

Recovery Plan for American Crocodile (*Crocodylus acutus*)
<https://www.fws.gov/verobeach/MSRPPDFs/Croc.pdf>

Original Approved: May 18, 1999
Original Prepared by: South Florida Ecological Services Field Office

DRAFT AMENDMENT 1

We have identified best available information that indicates the need to amend recovery criteria for the American crocodile (*Crocodylus acutus*) since the recovery plan was completed. In this proposed modification, we synthesize the adequacy of the existing recovery criteria, show amended recovery criteria, and provide the rationale supporting the proposed recovery plan modification, as well as new recovery actions needed to protect the American crocodile. The proposed modification is shown as an addendum that supplements the South Florida Multi-Species Recovery Plan (MSRP; U.S. Fish and Wildlife Service [USFWS] 1999), specifically the sections entitled Recovery Criteria on page 4-521, Species-level Recovery Actions on pages 4-521 through 4-524 and Habitat-level Recovery Actions on pages 4-524 through 4-527 of the MSRP. Recovery plans are non-regulatory documents that provide guidance on how best to help recover species.

For
U.S. Fish and Wildlife Service
Region 4
Atlanta, Georgia

March 2019

METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT

To prepare this amendment, staff from the U.S. Fish and Wildlife Service's (Service) Offices in Vero Beach and Fort Lauderdale, Florida reviewed the most recent recovery plan for the American crocodile as listed above. Next, to obtain the most current new information on the status and biology of, and threats to, the American crocodile (in association with this document and our concurrent species status assessment and five-year review for the species), the Service sent emails to those known to have knowledge of the species including researchers, state, Federal or county natural resource and wildlife managers, non-governmental agencies and other persons with expertise and/or interest in the species. An electronic mail address and call-in phone number with an automated answering system were also established to receive information on the American crocodile. To date, the Service has not received any new information relating to the American crocodile from these sources. To create the delisting criteria presented in this amendment, the Service relied heavily on performance measures for American crocodile growth and survival provided by the Southern Coastal Systems Restoration Regional Team of the Restoration, Coordination, and Verification team associated with the Comprehensive Everglades Restoration Plan (RECOVER 2015).

ADEQUACY OF RECOVERY CRITERIA

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, “objective, measurable criteria, which when met, would result in a determination...that the species be removed from the list.” Legal challenges to recovery plans (see *Fund for Animals v. Babbitt*, 903 F. Supp. 96 (D.D.C. 1995)) and a Government Accountability Audit (GAO 2006) have also affirmed the need to frame recovery criteria in terms of threats assessed under the five listing factors.

Recovery Criteria

The recovery plan only provided reclassification (*i.e.*, downlisting) criteria, found on page 4-521 at <https://www.fws.gov/verobeach/MSRPPDFs/Croc.pdf>. Since the species was reclassified from endangered to threatened (see Synthesis below), the downlisting criteria are no longer applicable.

Synthesis

The MSRP described habitat alteration (Factor A) and human disturbances (Factor E) as the primary threats to the species and highlighted efforts undertaken to ameliorate these threats. In the MSRP, a minimum of 60 breeding females was deemed necessary before reclassification could be considered. Because the population appeared stable, all of the threats described in the original listing had been eliminated or reduced, and the number of breeding females consistently exceeded 60 per year (based on the observation of at least 60 crocodile nests per year and 1 nest per breeding female crocodile per year), the American crocodile was reclassified from endangered to threatened in 2007 (71 FR 23027).

Information obtained after the reclassification of the American crocodile indicates that nesting within the berms of the Cooling Canal System (CCS) of Florida Power and Light’s (FPL) Turkey Point Power Plant (an important nesting site for crocodiles) decreased significantly starting in 2015. Nesting at this site ranged from 8 to 11 nests per year from 2015 through 2017 (nesting data from 2018 is not currently available), compared to 15 to 27 nests per year from 2008 through 2014. The decrease in nesting observed within the berms of the CCS can likely be attributed to decreased water quality in the CCS, including higher than normal levels of salinity, temperature, turbidity, and an outbreak of cyanobacteria beginning in 2012. Decreased water quality also resulted in a significant reduction in body condition of crocodiles, and the total number of crocodiles observed in and around the CCS (Squires et al. 2016). It is unclear what led to the decrease in water quality at the CCS. However, it may have resulted in part from improper management and disposal of berm vegetation into the waters of CCS coupled with drought conditions that occurred in the area. FPL has developed, and is currently implementing, several measures to improve the water quality conditions in the CCS, including pumping fresh and lower salinity water into the CCS. Currently, water quality at the CCS seems to be improving.

The assessment of threats, suggested recovery actions, and life history information pertaining to the American crocodile included in the MSRP remains largely applicable. However, in addition

to reduction in nesting due to poor water quality at FPL's Turkey Point Power Plant CCS, new potential threats to the American crocodile have emerged, including impacts from sea level rise associated with climate change (Factor E) and the recent establishment of non-native exotic reptiles, the Burmese python (*Python bivittatus*) and the Argentine black and white tegu (*Salvator merianae* = *Tupinambis merianae*) (Factor E), in South Florida. A brief discussion of these threats is provided below in the section entitled "Additional Site Specific Recovery Actions."

AMENDED RECOVERY CRITERIA

Recovery criteria serve as objective, measurable guidelines to assist in determining when an endangered species has recovered to the point that the protections afforded by the Act are no longer necessary and the American crocodile may be delisted. Delisting is the removal of a species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from an endangered species to a threatened species. The term "endangered species" means any species (species, sub-species, or Distinct Population Segment) in danger of extinction throughout all or a significant portion of its range. The term "threatened species" means any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Revisions to the Lists, including delisting or downlisting a species, must reflect determinations made in accordance with sections 4(a)(1) and 4(b) of the Act. Section 4(a)(1) requires that the Secretary determine whether a species is an endangered species or threatened species (or not) because of threats to the species. Section 4(b) of the Act requires that the determination be made "solely on the basis of the best scientific and commercial data available." Thus, while recovery plans provide important guidance to the Service, States, and other partners on methods of minimizing threats to listed species and measurable objectives to measure progress towards recovery, they are guidance and not regulatory documents.

Recovery criteria should help indicate when we would anticipate that an analysis of the species' status under section 4(a)(1) would result in a determination that the species is no longer an endangered species or threatened species. A decision to revise the status of or remove a species from the Federal Lists of Endangered and Threatened Wildlife and Plants, however, is ultimately based on an analysis of the best scientific and commercial data then available, regardless of whether that information differs from the recovery plan, that triggers rulemaking. When changing the status of a species, we first propose the action in the *Federal Register* to seek public comment and peer review, followed by a final decision announced in the *Federal Register*.

Below, we provide delisting criteria for the American crocodile.

Delisting Recovery Criteria

The American crocodile will be considered for delisting when:

1. At least three of the five nesting areas defined below exhibit a stable or increasing trend, evidenced by natural recruitment and multiple age classes.
 - a) FPL's Turkey Point Power Plant Site
 - b) North Key Largo including the Crocodile Lake National Wildlife Refuge
 - c) Northeast Florida Bay in Everglades National Park (ENP)
 - d) Flamingo/Cape Sable in ENP
 - e) Other (nesting occurring North of the Turkey Point Power Plant Site, Florida Keys South of North Key Largo, and the West Coast of Florida from North of Highland Beach to Sanibel Island).
2. Threats have been addressed and/or managed to the extent that the species will remain viable into the foreseeable future. (Factor A-E)
3. When, in addition to the above criteria, it can be demonstrated that despite sea level rise and other environmental influences, sufficient suitable habitat remains for the American crocodile to remain viable for the foreseeable future. (Factor A and E)

Justification

1. Populations that exhibit a stable or increasing trend and natural recruitment demonstrate that the population is secure and will be resilient to stochastic events. For the American crocodile, it is believed that at least three nesting areas exhibiting these traits are necessary to provide sufficient representation and redundancy to ensure the species will no longer require protection under the Act.
2. Abatement of the threats in the natural range of the American crocodile will allow populations to become stable and contribute to the viability of the species. American crocodile habitat in Florida continues to need maintenance and enhancement to provide protection for all life stages and support population growth and expansion. This includes ensuring appropriate nesting substrate and nursery habitat with appropriate salinity and water quality, free of predation from exotic species. As the American crocodile population increases and expands back into its natural range (which is now occupied by humans) anthropogenic sources of mortality (vehicle strikes, poaching) will need to be managed, as will other potential human and crocodile conflicts.
3. Location of suitable habitat needed for long-term viability of the American crocodile may change with habitat changes and loss projected due to sea-level rise.

Rationale for Amended Recovery Criteria

The existing criteria for American crocodile on page 4-521 in the MSRP (Service 1999) (https://ecos.fws.gov/docs/recovery_plan/sfl_msrp/SFL_MS RP_Species.pdf) included only

downlisting criteria. With these proposed amendments, delisting has been clearly defined with measurable, objective criteria in keeping with the recovery strategy and goals outlined in the MSRP. These criteria address what is necessary to ensure resiliency, redundancy, and representation by addressing factors that threaten the species. In achieving these criteria, we expect the American crocodile to have a low probability of extinction for the foreseeable future and have stable populations needed for long-term recovery. We will work together with all appropriate parties to strategically and efficiently implement the new criteria.

ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS

The following recovery actions are recommended in addition to those listed in the most current recovery plan for the American crocodile:

1. Monitor the effects of climate change and sea-level rise on American crocodile habitat in South Florida.

Sea-level rise resulting from climate change was not discussed in the MSRP as a threat to the American crocodile. Sea levels in coastal South Florida (Palm Beach, Broward, Miami-Dade and Monroe counties) are expected to rise from 6 to 10 inches (15.2 to 25.4 cm) by 2030 and 14 to 34 inches (35.6 to 86.4 cm) by 2060 (Compact 2015). The National Oceanic and Atmospheric Administration (NOAA) (2017) estimates that sea-level rise will increase by 1 to 8 feet (0.3 to 2.4 m) by the end of the century, with the business as usual scenario (no reductions in greenhouse gases) predicting 6.6 ft (2 m) of sea-level rise. Sea-level rise of this magnitude could result in the inundation of current nesting areas used by American crocodiles. Crocodiles would likely relocate nesting areas to the newly formed coastal areas in association with sea-level rise, if available. However, relocation of coastal human settlements due to sea-level rise could usurp new areas of habitat that crocodiles could use for nesting.

2. Continue to monitor and control exotic animals that may prey on American crocodiles or their eggs throughout its range.

Two non-native reptile species, the Burmese python and the Argentine black and white tegu recently introduced and established in south Florida, represent a threat to the survival of the American crocodile. The Burmese python has been documented to feed on a variety of animal species in South Florida, including the American alligator (*Alligator mississippiensis*). Although predation of American crocodiles has not yet been documented, Burmese pythons are certainly capable of killing and consuming hatchling, juvenile, and sub-adult crocodiles. The Argentine black and white tegu is known to eat reptile eggs and has been photographed by motion sensitive cameras consuming alligator eggs and loitering at a crocodile nest site (Mazzotti et al. 2014). A campaign to control the Burmese python and the Argentine black and white tegu, that includes surveying, trapping, and hunting, has been implemented by the Florida Fish and Wildlife Conservation Commission, University of Florida, and National Park Service. This effort should be continued and enlarged as needed.

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