

General Description

The American alligator resembles a large lizard, but reaches a much larger size, has a thicker body and tail, and is strongly associated with wetlands. Adults range in color from black or dark gray to dark olive. Juveniles are born with bright yellow bands that encircle their bodies. These bands gradually fade over time.

Alligators can live 40 or more years in the wild (Wilkinson et al. 2016), but captive animals have been documented to live more than 70 years (Weigl 2014). Upper size limits for males, which grow larger than females, are typically 13-14 feet (396 - 427 cm) in length, while females reach 9-10 feet (274 – 305 cm) (Woodward et al. 1995; Brunell et al. 2013; Brunell et al. 2015). Adult males can reach weights more than 500 pounds (227 kg), while females do not usually exceed 200 pounds (91 kg). Per Palmer and Braswell (1995), the largest male alligator ever examined in North Carolina was 12.5 feet long (382 cm total length) and weighed 475 pounds (215.5 kg), while the largest female was just over 8 feet (246 cm total length, weight unknown). External sexual characters are minimal for the alligator, but mature males do develop a swollen area under the tail around the vent during the breeding season.



Taxonomy

There are currently 24 described species of crocodylians in the world (IUCNCSG 2017). The genus *Alligator* includes the only two extant species that can endure temperate climates, the American Alligator (*Alligator mississippiensis*) and the Chinese Alligator (*Alligator sinensis*). *A. mississippiensis* (see Table 1) has existed in North America for at least 7 million years (Whiting 2016). Fossils of prehistoric crocodylians and their ancestors dating back to 231 MYA have been discovered in North Carolina, which contains the northernmost portion of the American alligator's present-day range.

Kingdom	Animalia
Phylum	Chordata
Class	Reptilia
Order	Crocodylia
Family	Alligatoridae
Genus	Alligator
Species	mississippiensis
Table 1. Taxonomy of Alligators.	

Prehistoric Presence of Crocodylians and Their Ancestors in North Carolina

Following the Permian-Triassic extinction event that took place approximately 252 million years ago (MYA), a newly evolved group of animals referred to as archosaurs became the dominant land vertebrates. Modern crocodylians and their extinct relatives belong to a group of archosaurs known as crocodylomorphs. *Carnufex carolinensis*, one of the oldest and earliest diverging crocodylomorphs described to date, was discovered in 2003 from the Carnian Pekin Formation (~231 MYA) in Chatham County, North Carolina (Zanno et al. 2015). While small-bodied crocodylomorphs had previously been unearthed by paleontologists from late Triassic excavations (Drymala and Zanno 2016, Sues et al. 2003), *Carnufex* was much more formidable at 3 meters long and boasting a skull length of 50 cm. This find reveals that crocodylomorphs filled top predator roles in the equatorial regions of Pangea prior to the global dominance of dinosaurs in the early Jurassic period.

Descendants of the crocodylomorphs that had survived the Triassic-Jurassic extinction event, alligatoroids were the first group of crocodylians to evolve by the Campanian period of the late Cretaceous epoch (~72-83 MYA). Fossils of *Deinosuchus rugosus*, one of the earliest-known alligatoroids, were uncovered at Phoebus Landing and the Black Creek Formation site in Bladen and Sampson counties of North Carolina around the time of the Civil War (Schwimmer 2002). Considerably larger than any living crocodylians, *D. rugosus* would have typically measured 8 meters long and weighed in at approximately 2.3 tons.

Era / System / Period	Series / Epoch	Stage / Age	numerical age (Ma)	
Cenozoic	Quaternary	Holocene	present	
		Pleistocene	Upper	0.0117
			Middle	0.126
	Neogene	Pliocene	Calabrian	0.781
			Gelasian	1.80
			Zanclean	2.58
		Miocene	Piacenzian	3.60
			Messinian	5.33
			Tortonian	7.24
			Serravallian	11.62
			Langhian	13.82
			Burdigalian	15.97
			Aquitanian	20.44
	Paleogene	Oligocene	Chattian	23.03
			Rupelian	28.1
		Eocene	Priabonian	33.9
			Bartonian	38.0
			Lutetian	41.3
		Paleocene	Ypresian	47.8
			Thanetian	56
Selandian			59	
Danian			61	
				66
Mesozoic	Cretaceous	Maastrichtian	66	
		Upper	Campanian	72
			Santonian	83
			Coniacian	86
		Lower	Turonian	89
			Cenomanian	93
			Albian	100
			Aptian	113
			Barremian	125
	Hauterivian		129	
	Jurassic	Upper	Valanginian	132
			Berriasian	139
			Tithonian	145
		Middle	Kimmeridgian	152
			Oxfordian	157
			Callovian	163
			Bathonian	166
			Bajocian	168
Aalenian			170	
Lower	Toarcian	174		
	Pliensbachian	182		
	Sinemurian	190		
Triassic	Upper	Hettangian	199	
		Rhaetian	201	
		Norian	208	
	Middle	Carnian	227	
		Ladinian	237	
		Anisian	242	
Lower	Olenekian	247		
	Induan	251		
		252		



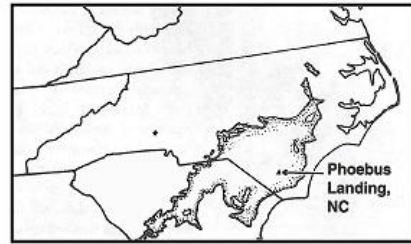
● *Alligator mississippiensis*

Above: American alligator (*Alligator mississippiensis*).



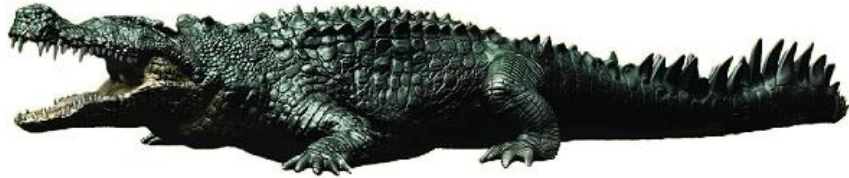
Left: Skull comparison of American alligator (smaller) to *Deinosuchus rugosus*.

Below: Location of Phoebus Landing archaeological site, Bladen County.



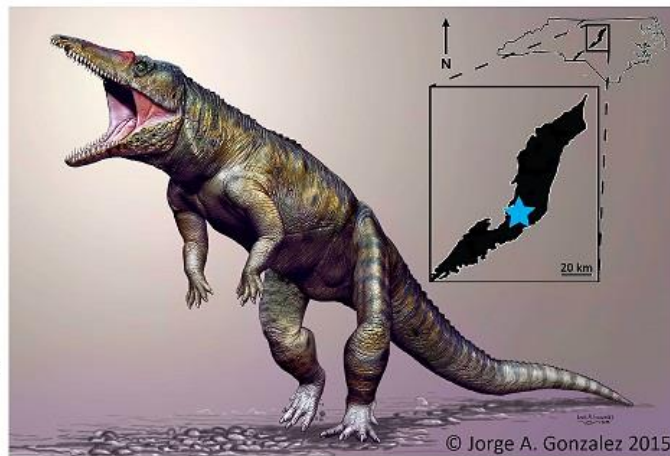
● Cretaceous-Paleogene extinction event

● † *Deinosuchus rugosus*



Above: *Deinosuchus rugosus*.

Below: *Carnufex carolinensis* and location of Pekin Formation archaeological site, Chatham County.



● Triassic-Jurassic extinction event

● † *Carnufex carolinensis*

● Permian-Triassic extinction event

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Life History and Ecology

Reproduction

Sexual maturity in alligators is directly related to body size. Both genders tend to be capable of reproduction at 6 feet (183 cm) in length. Males in North Carolina are thought to take 14-16 years to reach sexual maturity, while females require 18-19 years (Doerr and Hair 1983); this is longer than the amount of time required for alligators from more southern locales. For example, in South Carolina, researchers have estimated that male alligators reach sexual maturity at about 11.6 years of age, while females require approximately 15.8 years (Wilkinson et al. 2016; see Table 2). Due to slower growth rates, juvenile alligators in North Carolina require more time to outgrow a vulnerability to predation (Doerr and Hair 1983). Immature alligators are much less susceptible to predators upon reaching 3 feet (91 cm) in length.

Reported Length of Time (in Years) Required for American Alligators to Reach Sexual Maturity				
State	Males	Females	# of Alligators	Source
Louisiana	6 - 10	8 - 13	745	Rootes et al. (1991)
Florida	8.9 – 12.4		N/A	Fujisaki et al. (2007)
Texas	10		48	Saalfeld et al. (2008)
South Carolina	11.6	15.8	185	Wilkinson et al. (2016)
North Carolina	14 - 16	18 - 19	87	Doerr and Hair (1983)

Table 2. Reported Length of Time (in Years) Required for American Alligators to Reach Sexual Maturity

Alligators typically mate from mid-May to early-July in North Carolina (Klause 1984), after which females construct mound nests of vegetation and mud on the shore. They lay an average of 35 eggs, then cover them with additional vegetation to properly incubate for 9-12 weeks until hatching. The sex of young alligators is not determined at conception; rather, it is determined by nest temperatures during the thermosensitive period (TSP) of incubation. Lang and Andrews (1994) reported that the TSP occurs from stages 21 to 24 of embryonic development (in the middle third of the incubation period), during which nests with high or low temperatures produce females, while males are predominantly produced at intermediate temperatures (approximately 32-34°C or 90-93°F). Findings from a more recent study have expanded our understanding of this mechanism and demonstrated that the TSP begins by stage 15, and potentially earlier (McCoy et al. 2015).

After 60-80 days of incubation, the young hatch out at about 9 inches (23 cm) long. While hatching they instinctively call out to attract the mother, who scratches open the nest mound and carries the hatchlings in her mouth to the edge of the water (Hunt 1987). Females have also been

observed gently picking up eggs and rolling them in their mouth to aid in the hatching process (Kushlan and Simon 1981). Unlike most reptiles, female alligators protect their offspring from predators throughout incubation and into their early years of life. Juveniles generally congregate together in pods for the first few years, during which the mother will respond to distress calls made by the young when threatened (Hunt and Watanabe 1982, Kushlan 1973).

Ecology

During their first years of life, alligators eat primarily snails, frogs, crayfish, insects, and other small invertebrates. Larger alligators may eat smaller alligators, turtles, snakes, fish, waterbirds, beavers, raccoons, and otters. Given the opportunity, alligators can prey upon dogs, cats, and other small domestic animals, such as goats and pigs. Alligators in North Carolina grow more slowly than alligators to the south because our water temperatures do not stimulate feeding for as long a period each year.

Alligators create small wetlands using their snouts, feet, and tail to excavate “gator holes” the size of small backyard pools. Because these holes provide critical pockets of aquatic habitat to many other species during periods of drought, the alligator is considered a keystone species within the coastal communities they inhabit (Palmer and Mazzotti 2004).

A mutualistic relationship between alligators and long-legged wading birds has been documented by researchers (Nell et al. 2016). Large colonies of these birds choose to nest high up in trees near alligators because the presence of alligators is a strong deterrent for mammalian nest predators, such as raccoons and opossums. In return for their protection, the resident alligators have an opportunity to scavenge nestlings that fall from the nests, which can be a substantial food source for alligators. Because the birds forage in other locations, this relationship also facilitates the transfer of nutrients from other ecosystems to these wetlands (Nell and Frederick 2015).

As an apex predator, alligators play an important role in ecosystems by regulating mesopredator populations. In salt marsh food webs, for example, predation on blue crabs by alligators results in the increased survival of a keystone marsh grazer (the Periwinkle snail, *Littoraria irrorata*) and a *Spartina* cordgrass-facilitating mutualist (the Atlantic ribbed mussel, *Geukensia demissa*) (Nifong and Silliman 2013).

Behavior

Alligators usually remain in the same area where they were hatched for two to three years before establishing their own territories. Hagan (1982) reported that annual home ranges of alligators at Lake Ellis-Simon (Craven County, NC) ranged from 7.4 acres (3.0 ha) to 3,555 acres (1,439 ha) and that male home ranges were significantly larger than those of females.

Although adult alligators are usually solitary, they are known to congregate during the breeding season. Both males and females vocalize. The male calls with a loud, throaty bellow and may hiss and inflate to impress a mate. Females bellow and grunt, too, but less loudly.

Genetics

Genetic studies of alligators in Louisiana, Alabama, South Carolina, and Florida have revealed geographic patterns of genetic variation and population differentiation (Glenn et al., 1998; Davis et al., 2000). The results of a study in Texas indicated limited levels of gene flow between and among both coastal and inland populations of alligators (Ryberg et al. 2002). These findings suggest that alligators in North Carolina could exhibit genetic differentiation between geographically isolated metapopulations.

Distribution and Population Status

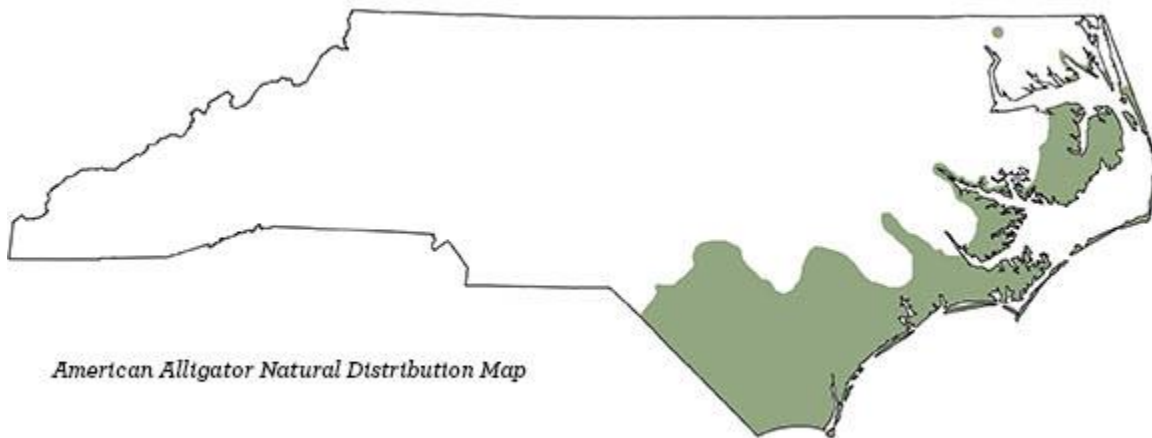
American Alligator Distribution

The range of the alligator includes areas from the southern tip of Texas through the northern coastal areas of North Carolina.

Alligator Distribution and Abundance in North Carolina

In North Carolina, the alligator occurs just north of Albemarle Sound, south along the eastern Coastal Plain, and west as far as Robeson County (Palmer and Braswell 1995; Gardner et al. 2016). The aquatic habitats that alligators occupy vary widely across their range in North Carolina and from season to season. Alligators tend to prefer fresh to brackish waters, although they can tolerate higher levels of salinity for short periods of time. They inhabit swamps, creeks, rivers, tidal marshes, canals, ponds, lakes, and reservoirs.

A recent study of alligators in North Carolina (Gardner et al. 2016) showed that alligator populations are likely stable or slightly increasing and their current distribution appears to be relatively consistent with the results of a study conducted 30 years ago (O'Brien and Doerr 1986). Although these results did not indicate a population decline, the researchers noted that alligators occur in patchy distributions and very low densities across much of their North Carolina range. Alligators were more abundant closer to the coastline, further south, and in locations that limit access by people and provide more protection for alligators.



Historic and Ongoing Conservation Efforts

Chiefly driven by the commercial market for alligator skin products, alligator populations were greatly diminished by the mid-twentieth century because of unregulated harvest throughout their range. Under the 1966 Endangered Species Preservation Act, the very first list of endangered species compiled in 1967 ([32 FR 4001](#)) included the American Alligator. This act authorized the use of federal funds for the acquisition of lands inhabited by listed species, but take (“to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any

such conduct”) of these species was not prohibited by federal law until Congress passed the Endangered Species Act of 1973. In 1969, Congress amended The Lacey Act to include reptiles, perhaps the most important legislation related to the recovery of American Alligator. The Lacey Act prohibits interstate commerce of illegally obtained wildlife. In 1973, governments of 80 countries signed a treaty—the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The international export of alligator skins was banned by CITES in 1975. Owing to these and state-level protections, alligator populations rebounded rapidly in many parts of their range. This recovery prompted the U.S. Fish and Wildlife Service to reclassify alligators range-wide in 1987 ([52 FR 21059](#)) as Threatened Due to Similarity of Appearance to the American Crocodile (*Crocodylus acutus*), which was federally listed as Endangered in 1979 ([44 FR 75074](#)) and down-listed to Threatened in 2007 ([72 FR 13027](#)). Under this classification, the U.S. Fish and Wildlife Service continues to regulate interstate trade of alligators today. Illegal trade of alligators or alligator parts is generally thought to seldom occur.

With the rare exception of individuals taken by WRC employees or permitted Wildlife Damage Control Agents (e.g., if an alligator poses a threat to public safety), there was no legal harvest of alligators in North Carolina prior to the first regulated hunting season in 2018. Although relatively uncommon, relocation of alligators occurs far more often than euthanization when “problem” alligators are found in locations that could be a safety hazard to humans or their pets. In many cases, private citizens are provided with information about alligators and encouraged to allow the alligator to move on its own, which typically occurs within a few hours to a couple of weeks.

Alligators are usually quite shy and secretive in nature. If fed by people, they can lose their natural fear of humans and learn to associate people with an easy meal. In 2007, the North Carolina General Assembly passed a law, [GS § 113 291.11](#), that prohibits the feeding of alligators. The NC Wildlife Resource Commission has published a document titled [Coexist with Alligators](#) that highlights how important it is for people to refrain from feeding alligators.

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