-bzz-bzz-bzz-bzz-bzz-bzz-bzz".

RANGE:

Bachman's Warbler has been recorded as a breeding bird in Alabama, Arkansas, Kentucky, Missouri, and South Carolina. It has been reported from Florida, Georgia, Louisiana, Mississippi, Indiana, Oklahoma, and Virginia, but there is some doubt as to the validity of the records from some of the northern and western parts of this area. Bachman's Warbler apparently wintered in Cuba. This species has only been collected a few times in Mississippi. All records from this state were of presumably migrating birds along the Gulf Coast. Bachman's Warbler was last seen in Mississippi on Ship Island in 1949.

HABITAT:

Bachman's Warbler apparently nested in timbered swamps or wetlands that had dense understory thickets. There is disagreement over whether optimal breeding areas were in mature swamp forests or in those that had been disturbed by either natural or man-made forces and had dense understories. It has been suggested that Bachman's Warbler might have been restricted to areas with extensive canebrakes for breeding.

LIFE HISTORY AND ECOLOGY:

Bachman's Warblers apparently leave their wintering grounds in late February, arriving on the breeding range a few weeks later. Nests are placed in low vegetation usually 1 m (3.3 ft.) or less above ground supported by the stems of blackberry, cane, or other species of plants. The nests are constructed of dead leaves, grasses, mosses, and plant stems are lined with black fibers of a lichen. Three to five eggs are laid in April or May, and hatching occurs in about eleven days. Young birds fledge in about ten days. Birds leave the nesting grounds relatively early and may arrive back in the winter range by August or September.

There is little information available on the diet of this species, but it is probably composed primarily of insects.

BASIS FOR CLASSIFICATION:

Bachman's Warbler has always been an extremely rare species and may now be extinct. There are a few reported observations of this species every year, but most are unconfirmed. One female was observed in Cuba in 1980, and this appears to be the most recent reliable sighting of the species.

The reasons for the decline of Bachman's Warbler are unknown. It has been suggested that the cutting of old growth swamp forests altered the habitat to the point that it was no longer acceptable to this species. Others have suggested that it declined because of alteration and destruction of both its wintering and breeding habitat, and that this included a decrease in both the amount and quality of these areas. Bachman's Warbler is listed as an endangered species by the U.S. Fish and Wildlife Service.

RECOMMENDATIONS:

Searches should be conducted for Bachman's Warbler in swamp forests during the breeding season. If individuals or a small breeding population are discovered, steps should be taken to preserve the area in which they occur.

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Gray Bat

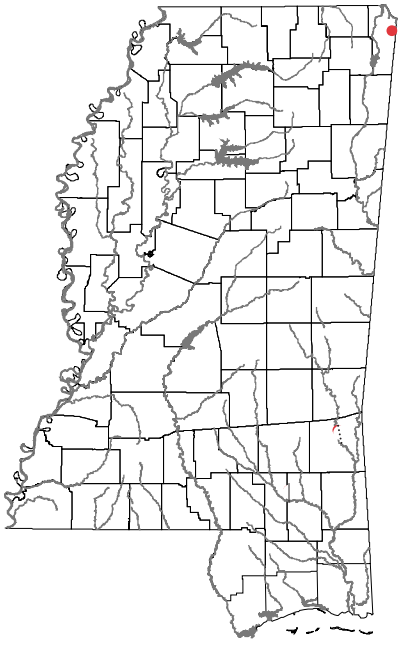
Myotis grisescens Howell
Family Vespertilionidae
Order Chiroptera

DESCRIPTION:

The gray bat is the largest of its genus in the eastern United States. This species has a wingspread of 25.5 to 30 cm (10.8 to 11.8 in.). It weighs from 7 to 16 grams. The fur along the back is uniformly dark gray from the base to the tips, distinguishing it from other eastern bats. The wing membranes are attached to the foot at the ankle.

RANGE:

The gray bat occurs from Arkansas and Missouri east to southern Illinois and Indiana and south in the limestone belt to western Florida. Largest populations are found in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee. This species is known only from Tishomingo County in Mississippi and likely represents wandering individuals.



HABITAT:

The gray bat roosts in caves during the summer as well as during the winter. Caves used during hibernation are usually deep, vertical pits that act as cold-air traps. There are only nine known caves that are believed to house 95% of the hibernating population. Summer caves used by females usually have dome-shaped ceilings which act as warm-air traps. Most gray bats forage over the water of rivers or reservoirs in the vicinity of their summer caves.

LIFE HISTORY AND ECOLOGY:

Gray bats migrate between summer caves and hibernation caves. Mating takes place upon arrival at the winter caves, which usually occurs between early September and October. Adult females begin hibernating soon after mating while adult males and juveniles remain active a few weeks longer, usually going into hibernation by mid-November. Gray bats emerge from winter caves from late March to mid-May, with females leaving the caves first, followed by juveniles and later still by adult males. After migration to the summer range, adult females roost in different caves than those occupied by adult males and juveniles. Groups of adult females are known as maternity colonies. These congregations are large, and the females give birth to a single young in late May or early June. Depending upon growth rate, the young may begin flying from 20 to 35 days after birth. Gray bats appear to feed primarily upon aquatic insects, particularly emerging mayflies. This species may live for up to 35 years.

BASIS FOR CLASSIFICATION:

The gray bat has declined substantially over the last 30 years, and as a result, is listed as endangered by the U.S. Fish and Wildlife Service. The gray bat is very selective in its requirements for hibernating caves. It has been estimated that fewer than 5% of caves and caverns are suitable habitat for gray bats. Because of this specificity, hibernating gray bats are extremely vulnerable to human disturbance. If bats are provoked at this time, they metabolize stored fats which would have sustained them through the rest of the winter. Thousands of gray bats have starved to death in their winter caves because of repeated disturbances, primarily by humans, during hibernation. Gray bat maternity roosts have also suffered from human disturbance. Visitors to the maternity caves have caused thousands of flightless young to become dislodged from the cave roof and fall to their deaths.

In addition to unintentional disturbances by cave explorers, this species has suffered from vandalism, such as collecting or killing bats in the cave or at the cave entrance, commercialization of the hibernation caves and maternity caves, destruction of caves by reservoir construction, and from pesticide pollution. The cutting of forests in the vicinity of maternity colonies and along rivers and reservoirs also has impacted this species by reducing available foraging habitat and by making the bats, especially juveniles, more vulnerable to predation.

RECOMMENDATIONS:

This species does not appear to breed or hibernate in Mississippi, so there is little that can be done to protect them in this state. However, the frequency with which they migrate through Mississippi needs to be determined, and if any of the few caves in the state turn out to be important temporary roosts, those caves should be protected.

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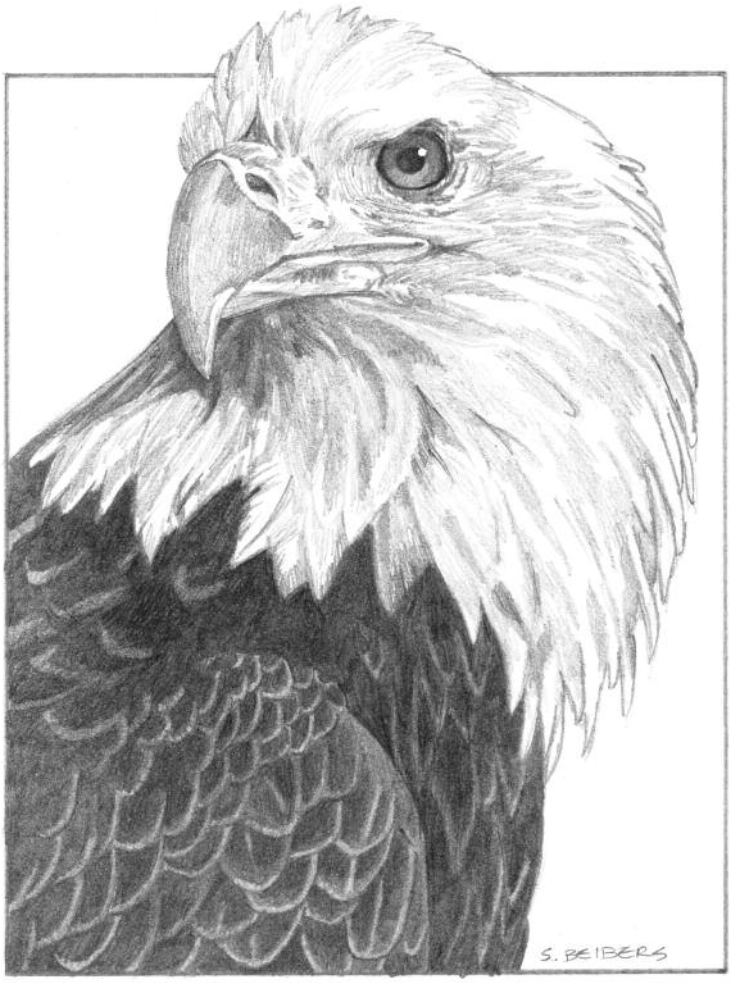
Bald Eagle

Haliaeetus leucocephalus (Linnaeus)
Family Accipitridae
Order Falconiformes

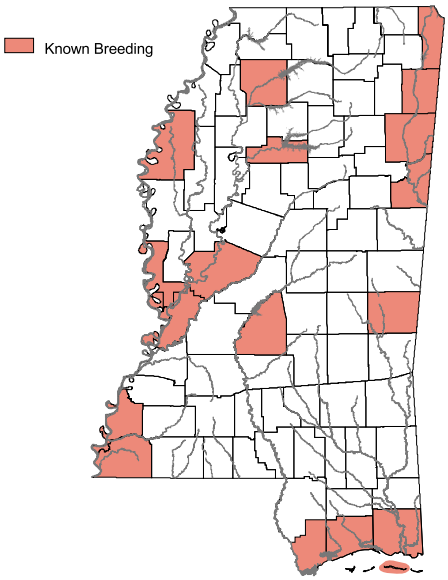


DESCRIPTION:

The Bald Eagle is a large, hawk-like bird 79-94 cm (31-37 in.) in length with a wingspread of 178-229 cm (70-90 in.). Adults are dark brown with a white head, neck, and tail. The bill and feet are yellow. Immature birds are variously marked, not attaining adult plumage until they are about five years old. Juveniles in their first year are uniformly brown while older juveniles have increasing amounts of white giving them a blotchy, mottled appearance. The Bald Eagle's call is a series of high-pitched chitterings.

RANGE:

The Bald Eagle breeds from Alaska and northern and western Canada south to the northern United States, Florida, the Gulf Coast, and Arizona. During the non-nesting season Bald Eagles occur along large lakes and rivers throughout the United States. During the 1999 nesting season at least 25 pairs of Bald Eagles were monitored in Mississippi. Pairs nest along the Gulf Coast and near the Mississippi River in the west-central part of the state.



HABITAT:

The Bald Eagle generally occurs in the vicinity of lakes, rivers, marshes, and along sea coasts. Nesting usually occurs in areas with mature trees near large bodies of water.

LIFE HISTORY AND ECOLOGY:

Bald Eagles generally begin nesting activities in early to mid-September in the southeastern United States. Most nests are placed in the upper 10 m (30 ft.) of a large live pine or bald cypress. A nest is usually placed such that there are branches shielding it from above and a clear view of open water from the top of the nest. The nest itself is cone-shaped and may be 1.8 m (6 ft.) in diameter and 1.8-2.4 m (6-8 ft.) from top to bottom. It is often lined with Spanish moss or grasses. The same nest is often used by a pair of eagles year after year.

The peak of egg-laying in the southeast appears to occur in December, although this may vary from October to March depending upon latitude. Usually one or two, or occasionally three, eggs are laid. Hatching occurs in about 35 days and young birds are able to leave the nest in 10-12 weeks. The parents usually care for the young birds an additional four to six weeks after they have left the nest. Research on Florida and South Carolina Bald Eagles has indicated that these birds move northward for long distances after the nesting season. Several birds from these states have been recorded 1000 miles or more north of where they were hatched.

The bulk of the diet of southeastern Bald Eagles is composed of fish. However, this species also feeds on reptiles, waterfowl, small mammals, and carrion.

BASIS FOR CLASSIFICATION:

Bald Eagle populations declined considerably from early 1950 through the 1970. This decline prompted the listing of this species as endangered by the U.S. Fish and Wildlife Service. Recently however, Bald Eagle nesting activity has increased throughout the Southeast as well as range wide, prompting the U.S. Fish and Wildlife Service in 1994 to reclassify the Bald Eagle as threatened. Surveys of nesting Bald Eagles in the lower 48 states in early 1960 showed only 417 active eagle nests whereas surveys in the early 1990s showed 4,016 active nests. Environmental contaminants were responsible for dramatic declines of this species during 1950-1960. One of the major chemicals involved was DDT and

Indiana Bat

Myotis sodalis Miller and Allen
Family Vespertilionidae
Order Chiroptera

DESCRIPTION:

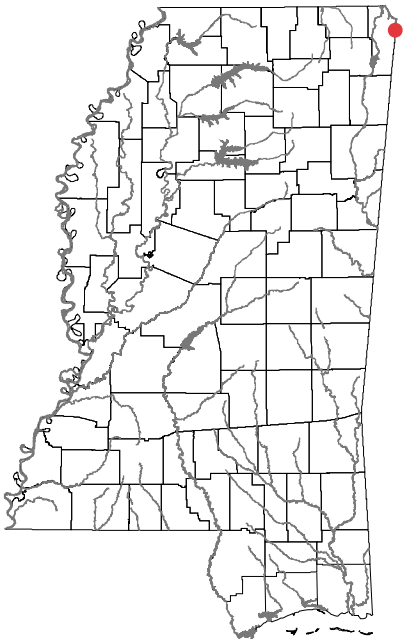
The Indiana bat is a medium-sized North American bat. It has a wingspread of 24 to 26 cm (9.5 to 10.5 in.). The Indiana bat is a dull, dark, chestnut-gray above and paler below. Individual hairs have dark bases and lighter tips. The wing membrane is attached at the base of the toes and the calcar (heel of the foot) is strongly keeled.

RANGE:

The Indiana bat has been reported from Oklahoma north to southern Wisconsin, and Iowa, east to New England, and south to Florida. The main breeding and hibernating area appears to be in the Midwest. This species apparently does not occur regularly in Mississippi and has been collected only from Tishomingo County. This species is not known to breed or hibernate within the state, and its occurrence here probably represents occasional wandering individuals.

HABITAT:

Indiana bats hibernate in limestone caves during the winter, but roost under bridges, and maternity colonies have been found in hollow trees and under bark during the summer. Foraging occurs above the trees along rivers and streams. Creeks are apparently not used if riparian trees have been removed.



LIFE HISTORY AND ECOLOGY:

Indiana bats are migratory, arriving at their hibernation caves in late August to early September. As with gray bats, females mate soon after their arrival at the winter caves and begin hibernation shortly thereafter. Males and juveniles remain active until about mid-October to November. Female Indiana bats generally leave their winter caves from mid to late April. Some males also migrate to the summer range, but others remain in the vicinity of the winter hibernation caves.

There is little information on the activities of female Indiana bats while they are rearing young. The data available indicate that small maternity colonies are formed under the loose bark of living or dead trees. The single young is born in late June or early July and is able to fly in three to four weeks. Indiana bats feed upon insects, especially moths and flies.

BASIS FOR CLASSIFICATION:

The Indiana bat has declined substantially over the last 30 years, and as a result, is listed as endangered by the U.S. Fish and Wildlife Service. This species is selective in its requirements for hibernating caves with 85-90% of the known population of Indiana bats hibernating in only 7 caves. Because of this specificity, hibernating Indiana bats are extremely vulnerable to human disturbance. If bats are provoked at this time, they metabolize stored fats which would have sustained them through the rest of the winter. Thousands of Indiana bats have starved to death in their winter caves because of repeated disturbances, primarily by humans, during hibernation.

In addition to unintentional disturbances by cave explorers, this species has suffered from vandalism, such as collecting or killing bats in the cave or at the cave entrance, commercialization of hibernation caves, destruction of caves by reservoir construction, and from pesticide pollution. The cutting of forests in the vicinity of maternity colonies and along rivers and reservoirs also has impacted this species by reducing available forag-

ing habitat and by making the bats, especially juveniles, more vulnerable to predation.

RECOMMENDATIONS:

The Indiana bat does not appear to breed or hibernate in Mississippi, so there is little that can be done to protect them in this state. However, the frequency with which they migrate through Mississippi needs to be determined, and if any of the few caves in the state turn out to be important temporary roosts, those caves should be protected.

SELECTED REFERENCES:

Barbour, R.W. and W.H. Davis. 1969. Bats of America. University Kentucky Press, Lexington. 286 pp.

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related compounds that inhibited calcium deposition. This resulted in thin, fragile egg shells which were often broken by the adults during normal nesting activities. Recently, lead poisoning from shotgun pellets, which are ingested when eagles feed on dead or wounded waterfowl, has been implicated as a significant cause of mortality.

Shooting has been a major factor in the decline of Bald Eagle populations. From 1961-1981, 25% of documented eagle deaths were from gunshot wounds. Habitat destruction has also impacted Bald Eagle populations. Suburban development, water control projects, and habitat alteration in the vicinity of nest sites have all contributed to the decline of the Bald Eagle.

RECOMMENDATIONS:

Areas along the Mississippi River should be regularly surveyed to locate any new Bald Eagle nests that may be built. Areas with nests should be monitored and protected from development or human disturbance. The use of steel shot for hunting ducks should be continued throughout the state.

Since 1988, there have been two major efforts to augment the state's eagle population through hacking. Hacking is a term used to describe the care and feeding of hatchling eagles in "hack" towers, until they are capable of living on their own. As of 1992 one hundred seven eaglets had been released along the coast and the Tennessee-Tombigbee waterway.

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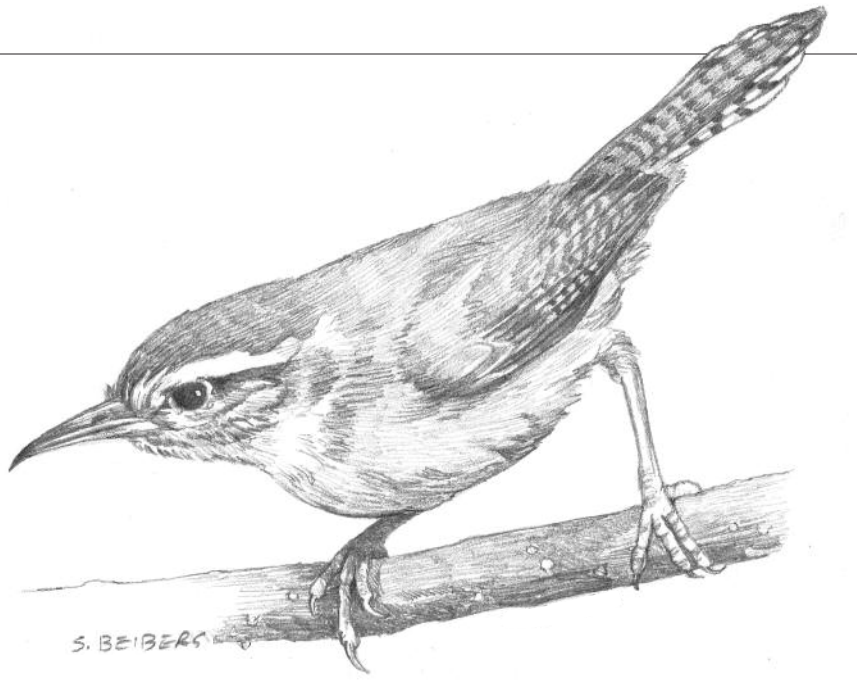
Bewick's Wren

Thryomanes bewickii (Audubon)
Family Troglodytidae
Order Passeriformes

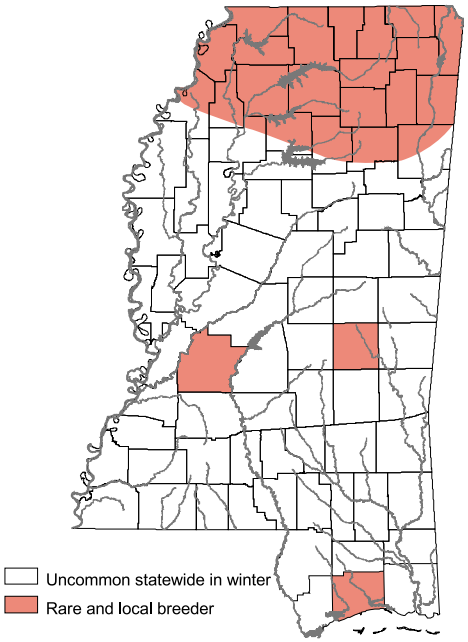


DESCRIPTION:

Bewick's Wren is a small bird 12.5-14 cm (5-5.5 in.) in length. The upper parts of the head, body, and wings are reddish brown and the lower surface is uniformly grayish-white. There is a white stripe above the eye and a dark brown line both in front of and behind the eye. The wings and tail have dark brown bars, and the outer parts of the tail feathers are white. The song of Bewick's Wren has been variously described as a thin, loud "chick, click, for me-e, for you" or "cheep cheep chewe-e-e-e". It also makes a call note described as a harsh, grating "weed-it, weed-it".

RANGE:

Bewick's Wrens breed from southern British Columbia, southwestern Wyoming, southern Ontario, and southwestern Pennsylvania south to the northern parts of the Gulf States and into Mexico. It is a year-round resident in the western parts of its range but migratory in much of the eastern United States, wintering from the lower Ohio River valley south to the Gulf Coast and central Florida. Bewick's Wrens nest in the northern third of Mississippi and winter throughout the entire state.



HABITAT:

Bewick's Wren occurs in and around brush piles, in open woodlands, and in scrubby areas in the eastern United States. It is often found in the vicinity of buildings, especially out-buildings in a state of disrepair.

LIFE HISTORY AND ECOLOGY:

This species builds bulky nests of sticks lined with leaves, grasses and feathers. The nests are built in natural cavities in tree stumps, brush piles, or woodpecker holes, and in artificial ones such as tin cans and baskets, empty barrels, or crevices in stone or brick walls. Breeding occurs between late March and July, and two or even three broods may be raised per year. Usually 5-7 eggs are laid, but clutch size may range from 4-11. The eggs hatch in about 14 days, and the young are able to fly in about two weeks. The young are apparently cared for by the parents for an additional two weeks after they leave the nest. The diet of Bewick's Wren is composed primarily of insects and other invertebrates.

BASIS FOR CLASSIFICATION:

The Bewick's Wren has declined considerably in the eastern part of its range, including Mississippi, over the last 20-30 years. The reasons for this decline are unknown, but may include pesticide poisoning, land use changes, or competition with the house wren (*Troglodytes aedon*). The house wren nests in the same locations and occupies the same habitats as Bewick's Wren, and the two species are apparently intolerant of one another. Destruction or alteration of wintering habitat in the east has also been suggested as a possible factor contributing to the decline of this species.

RECOMMENDATIONS:

A status survey of Bewick's Wren in Mississippi is needed, especially in the northern counties where it nests. Research is also needed to determine exactly why this species has been decreasing in the eastern United States.

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Farrand, J., Jr. (Editor). 1983. The Audubon Society Master Guide to Birding, Vol. 2. Alfred A. Knopf, New York, New York. 398 pp.

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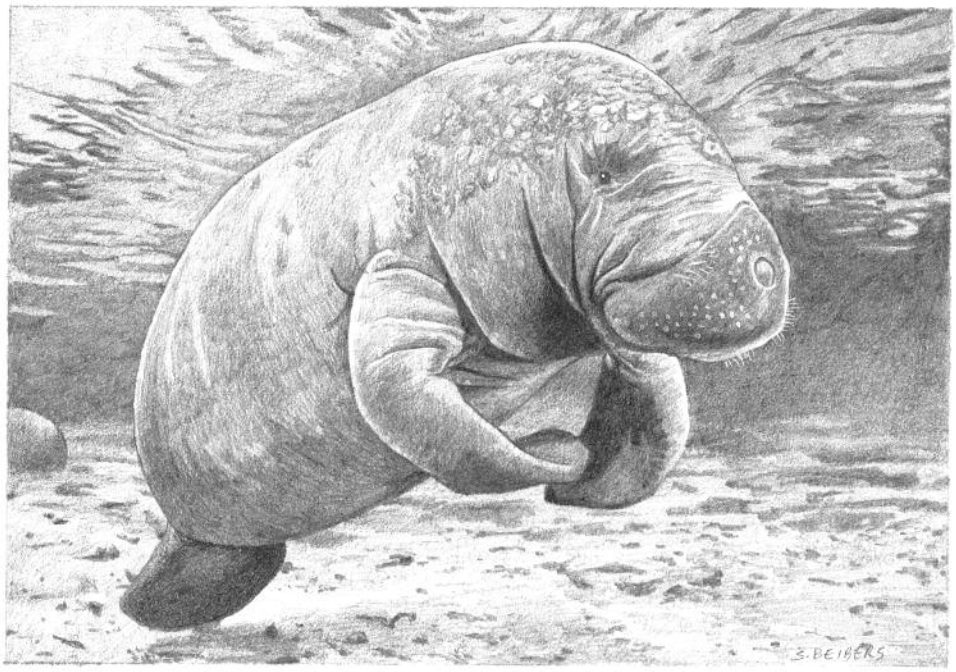
West Indian Manatee

Trichechus manatus Linnaeus
Family Trichechidae
Order Sirenia



DESCRIPTION:

The West Indian manatee is an aquatic mammal which averages 3 m (10 ft.) in length and 450 kg (1000 lbs.) in weight. The skin is thick and slate-gray to brown in color. The front limbs are modified into flippers, and there are no hind limbs. The paddle-shaped tail is flattened horizontally. Manatees are nearly hairless, with only a few colorless hairs scattered over the body and stiff bristles on the upper lip. There are no external ears. Juveniles (calves) are blackish-gray.

RANGE:

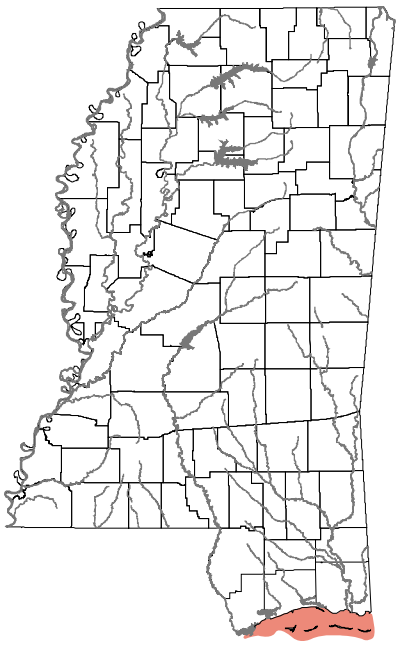
Trichechus manatus occurs in rivers, estuaries, and coastal areas of Florida, southeastern Georgia, and the shores of the Gulf of Mexico, Caribbean Sea, and Atlantic Ocean from Mexico to northern Brazil. One or more individuals have been observed at a number of sites inshore along the Mississippi coast in most years during the past decade. These were all relatively young and were thought to represent wandering individuals.

HABITAT:

Manatees live in both fresh and saltwater throughout their range. These habitats include rivers, bays, estuaries, and similar areas at least 1 m (3.3 ft.) in depth. Occasionally manatees have been observed well away from shore in the Gulf of Mexico. Manatees migrate long distances (850 km) to congregate in warm water wintering areas in the coastal waters of southern Florida and in warm springs and outlets as far north as southeast Georgia. In summer they may migrate as far as coastal Virginia or the Louisiana coast.

LIFE HISTORY AND ECOLOGY:

Manatees apparently breed throughout the year, with birth of usually one (rarely two) young occurring 12 to 14 months after mating. It is thought that females choose secluded backwaters in which to give birth and that most births occur in the spring and early summer. The calves may be over 1 m (3.3 ft.) in length at birth and weigh from 11 to 27 kg (24.3 to 59.5 lbs.). Birth and nursing take place entirely within the water. Calves remain with their mothers for at least one to two years. Females apparently have calves once every two to five years. Manatees may mature when they are 3 to 6 years of age, although one investigator estimated that females mature in 7 to 8 years and males at 9 to 10 years. They may live over 50 years. Usually manatees are solitary, but they frequently form small herds to play or mate. These animals communicate with sounds audible to humans.



The manatee is primarily a plant-eater, although some individuals have been observed to eat fish. Manatees feed on a wide variety of aquatic plants, including submerged plants (those growing entirely under water), floating plants, and emergent plants (those growing in water but with a significant portion of their mass above the surface.) Hydrilla, elodea, eelgrass, coontail, water milfoil, alligator weed, water hyacinth, and seagrasses are all eaten. Manatees may feed about five hours per day.

BASIS FOR CLASSIFICATION:

The West Indian manatee has been decreasing since the arrival of the first Europeans. Current estimates are that about 3200 remain in the United States. As a result, this species is listed as endangered by the U.S. Fish and Wildlife Service. The initial decline of manatee populations resulted from overhunting for food, oil, and hides. At present, the illegal killing of manatees has almost been eliminated, but many individuals are injured or killed from collisions with power boats and barges, or are trapped, crushed, or drowned in automatic flood

control structures and power plant intake pipes. Occasionally manatees are entrapped and drowned in shrimp nets or hoop nets. Manatees are also susceptible to cold temperatures and to habitat disturbance such as destruction of seagrass beds by boating facilities.

RECOMMENDATIONS:

The manatee is an occasional visitor to Mississippi's coasts. If possible, manatees should be photographed when sighted. Recognition of individuals is often possible because of unique scar patterns. The U.S. Fish & Wildlife Service in Florida maintains a database of individual animals (as identified by scar patterns), and their movements. Any manatee found in Mississippi waters would probably not survive winter weather, as this species is prone to respiratory diseases during cold periods. Therefore, any manatees discovered in Mississippi during the winter should be reported to the U.S. Fish & Wildlife Service.

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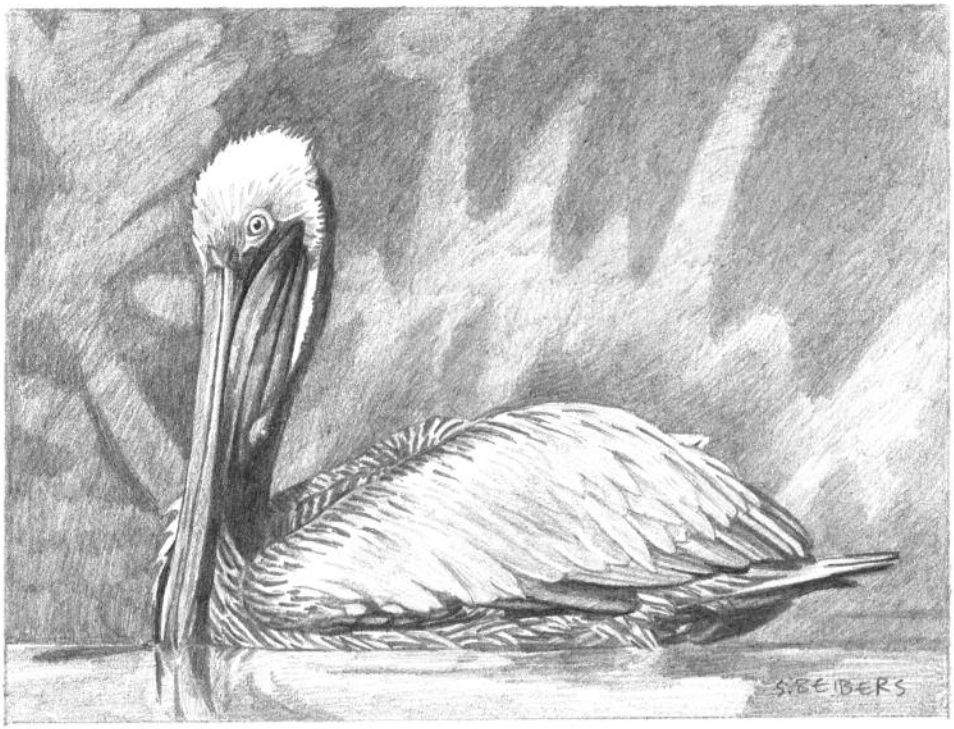
Brown Pelican

Pelecanus occidentalis (Linnaeus)
Family Pelecanidae
Order Pelecaniformes



DESCRIPTION:

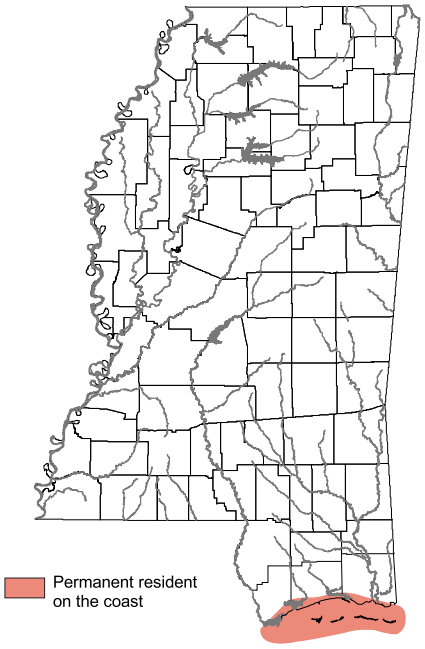
The Brown Pelican is a large, relatively stocky bird 114-137 cm (45-54 in.) in length with a wingspread of 2.5 m (7.5 ft.). Its body is grayish-brown and its belly is dark-brown to black. The non-breeding adult has a white head and neck which sometimes has a yellowish tint. In breeding plumage, the rear of the neck is dark chestnut and there is a yellow patch on the front part of the neck at its base. Juvenile Brown Pelicans are entirely gray-brown with whitish underparts. Brown Pelicans have long, heavy bills with huge throat pouches. The head is drawn back during flight.

RANGE:

The Brown Pelican occurs from North Carolina south to Venezuela on the Atlantic coast and from British Columbia to Chile on the Pacific coast. Brown Pelicans do not nest in Mississippi but are seen fairly regularly along the Gulf Coast and near the barrier islands.

HABITAT:

Brown Pelicans nest most commonly on offshore islands, but have also nested on islands in estuaries. This species feeds in small inlets, in tidal rivers, and along open beaches. They may also congregate near wharves and pilings where they scavenge food from tourists and fishermen. Brown Pelicans may be seen as much as 20-40 miles offshore and may roost on coastal sand bars and mud flats.



LIFE HISTORY AND ECOLOGY:

Brown Pelicans are colonial birds, building nests in groups of 25-250 in low shrubs, trees, or on the ground. Nesting dates in the southeast are from February to June, depending upon latitude. Two or three eggs are normally laid in each clutch and hatching occurs in about 30 days. The young leave the nest when they are 71 to 88 days old. Brown Pelicans begin breeding at four to seven years of age and may live for 20 years.

Brown Pelicans eat fish, with menhaden appearing to be the most commonly eaten species. Pigfish, pinfish, thread herring, crevalle, silversides, and mullet are also common prey items. Brown Pelicans catch fish by plunge-diving, in which they dive from heights of up to 20 m (65 ft.), partially or fully submerge, and capture their prey in their pouches. They may feed both at day and during the night.

BASIS FOR CLASSIFICATION:

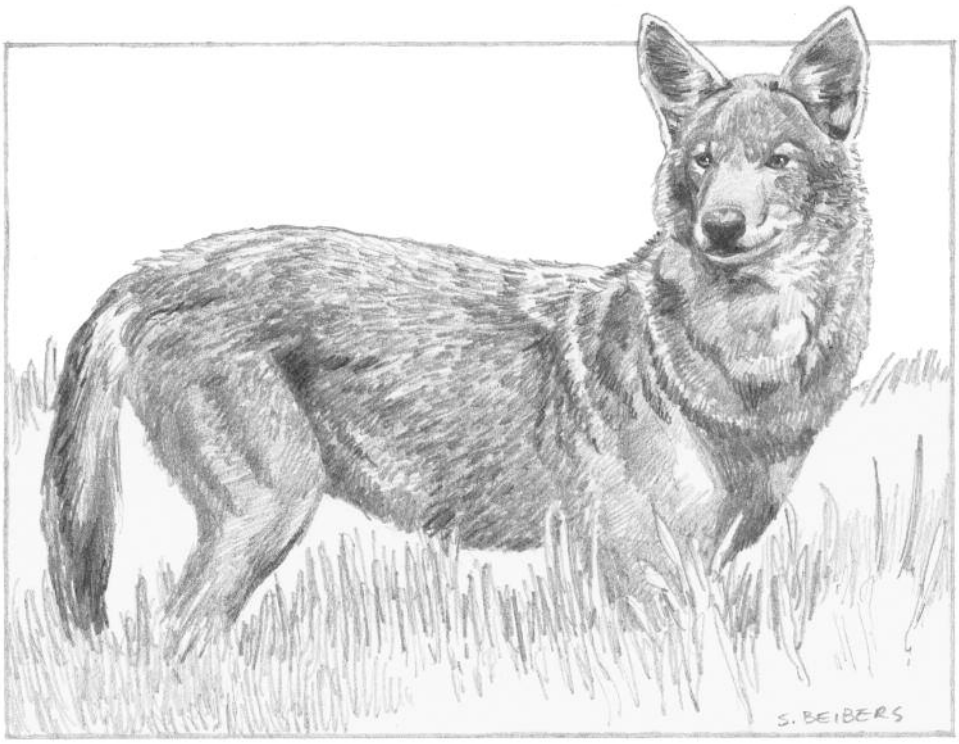
The Brown Pelican is listed as an endangered species by the U.S. Fish and Wildlife Service in Mississippi, Louisiana, Texas, California, Mexico, Central America, and South America. It had disappeared as a breeding species from Louisiana and had severely declined along the Texas coast by early 1960. Populations in other areas were also declining. This was caused by pesticides which acted through direct poisoning of the birds and through interference with its reproductive system. Pelicans acquired these chemicals by eating contaminated fish. These compounds generally inhibit calcium deposition during egg shell formation, resulting in thin- shelled eggs that are easily broken during normal nesting activities. Both endrin and DDT have been implicated in the decline of this species.

Since restrictions were placed on the use of many pesticides, the Brown Pelican has slowly recovered over parts of its range. Populations in the Carolinas, Florida, and Alabama were recently delisted by the U.S. Fish and Wildlife Service because of stable or increasing breeding populations in those states.

Red Wolf

Canis rufus Audubon and Bachman
Family Canidae
Order Carnivora

Extinct in the Wild



DESCRIPTION:

The red wolf is a large, slender canid (member of the dog family), intermediate in size between coyotes and gray wolves. Red wolves are not always red; coloration is highly variable, and animals might be cinnamon, gray, or black. Adults range in total length from 1355-1650 mm (about 5 ft.) and weigh from 16-41 kg (36-90 lbs.); females are slightly smaller than males. Legs of the red wolf might appear longer relative to body size than those of gray wolves, coyotes, and dogs.

RANGE:

Red wolves were the only wolves that evolved entirely in North America. Possibly, red wolves once ranged in suitable habitats throughout the southern United States, from Missouri, Indiana, and Virginia south to Texas and Florida. Three subspecies might have existed, one of which (*Canis rufus gregoryi*) occurred from eastern Texas to eastern Mississippi. *Canis rufus* is extinct in the wild, although some red wolf-coyote hybrids might persist in remote marshes on the Texas-Louisiana coast. A small, closely-monitored red wolf family was temporarily introduced on Horn Island (Gulf Islands National Seashore) in 1989, as part of a five-year endangered species project. There are currently no wolves on Horn Island

LIFE HISTORY AND ECOLOGY:

Few studies of the red wolf were performed when it was still abundant, so little of its natural history is known. Red wolves mate in the winter, and pups are born about 60-63 days later, in April and May. Up to twelve pups can be born in a litter, but average litter size is seven in the wild and five in captivity. Dens are built in hollow logs, culverts, and other hidden areas. Mated pairs usually travel together and both mates take care of the pups. The calls of red wolves and coyotes are very similar.

Evidently red wolves were most common in moist areas with dense plant growth: swamps, marshes, pine forests, and bottomland hardwood forests. Unlike gray wolves, red wolves were not major predators of deer and other large game, but mostly ate rabbits, other smaller animals, and carrion. Rangers in the South disagreed over whether red wolves were serious predators of livestock.

BASIS FOR CLASSIFICATION:

Red wolves declined for several reasons. Human activities—habitat destruction, trapping, and poisoning—were the major causes of mortality. Red wolves are also susceptible to various diseases, including hookworms, heartworms, and distemper. Historically, coyotes did not live in eastern North America. Since about 1930, coyotes have spread into the eastern United States (possibly due to the combination of the elimination of red and gray wolves, and the clearing of vegetation), and they have taken up residence in many areas once inhabited by red wolves. The appearance of red wolf-coyote hybrids, particularly in Texas, seems to have occurred as humans were eradicating red wolves.

In 1967 the U.S. Fish and Wildlife Service listed *Canis rufus* as a Federally Endangered species. As wild populations in Louisiana and Texas continued to dwindle, biologists captured the last few animals that appeared to be "pure" red wolves (that is, not wolf-coyote hybrids) in order to start a captive breeding program. In 1980, the U.S. Fish and Wildlife Service considered the red wolf extinct in the wild.

PROSPECTS:

Red wolves have been reintroduced on Bulls Island (Cape Romain National Wildlife Refuge), South Carolina and Alligator River National Wildlife Refuge, North Carolina. Scientists are learning more about the biology of these unique animals. Hopefully, the captive breeding program, combined with successful reintroductions in native habitat, will save red wolves from extinction, and perhaps one day wild populations will thrive in protected areas.

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RECOMMENDATIONS:

Monitoring Brown Pelican population trends along the Mississippi coast should continue. If nesting is attempted, the area should be monitored and protected.

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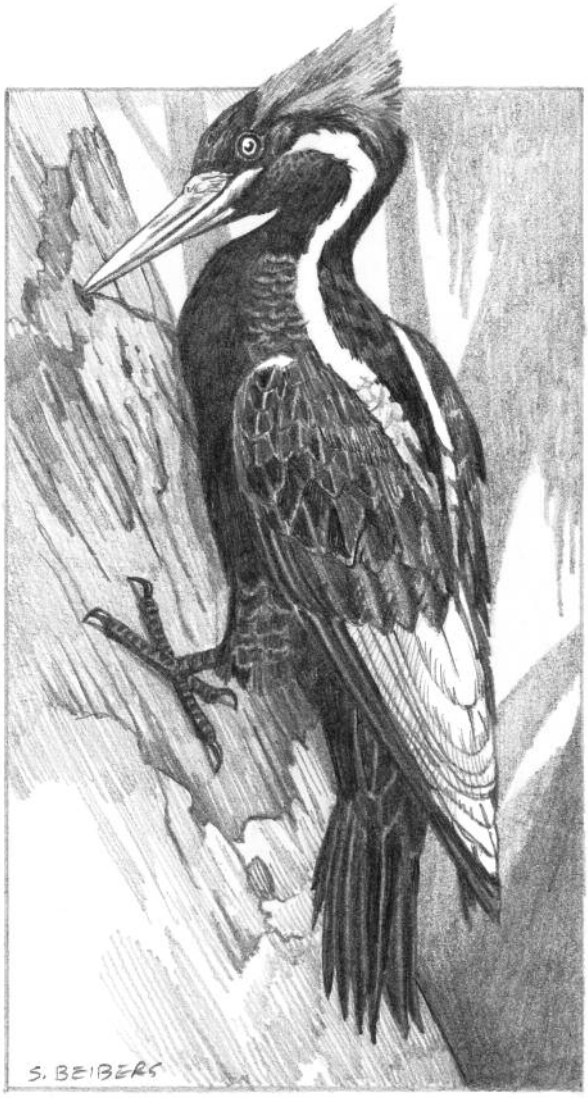
Ivory-billed Woodpecker

Campephilus principalis (Linnaeus)
Family Picidae
Order Piciformes



DESCRIPTION:

The Ivory-billed Woodpecker, commonly referred to as "ivory bill", is 48.5 to 53.5 cm (19-21 in.) long and the largest woodpecker in the United States. Both sexes have a prominent crest on the head which is red in males and black in females. The rest of the head and throat is black and the bill is ivory-white. A white stripe begins on each cheek and continues down the neck onto the back. The two stripes meet in the middle of the back forming a large white saddle which is prominent when the bird is perched. There is a broad white patch on the rear of each wing which narrows toward the tip. There is another white patch on the leading underside of each wing. The other large woodpecker in Mississippi, the Pileated Woodpecker (*Dryocopus pileatus*), has a white chin, no white saddle visible on the back when perched, and a large white patch on the front underside surface of the wings, not on both the front and rear parts of the underside of the wing as in the ivory-bill. Immature Ivory-billed Woodpeckers are a duller black with less white than the adults and lack the red crest. The voice of the ivory-bill has been described as a nasal "kent" or "pait", usually given in a series such as "kent, kent-kent, kent". When an ivory-bill drums (territorial signal made by pounding with the bill on limbs or stubs), it usually strikes the stub or limb only twice, the second immediately following the first and sounding like and echo of it. Other woodpeckers drum by striking stubs or limbs several times in rapid succession producing a rolling sound.

RANGE:

The Ivory-billed Woodpecker formerly occurred in the Coastal Plain from southeastern North Carolina south to southern Florida, west to eastern Texas, and north and west in the major river valleys to central Alabama, southern Illinois, southeastern Missouri, and southeastern Oklahoma. It also occurred in Cuba. There have been no verified sightings of this species since 1950 and it probably is extinct in North America. The ivory-bill was recently re-discovered in Cuba but also appears to be close to extinction.

There are records of Ivory-billed Woodpeckers in Mississippi from Monroe, Clay, Jackson, Harrison, Hancock, Bolivar, and Sharkey counties. Some of these are sight records and others represent collected specimens. Most are from late 1800's. The Ivory-billed Woodpecker was last reported in Mississippi from swamps along the Pascagoula River in Jackson County in 1921.

HABITAT:

The Ivory-billed Woodpecker is (or was) an inhabitant of old growth forests in swamps and bottomlands along large rivers throughout most of its range. These sorts of habitats in Mississippi were dominated by forests of sweetgum, Nuttall oak, and green ash, with lesser numbers of various species of oaks, elms, hackberry, water hickory, and pecan. In Florida, it also occurred in large cypress swamps not associated with rivers.

LIFE HISTORY AND ECOLOGY:

Ivory-billed Woodpeckers excavated cavities for nests in both the dead parts of living and dead hardwood trees usually 12 to 18 m (40-60 ft.) above the ground. The cavity was about 48 cm (19 in.) deep and had an entrance hole about 11.5 cm wide by 13.4 cm long (4.5 by 5.25 in.). Nesting occurred from January to May when one to four eggs were laid. The eggs hatched in about 20 days, and the young remained in the nest about five weeks. The young were cared for by the parents for two to three months after they learned to fly. Ivory-billed Woodpeckers apparently ranged over a relatively wide area while looking for food. They were estimated to occur at a density of one pair per six square miles of habitat, a much lower density than is characteristic of most other species of woodpecker. Ivory-bills fed primarily upon the larvae of wood-boring beetles, but also ate fruits and acorns when they were available. The beetles were captured by scaling the bark from recently dead trees. Most feeding occurred on old, large sweetgums, Nuttalls oaks, and hackberry.

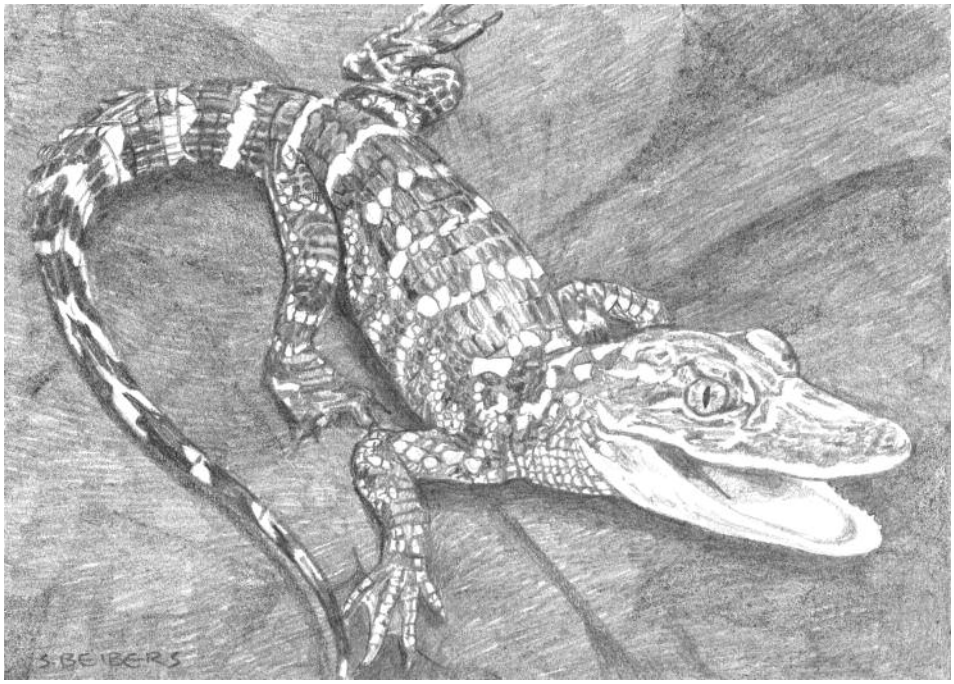
BASIS FOR CLASSIFICATION:

The Ivory-billed Woodpecker is listed as an endangered species by the U.S. Fish and Wildlife Service, but may actually be

American Alligator

Alligator mississippiensis (Daudin)
Family Alligatoridae
Order Crocodylia

Delisted Species



DESCRIPTION:

The alligator is a large aquatic reptile which may grow to more than 4 m (13 ft.) in length and more than 150 kg (330 lbs.) in weight. The adult is heavily scaled and is dark gray or black. Juveniles are patterned with black and yellow. The tail is laterally compressed and topped with high, pointed scales.

RANGE:

The alligator historically occurred in the Coastal Plain from North Carolina south through most of Florida, west to central Texas, and north to southeastern Oklahoma and southwestern Arkansas. The historical distribution of alligators in Mississippi is not precisely known, but is assumed to have included the southern two-thirds of the state. It was introduced into several counties north of this area in the early 1970's. At present, the alligator is known to occur in at least 55 Mississippi counties, with the largest population along the Gulf Coast.

HABITAT:

Alligators inhabit coastal salt marshes, sluggish rivers and streams, lakes, oxbows, and ponds. Large lakes with marshy borders, and fresh and brackish marshes appear to be the best habitat for alligators.

LIFE HISTORY AND ECOLOGY:

The reproductive season for alligators begins in March or April, (depending upon local weather conditions) and involves bellowing by both sexes. Mating takes place in the water, usually at night. Females build mound-shaped nests composed of mud and organic debris in May or June. The nest is typically about two meters (6.5 ft.) in diameter and one meter (3.2 ft.) high and is located fairly close to water. The female deposits between 30 and 70 eggs in a cavity in the center of the nest mound. The cavity is covered with debris after the eggs are laid. Most females remain in the vicinity of the nest mound and will defend it against intruders. The eggs hatch in August or September. Hatchlings are about 23 cm (9 in.) long and make high-pitched yelping noises, which may induce the female to help open the nest. The young may remain together for the rest of the summer, and may remain in the vicinity of the nest site for several months thereafter. The young grow approximately 30 cm (11.8 in.) per year under optimal conditions.

Adult alligators often dig dens along the edges of rivers and lakes, or in marshes. These dens are tunnels with underwater entrances, and serve as shelters against adverse weather conditions and as retreats.

Alligators eat a wide variety of prey items, and the diet is determined in part by the size of the alligator. Small alligators eat crayfish, small frogs, insects, and mollusks. Larger individuals feed on wading birds, snakes, turtles, fish, and small mammals. Very large adults may kill and eat deer, hogs, or cattle.

BASIS FOR CLASSIFICATION:

The alligator was almost hunted to extinction for its hide beginning in the mid to late 1800's and continuing until the mid-1960's. Millions of acres of alligator habitat were also destroyed by development. Alligators had declined so much that the species was listed as endangered by the U.S. Fish and Wildlife Service in 1967. Federal and state protection has enabled alligator populations to stabilize or increase throughout its range to the extent that the species was reclassified as threatened due to similarity of appearance in 1987. This is a formal recognition by the U.S. Fish and Wildlife Service that the alligator is biologically secure throughout its range.

RECOMMENDATIONS:

Presently the alligator is considered to be a game species in Mississippi, but one without a designated open hunting season. The Department of Wildlife, Fisheries and Parks has issued detailed regulations on the management and captive breeding of this reptile. It is anticipated that a limited harvest season for the alligator will be initiated in the future.

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extinct in the United States. It apparently declined because the cutting of old-growth timber destroyed its food supply. The original bottomland forests within the range of the ivory-bill contained many old trees that were gradually and constantly weakening and dying, resulting in an abundance of standing dead trunks and dead limbs and branches. The abundance of dead wood in these forests meant that the populations of wood-boring beetle larvae upon which ivory-bills fed were also locally abundant. These particular beetle larvae are most common in wood that has been dead about two years. Wood that has been dead longer than two or three years is no longer suitable for them to live in. The major food source for the ivory-bill was therefore present for only a short period of time on any particular tree, and was widely scattered throughout the old growth forests. Logging these forests removed most of the large, old trees upon which the ivory-bill depended for food. The woodlands that replaced the original forests were composed of healthy, young trees. Little newly dead wood was available for the beetle larvae, and thus little food was available for the ivory-bill.

RECOMMENDATIONS:

A survey was funded by the U.S. Fish and Wildlife Service to determine whether the Ivory-billed Woodpecker still exists in the United States. The survey did not yield evidence of their continued existence in Mississippi. If ivory-bills are ever found in Mississippi, steps should be taken immediately to preserve the habitat and to conduct intensive surveys to determine the numbers of individuals in the area.

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