American Alligator

The American alligator, *Alligator mississippiensis*, occurs throughout most of the southeastern United States. Alligators were once hunted primarily to produce leather products, which became fashionable in the late 1800s. Untold numbers of animals were killed during decades of unregulated hunting. Even after limited protection was put into effect in some areas in the mid-1900s, animals continued to be poached. As a result, alligator numbers were dramatically reduced and in some regions it was feared that local populations would go extinct. Federal legislation in the 1970s and 1980s, including the Endangered Species Act of 1973 and amendments to the Lacey Act in 1981, ensured the alligator's protection, and eventually its comeback. Today alligator numbers are estimated in the millions and they are common throughout most of their historic range.

The story of the American alligator, both tragedy and success, is similar to that of many of its close kin, the crocodiles. Worldwide there are 23 species of crocodilians; most were also hunted for food and skins, and by 1971 all crocodilians were endangered, threatened, or declining in numbers. Habitat destruction in many countries exacerbated the declines. But a combination of legislation, effective law enforcement, dedicated conservationists, and innovative sustainable yield harvesting programs reversed the decline for many species, despite continuing habitat loss. Since the 1970s 16 of the 23 crocodilian species have increased in population size. However, some species, such as the Chinese alligator, remain highly endangered in the wild.

The current federal protection status of the alligator remains as "threatened due to similarity of appearance" to endangered crocodiles (and products made from their skin). In some states alligators may be harvested using controlled hunts. Alligators are also bred and raised in captivity for the production of meat and skins, but most of the half million farmed alligators are hatched from eggs collected from the wild. The products from these tightly regulated wild harvests and alligator farms are now sold legally, providing important funds for the conservation of this species and its habitat.

Alligator Ecology

Habitat

Alligators live in fresh and brackish water habitats but will venture into salt water. Alligators inhabit swamps, tidal marshes, creeks and rivers, canals, ponds, lakes, and reservoirs. In some areas alligators do something that only a few species, such as humans and beavers, do—create wetland habitat. In marsh, sawgrass, and floodplain habitats gators sometimes create "gator holes," which provide a refuge for many other animals during dry periods. Alligators create the holes, which can be the size of a small backyard pool, using their snout, forefeet, and tail. Alligators are called a "keystone species" due to the strong influence they have on other species.

Alligator in a gator hole (photo by T.C. Glenn, SREL).

The habitat preferences of alligators depend somewhat on the size, age, and sex of the gator. Large adult male alligators generally prefer deep, open water during the entire active season. Large females also are found in open water during the breeding season, but then move to marshes and lake edges during the nesting season and after young have hatched. Smaller alligators (4-5 ft/1.2-1.5 m or less) typically occur in wetlands with relatively dense vegetation, which provides both a hiding place and good habitat for prey items.

Reproduction, nesting, & hatching

The time it takes for alligators to become mature, and thus able to reproduce, varies from population to population. Reproductive maturity in alligators is primarily related to body size, so the age at which an individual can breed depends on how fast it grows throughout its life. Both males and females tend to mature at about 6 feet (1.8 m) in length, but the size at which an alligator may successfully breed is also dependent upon social interactions among members of the population. The courtship and breeding season for alligators is generally from April through May, although there are some reports of autumn mating. Breeding occurs in open water. Body posturing, snout rubbing, water slapping, and bellowing are all part of the courtship process.

After mating, females construct shoreline mound nests made from vegetation, leaf litter, and mud. In June and July females lay 20-60 eggs in the nest and cover them with additional vegetation and debris. The temperature of the nest during the middle third of the incubation period determines the sex of the hatchlings. Constant incubation temperatures below 87.8°F (31°C) during this period produce only females, temperatures between 90.5 and 91.4°F (32.5-33°C) produce only males, and temperatures above 93.2°F (34°C) produce a high proportion of females. It generally takes a little more than two months for the embryos to develop and for hatchlings to emerge from the eggs. Eggs in alligator nests are often preyed upon by raccoons, opossums, skunks, pigs, and other nest predators. For example, in Florida it is considered "normal" if only 50% of the eggs escape predation and hatch. At hatching time the babies make a call that attracts the female. She uncovers the hatchlings in the nest by digging with her front feet and snout and may carry hatchlings in her mouth from the nest to the water's edge.

Hatchling gator hitching a ride on Mom.

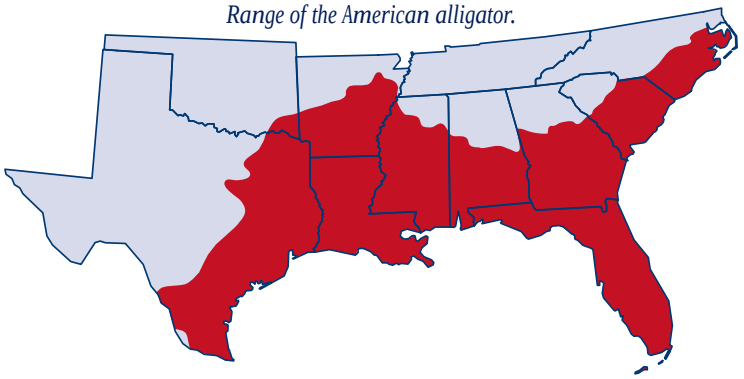
Most reptile species do very little "parenting," especially after the eggs have hatched. In contrast, female alligators will protect babies at all stages: eggs in the nest, hatchlings, and babies up to three years old. Hatchling gators generally stay together in a "pod" for 1-3 years, and make a call (presumably a distress call) to which females respond. Nonetheless, many hatchlings are preyed upon by a wide variety of animals, including large wading birds, snakes, bass, and even bullfrogs.

Feeding habits

The diet of alligators is quite varied, and is dependent upon the size of the gator. All gators, regardless of size, are primarily carnivores, although some plant material may incidentally be ingested. Hatchlings and young alligators eat insects, crayfish, snails and other invertebrates, small fish, and amphibians. At 5-6 ft long (1.5-1.8 m) alligators begin to feed more on large fish, turtles, snakes, waterfowl and wading birds, and small mammals. In addition to keen eyesight, hundreds of specialized pressure sensors on the snouts of gators help them locate prey in the water; these bumps are sensitive enough to detect ripples from a single drop of water. Because alligators are "cold blooded" their feeding activity is dependent on water temperature—gators will usually stop feeding if water temperatures are below approximately 70°F (21°C). Thus, alligators generally feed from late March/early April through October.

Growth & body size

Growth rates in young alligators vary from 4-14" (10-36 cm) per year, depending on



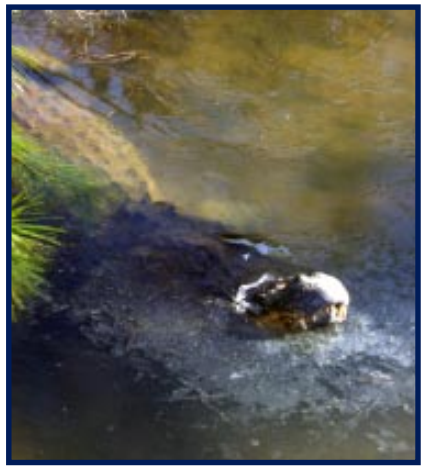
Range of the American alligator.

temperature, food resources of the habitat, and the animal's sex, size, and age. For example, juvenile alligators in some South Carolina populations average 7.5" (19 cm) of growth per year, while those in Louisiana may grow 12" (30.5 cm) per year. Because maturity is related to body size, this means that alligators in Louisiana may reach maturity earlier than those in South Carolina. As alligators get larger their growth rate slows, and once an alligator becomes reproductively mature its growth rate drops dramatically. Male alligators grow faster and larger than females. Females can attain approximately 9 ft (2.7 m) in length and 200+ lbs (91 kg). Males can grow to 13+ ft (4 m) and 500+ lbs (227 kg). The record alligator, taken on Marsh Island, Louisiana, was reported to be 19'2" long.

Interesting behaviors

For an animal with a maximum brain mass of less than ½ ounce (~10.5 grams), alligators demonstrate some interesting behaviors.

- In the temperate portions of their range, alligators construct dens (a cave-like structure in the bank of the waterway) where they remain dormant during winter months. Gators also exhibit "icing behavior" in response to extreme cold. Before a pond freezes, an adult will move to shallow water, place its nostrils (on the tip of the snout) out of the water, and let its snout become frozen into the ice. Hatchlings and juveniles may not be as successful at this, which may explain (in part) the limits to the range of the alligator.
- Humans can hear a wide variety of the sounds that alligators use to communicate, from coughing and hissing to distress yelps, hatching calls, and bellowing. In addition, alligators are one of many species of animals that communicate using sounds that we cannot hear. Humans hear sound in the range of 20-20,000 Hz (hertz; cycles per second), and some alligator vocalizations are below 20 Hz, in the infrasound range. Low frequency sound can travel very long distances.



An alligator exhibiting "icing" behavoir.

- Researchers who have used radiotransmitters to track alligators have learned that they have large home range sizes, with males using a larger area than females. Males move the most and have their largest home ranges during the breeding season, and females move the least and have their smallest ranges during the nesting season. Alligator home range size depends on many factors, including the location and type of habitat, but an adult male alligator may have a home range of more than 1,000 acres.
- Unique among reptiles, crocodilians have been observed bringing food to their young.

Alligator Research at SREL

The University of Georgia's Savannah River Ecology Laboratory (SREL) began conducting ecological studies on the newly created Savannah River Site (SRS) on the upper Coastal Plain of South Carolina in 1951. Studies of the American alligator on the SRS have increased our knowledge about its basic ecology and provided insights on the effects of industrial facilities on alligators. SREL's ongoing research, in collaboration with researchers from around the world, continues to lead to new discoveries about alligators and other crocodilians.

The SREL program of alligator research began in the late 1960s when nuclear production reactors were periodically discharging heated effluents into cooling reservoirs and streams on the SRS. The heated waters created unique gradients of water temperature never before experienced by alligators. As one example of a "thermal effect," alligators that inhabited the warm portions of the 2,840 acre (1,150 hectare) Par Pond reservoir were noted to bask less frequently, especially during cooler months, than gators in normal-temperature water. Research over the next decade documented the seasonal use of heated waters, particularly by larger males that moved into the warm waters and remained active during the winter months of the year. The prolonged active season of these larger male alligators seemed to put them out of