

American Alligator *Alligator mississippiensis*

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Common Names: American alligator, gator

Range: Southeastern United States of America



Figure 1. Distribution of *Alligator mississippiensis*.

Conservation Overview

CITES: Appendix II

2018 IUCN Red List: Lower Risk/Least Concern (last assessed in October 2018) (Elsey *et al.* 2019).

CSG Action Plan:

- Availability of survey data: Good
- Need for wild population recovery: Low
- Potential for sustainable management: Highest

Principal threats: Habitat destruction, environmental contamination, undesirable water management, human-alligator conflict

Ecology and Natural History

Alligator mississippiensis is one of the best-known species in terms of ecology (see Joanen and McNease 1987; Mazzotti and Brandt 1994). Maximum adult sizes rarely exceed 4.5 m total length (TL) for males and 3.0 m TL for females (Woodward *et al.* 1995; Brunell *et al.* 2015).

Distributed throughout the southeastern United States, American alligators inhabit freshwater swamps, lakes, marshes and streams. They also inhabit brackish water habitats and, although they have a low tolerance for salt water,

they will use marine environments for feeding (Rosenblatt and Heithaus 2011).

The name “alligator” presumably derives from a corruption of the Spanish word “el lagarto”. The work of McIlhenny (1935) in Louisiana was among the first to document some of the remarkable aspects of the natural history of this species. Studies on alligator social behaviour have demonstrated a remarkable degree of complexity in the species’ ability to communicate vocally (through bellows and headslaps), and visually (through a complex series of body postures) (Garrick *et al.* 1978; Vliet 1989, 2001).



Figure 2. Female *Alligator mississippiensis* defending nest. Photograph: Ruth M. Elsey.

Females become sexually mature at 1.8-2.1 m TL and 10-16 years of age, depending on climate and habitat productivity (Joanen and McNease 1989; Woodward *et al.* 1992; Wilkinson *et al.* 2016). Courtship and mating take place during the spring (April-May) warming period. Nest construction and egg-laying occur in June and early July (Joanen and McNease 1989; Woodward *et al.* 1989).

Females construct a mound nest of vegetation or peat and lay an average of 30-50 eggs, depending on age and size of the female and habitat quality. Incubation of eggs takes 63-84 days, depending on temperature (Lang and Andrews 1994), and young hatch in late August or early September. Females typically open the nest to help the young emerge, and will remain near the pod of hatchlings for up to 9 months and sometimes longer. In some cases, hatchlings overwinter with the female in her den, a burrow that they excavate in thick vegetation or mud.

In some habitats, alligators use dens as refuges during droughts or winter freezes for protection against severe weather conditions. In marsh ecosystems, alligators create and maintain small ponds, called “alligator holes”, which play a vital ecological role by providing both wetter and drier habitats for alligators and other organisms (Campbell and Mazzotti 2004). Alligators are one of the most temperate species of crocodylians, and are known to survive short spells of below-freezing weather by resting in shallow water with their snouts at the surface, thus keeping a breathing hole open in the surrounding ice (Brisbin *et al.* 1982).



Figure 3. *Alligator mississippiensis* nest, with attendant female (at left in water), in a Louisiana marsh. Photograph: Ruth M. Elsey.

Conservation and Status

The *A. mississippiensis* population is secure in its historical range, and there is evidence that alligators are expanding their range northward in Arkansas and Oklahoma (Watt *et al.* 2002; Patton *et al.* 2010), but not in North Carolina (Gardner *et al.* 2016). The main threats to alligators are the loss of habitat to expanding agriculture and residential development, nutrient and chemical pollution (Woodward *et al.* 2011), saltwater intrusion and flooding, and water diversion (Mazzotti *et al.* 2009). Several hurricanes (Katrina and Rita in 2005 and Gustav and Ike in 2008) had short-term negative effects on alligators in coastal Louisiana and Texas, but this resilient species rapidly recovered to normal population distribution (Elsey *et al.* 2006, 2008).

The American alligator is the outstanding example of the application of sustainable use for the successful conservation of a crocodylian species. Although heavily exploited since the 1800s, and classified as endangered in the early 1960s, populations responded well to U.S. and state laws enacted during the early 1970s to prohibit illegal trade in alligator skins. Subsequent implementation of management programs in states throughout the alligator’s range have further enhanced population recovery. Extensive surveys of alligator populations have been undertaken throughout the species’ range. Annual monitoring of numerous localities is conducted as part of sustainable use programs in most range states. Overall, alligator populations are quite healthy. Owing to increasing alligator populations and expanding human

populations, programs to control alligators that pose a threat to people or domestic animals (termed “nuisance” alligators) are an integral part of alligator management programs. In some states, near the periphery of the alligator’s distribution, alligator populations are less dense and they are completely protected. The current total wild population is estimated to be 3-4 million non-hatchling *A. mississippiensis*.

Sustainable harvest management programs have been operating in Louisiana, Florida and Texas for many years. More recently, South Carolina, Georgia, Alabama, Mississippi and Arkansas have implemented sustainable harvest programs for larger alligators. Louisiana, Florida and Texas allow the collection of wild eggs for captive rearing and harvest (ranching). Farming and ranching are now being carried out on a large scale, particularly in Louisiana and Florida. Stocks in over 100 commercial farms and ranches throughout the country are high, with over 932,000 alligators on farms in Louisiana alone in 2016. Captive breeding (farming) produces about 45,000 hatchlings annually. Commercial production of skins is highly regulated with a coordinated system of permits, licences, periodic stock inventories, ranch inspections, and rigorous tagging and export permit requirements.



Figure 4. Hatchling *Alligator mississippiensis*. Photograph: Grahame Webb.

Louisiana: Utilization is primarily in the form of egg collection for ranches and a managed hunt that utilizes seasonal habitat segregation of female alligators into less accessible parts of the range to focus the hunt on males (65-75% of the harvest; Elsey *et al.* 1994, 2004). The wild harvest generates 30,000-35,000 skins annually. Hunting quotas are controlled by allocating a number of tags to each licensed hunter, based on the area and quality of alligator habitat and population estimates based on aerial nest surveys. Egg collection from private and state-owned lands has typically provided 350,000-500,000 eggs annually to ranches in recent years; although ideal habitat conditions led to ranching of over 616,000 eggs in 2016. Ten percent of the animals commercially ranched (~1.2 m TL) are required to be returned to the wild. Skin production from ranches has ranged from 250,000-300,000 per year in recent years.

Florida: The Florida program includes farming, hunting and nuisance alligator control, as well as egg and hatchling

harvests for ranching. Controlled hunting and egg collection on both private and public lands are based on harvest allocations generated from annual spotlight surveys and nest counts for each area (David *et al.* 1996; Dutton *et al.* 2002). Long-term studies on harvested wetlands demonstrate that alligator populations remain stable when up to 6% of alligators >1.8 m TL are harvested annually (Woodward *et al.* 1992) or up to 50% of located nests are collected for ranching (Rice *et al.* 1999). Harvest quotas based on annual monitoring of population density is an integral part of the program. Annual production of skins in Florida is approximately 20,000 from wild alligators and 30,000 from farming/ranching. In recent years, 50,000-100,000 eggs and hatchlings have been transferred to farms in other range states for rearing and harvest.

Other states: Texas allows wild harvest of up to 2000 larger alligators per year, and egg collection for ranching, which result in an average annual production of about 15,000 skins. South Carolina's program allows controlled hunting on private lands (Rhodes 1996, 2002) and public waters. Mississippi, Georgia, Alabama and Arkansas have also conducted successful regulated hunts in recent years.

In most range states, nuisance alligator control is achieved by licensed trappers who, acting under the direction of state wildlife agencies, respond to public complaints of nuisance alligators (Woodward and David 1994). Nuisance alligators are captured or trapped, and in most instances killed and their skin and meat sold to defray costs. These programs have converted an expensive animal control program into a mostly self-financed public service that provides increased safety to the public who live or recreate in alligator habitat.

Sustainable use of alligators in the USA generates more than \$US100 million dollars annually at the product level, providing a substantial incentive for the public to retain habitat and live with alligators. Fees from the regulatory system provide funding for management, regulation, enforcement and research programs on alligators.



Figure 5. Extensive research in Louisiana and Florida has contributed to *Alligator mississippiensis* being one of the best-known of the world crocodilians. Photograph: Phillip Trosclair III.

Priority Projects

Moderate priority

- 1. Investigations on the effects of water management in the Everglades ecosystem:** The construction of a network of canals in the greater Everglades ecosystem of Florida during the early part of the 1900s altered hydrological patterns and the long-term productivity of alligators in that ecosystem. Alligator ecology investigations, as part of the Comprehensive Everglades Restoration Plan, have been conducted since the 1990s and are still underway to measure the long-term effects of hydrological restoration of this ecosystem (Mazzotti *et al.* 2009).
- 2. Research on human dimensions in alligator conservation:** Alligators present a *bona fide* safety threat to humans and their domestic animals. State alligator management programs have been challenged in recent year with trying to maintain public safety while keeping alligator populations at levels that conserve the species and allow sustainable harvests for commercial and recreational purposes. Research into approaches to optimize the ecological, aesthetic, and economic values of alligators while maintaining public safety is needed.
- 3. Investigations on population biology:** The presence of healthy alligator populations, and the availability of institutional and financial resources have led to numerous investigations of alligator biology over the years. Although the American alligator is the most thoroughly studied of all crocodilians, we still know relatively little about its population dynamics and behaviour in the wild. A better understanding of the population ecology of this species would not only benefit the management of alligators but other large crocodilians as well. These investigations are facilitated and financed by the presence of management programs such as cropping and ranching, and are currently underway in several states. For example, a recent long-term study on growth and reproductive lifespan documented female alligators can nest for up to 46 years, and that alligators commonly live to 50 and can possibly live over 70 years (Wilkinson *et al.* 2016).
- 4. Research on husbandry techniques:** Because of the extensive commercial ranching and farming industry in the USA, the American alligator is a prime candidate for research on captive husbandry. Captive breeding, incubation and rearing techniques need to be improved to increase the efficiency of the industry. Extensive research on these topics is currently underway, particularly in Louisiana (Reigh and Williams 2016) and Florida.
- 5. Research on the international market dynamics of alligator skin prices:** The economic stability of state alligator management programs is largely dependent on revenues generated from the sale of skins and meat from harvested alligators. Low skin prices over the past several years have strained alligator farming, wild harvest, and nuisance control enterprises, jeopardizing the ability of



Figure 6. *Alligator mississippiensis*. Photograph: J. Patrick Delaney.

states to maintain alligator management and conservation programs at optimum levels. A better understanding of alligator skin production chains, as well as supply and demand dynamics will help both government and private participants in alligator management understand and adapt to changing economic conditions.



Figure 5. Adult male *Alligator mississippiensis*. Photograph: Grahame Webb.

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