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February 12, 2004

Species Conservation Guidelines

South Florida

American Crocodile

The Species Conservation Guidelines for the American crocodile (*Crocodylus acutus*) provides a tool to assist the user in determining if their project, *i.e.*, a Federal permit, a Federal construction project, or other such action, may adversely affect American crocodiles. Here we describe what actions might have a detrimental impact on the American crocodile and how these effects can be avoided or minimized.

Life History

The ecology of the American crocodile in south Florida is summarized in Service (1999). It inhabits coastal habitats of extreme south Florida, the Caribbean, Mexico, Central America, and northern South America. While the American crocodile population is small it appears to be stable and limited by climate more than habitat (Kushlan 1988). Crocodiles nest on land and make use of extensive aquatic habitats in our area. Nesting season is from March to September. A general activity pattern for the American crocodile is found in Figure 1.

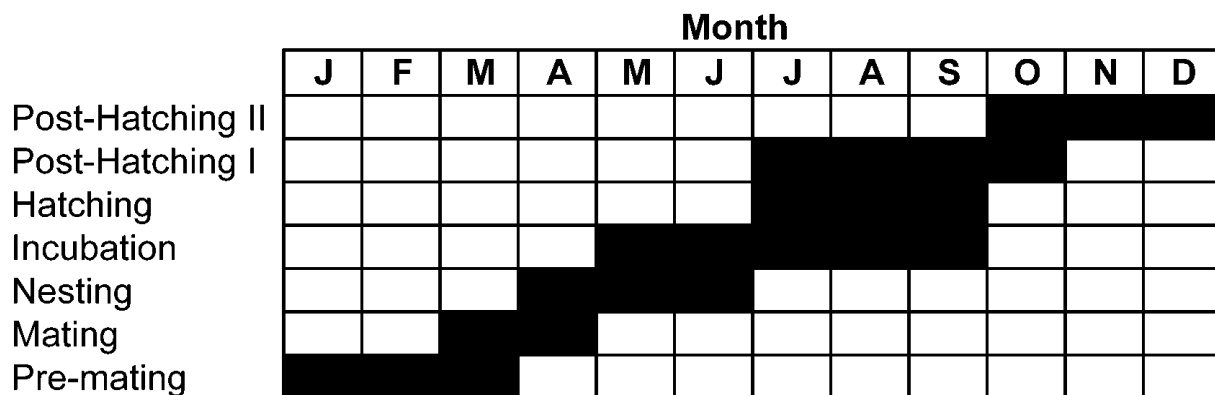


Figure 1. General activity periods of the American crocodile after Wilcox and Mazzotti (1991).

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Habitat

The American crocodile is found in mangrove swamps and along low-energy mangrove-lined bays, creeks, and inland swamps (Kushlan and Mazzotti 1989). During the non-nesting season, they are found primarily in the fresh and brackish water inland swamps, creeks, and bays, retreating further into the back country in fall and winter. The high use of inland waters suggests crocodiles prefer less saline waters, using sheltered areas such as undercut banks and mangrove snags and roots that are protected from wind and wave action. Natural nesting habitat includes sites with well drained sandy shorelines or raised marl creek banks adjacent to deep water (Ogden 1978). Crocodiles also nest on elevated man-made structures such as canal berms and other places where fill has been introduced. Many nest sites are used recurrently (Moler 1992).

Critical Habitat

Critical habitat for the American crocodile has been designated (50 CRF 17.95). The area encompasses the easternmost tip of Turkey Point, Miami Dade County to Elliott Key then south along the keys to Long Key then northwest to Cape Sable (Figure 2, see GIS layers). Except for the shoreline from U.S.1 at Manatee Bay to the Turkey Point power plant and parts of the keys from Key Largo to Long Key most of the critical habitat is protected by conservation areas.

Distribution

Historically, American crocodiles occurred at least as far north on the Florida east coast as Lake Worth, Palm Beach County (Ogden 1978b), to Tampa Bay on the west coast (Kushlan and Mazzotti 1989), and as far south as Key West (Allen and Neill 1952, Neill 1971). The current distribution of the American crocodile is limited to extreme South Florida, including coastal areas of Miami-Dade, Monroe, Collier, and Lee counties (Figure 2). In Biscayne Bay, crocodiles have been observed as far north as Crandon Park, Bill Baggs Cape Florida State Recreation Area, Snapper Creek, and Chapman Field Park (Service 1999). Along Florida's southwest coast, several small groups and individual crocodiles have been documented from Sanibel Island, Lee County, south to Collier Seminole State Park, Collier County. There are also records in the Florida Keys from Key Largo, Matecumbe Keys, Bahia Honda, Big Pine Key, Little Pine Key, Howe Key, and Stock Island (Ogden 1978b), though no nesting is reported from this area (Moler 1992). The distribution of crocodiles during the non-nesting season may vary considerably among years since adult crocodiles can disperse great distances. However, the majority of crocodiles are present in the vicinity of core nesting areas, located near Biscayne and Florida Bays (Kushlan and Mazzotti 1989). Encounters with the American crocodile are most common within the consultation area delineated in Figure 2.

The SLOPES flowchart in Figure 3 can help you determine the impact of your project on American crocodiles. Check the consultation area map in Figure 2. If your project falls outside

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the consultation area then no effect to the American crocodile is anticipated. If needed, written concurrence from the Service can be obtained. If, by chance, you encounter an American crocodile on your site outside the consultation area then appropriate protective measures should still be implemented (see below).

If the project is inside the consultation area then check if suitable habitat is present. Suitable habitats for the American crocodile are mangrove swamps and low energy mangrove lined bays, creeks, and inland swamps near the coast. Elevated banks should be present for nesting. If no suitable habitat is present then no effect is anticipated and written concurrence from the Service obtained, if needed.

Determination

If suitable habitat is present a survey of emergent areas along the shore should be carried out and observations summarized in a biological assessment. See the SLOPES Introduction for details on how to prepare a biological assessment. Look for American crocodile signs such as sunning individuals, exposed slides up onto the banks, tail drags, footprints, and nests. We recommend that a person experienced with crocodiles perform the survey. If American crocodiles are known on site or are assumed to be on site (option b) then you should proceed with implementing protective measures listed below.

[If American crocodiles are found then what should be recommend?

Single non-breeding individual, several non-breeding individuals, breeding individuals]

If no American crocodiles or nests are found then the project is not likely to adversely affect the species and concurrence can be requested from the Service. Mangrove shores have many beneficial qualities as such the Service encourages maintenance of this habitat on site if possible or to minimize disturbance.

If suitable habitat is present formal consultation is necessary. Early contact and discussion with the Service will facilitate the completion of the project. A biological assessment of the project impacts including crocodile survey should be forwarded the South Florida Field Office to start the formal consultation process.

Anthropogenic changes in the amount and timing of freshwater flow into the critical habitat area may have an impact on the American crocodile. All projects that might alter hydrology in this area should be evaluated as to their effect on the American crocodile.

[What are we going to do if suitable habitat is present but no crocodiles? What if crocodiles are present?]

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Conservation Measures

Below are measures that you might incorporate into your project to minimize impacts on the American crocodile.

Maintain suitable habitat intact and protect through conservation easement. If modification of habitat is necessary, limit footprint size and improve existing habitat through removal of exotic species and restore and maintain native vegetation through time.

Create nest sites where the lack of natural nest sites is limiting.

Protect American crocodiles from vehicular mortalities by posting caution signs in areas of known crossings. Install fencing or culverts to allow road crossing without interact with vehicles. Where road crossings are frequent under road crossings (box culverts) are recommended.

Where crocodiles are known to nest the following measures can help reduce impacts.
[Protective Measures at Turkey Point Power Plant (from Wilcox and Mazzotti 1991)]

- 1) Minimize vehicular traffic (particularly heavy equipment) from March through September (mating to post hatching) during the day. Minimize all vehicular activity at night during all times of the year. Vehicular activity at night may prevent the establishment of nests by discouraging crossings, may result in the abandonment of nests, or may result in the death of hatchling crocodiles dispersing.
- 2) Schedule routine road maintenance or construction from October to February and limit activity to daylight hours.
- 3) If road crossing sites are known, do not block with fill or erect any impassable barriers. Also do not leave construction materials or equipment on crossing sites at night during any time of the year.
- 4) At know nesting sites mark and post a 100-m (328-ft) buffer around the nest to reduce intrusions onto the nest site. Maintenance activity (dredging, clearing, burning, berm dressing, etc.) should be limited to within 300 m (984 ft) of these sites during the nesting season. Prior to any maintenance activity, berms should be surveyed for any signs of crocodile nesting activity (crawls, scrapes and digging). Control of non-native vegetation should be part of a maintenance program. Hack and squirt herbicide applications should be the preferred method of control. Planting of cleared berms with low maintenance native vegetation should be encouraged. Seasonal restrictions for disruptive recreational uses such as powerboating, jet skis, camping, etc., may be appropriate near crocodile nesting locations.

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- 5) As a last resort remove and relocate crocodiles from developed areas to assure continued protection. This requires a monitoring component to determine the success of the translocation. The Florida Game and Fresh Water Fish Commission, through a cooperative agreement with the FWS, currently addresses human crocodile conflicts on a case by case basis (GFC 1988) (Appendix A). At sites with nesting hatchling relocation will be determined on a case by case basis.

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GIS Layers

Consultation Area	Crocodile_ca
Critical habitat	Crocodile_ch

Appendices

GFC. 1988. Guidelines for resolving crocodile complaints.