



# RECOVERY OUTLINE

## ELKHORN & STAGHORN CORALS

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### I. INTRODUCTION

This document lays out the broad, preliminary outline for the recovery of elkhorn and staghorn corals. A recovery team is being assembled for these species, and this outline will serve to guide recovery-planning efforts and provide information for consultations and permitting activities until the recovery plan has been finalized and approved.

Listing and contact information for both species:

Scientific Name:	<i>Acropora palmata</i> , <i>Acropora cervicornis</i>
Common Name:	Elkhorn and Staghorn coral (respectively)
Listing Classification:	Threatened
Listing Date:	May 9, 2006 (71 FR 26852)
Lead Agency:	National Marine Fisheries Service (NOAA Fisheries Service)
Lead Office:	Southeast Regional Office, St. Petersburg, Florida
Contact Biologist:	Jennifer Moore, 727-824-5312, <a href="mailto:Jennifer.Moore@noaa.gov">Jennifer.Moore@noaa.gov</a>

The general life history and habitat requirements of elkhorn and staghorn corals are well known. The historic range of both species has been determined based on historic quantitative data and recent qualitative data/observations. The most significant uncertainties with respect to setting recovery objectives and prioritizing recovery actions include the lack of specific information on the current and historical distribution and abundance; reproduction, settlement, and recruitment processes; and the causal factors for disease in each species. An additional significant uncertainty includes the lack of information on the genetic structure of both species' populations. These uncertainties are acknowledged as playing a limiting role in the early recovery efforts for these species and should be resolved to the extent possible through the recovery planning process.

### II. RECOVERY STATUS ASSESSMENT

#### A. BIOLOGICAL ASSESSMENT:

*Recovery implications of the species' demographic and genetic status*

Historic records indicate elkhorn and staghorn corals were commonly found in water depths of 1 to 30 m throughout the wider Caribbean. Survey data from the Atlantic and Gulf Rapid Reef Assessment Program (AGRRA) indicate the historic ranges of both species remain intact; *A. cervicornis* is rarely found throughout the range (including areas

of previously known occurrence); and *A. palmata* occurs in moderation (*Acropora* Biological Review Team (BRT) 2005). Based on a few locations where quantitative data are available, declines in abundance (coverage and colony numbers) for both species are estimated at >97% (*Acropora* BRT 2005).

Elkhorn and staghorn corals are almost entirely dependent upon sunlight for nourishment (Porter 1976, Lewis 1977). Both species require relatively clear, well-circulated water (Jaap et al. 1989). Optimal water temperatures for *A. palmata* range from 25 to 29°C, but Jaap (1979) and Roberts et al. (1982) note an upper temperature tolerance of 35.8°C for the species. All Atlantic acroporids are susceptible to bleaching due to adverse environmental conditions (Ghiold and Smith 1990, Williams and Bunkley-Williams 1990). Additionally, little is known concerning the settlement patterns of planula larvae of Atlantic *Acropora* sp. (Bak et al. 1977, Sammarco 1980, Rylaarsdam 1983). In general, however, larvae and asexual fragments seem to prefer hard, consolidated substrates for settling and reattachment. Identifying historic and current habitats used by both species has important recovery implications.

These species have rapid growth rates and high potential for propagation via fragmentation; however, fragmentation is not as effective when fragment sources are scarce (*Acropora* BRT 2005). There is substantial evidence suggesting that sexual recruitment of both coral species is compromised (*Acropora* BRT 2005). It is believed some populations may be reproductively isolated (Bruckner 2002). A recent study examining the genetic exchange and clonal population structure in *A. palmata* identified two distinct populations in the eastern and western Caribbean, with an area of genetic mixing located in Puerto Rico (Baums et al. 2005b). Additionally, the genotyping of 93 colonies resulted in the identification of only 14 genets, with only 1 genet represented at 2 reefs in the Florida Keys (Baums et al. 2005a). This lack of genotypic diversity is a basis for concern for the long-term persistence of these species. Successful sexual reproduction will need to play a major role in recovery of both species (Bruckner 2002).

B. THREATS ASSESSMENT:

*How do the threats facing the species affect its recovery prognosis?*

The threats facing elkhorn and staghorn corals have been fully described through the listing process, and no additional threats are known.

The overriding threats to both species are disease, temperature-induced bleaching, and physical damage from hurricanes. These threats are severe, ongoing, synergistic, and have displayed an increasing trend in the recent past. Disease is widespread, episodic, and unpredictable in its occurrence and results in high amounts of mortality. Sea-surface temperature is expected to continue rising over time and may exacerbate disease impacts. The number of hurricanes affecting Caribbean reefs has increased over the past two

decades. In order to insure the species does not decline further, actions are needed to determine the causal and mechanistic aspects of these threats to both species.

The threats to elkhorn and staghorn corals are exacerbated further by less severe threats (e.g., nutrients, sedimentation, anchoring, boating), which degrade coral condition and increase synergistic stress effects (e.g. bleaching). Actions also need to be taken to reduce the threats posed by human activity (e.g., construction or dredging, run-off, water quality).

C. CONSERVATION ASSESSMENT:

*What steps have been taken to address the species' recovery needs?*

Some fundamental laws, regulations and policies governing U.S. waters provide various protections for coral reefs in general but are not specifically directed toward the conservation of elkhorn and staghorn corals. Research has been conducted on both species concerning restoration, reproduction, genetics, and diseases.

Current conservation measures consist of restoration efforts following physical damage from ship groundings and hurricanes. *Acropora* sp. fragments are either re-attached to the substrate at the damage site or transplanted to suitable substrate (natural and artificial) elsewhere. Additional measures, intended to protect coral reefs in general, include mooring buoys and navigational markers. Both corals can be found within the boundaries of several different marine protected areas (MPAs) in Florida, Puerto Rico, and the U.S. Virgin Islands.

Numerous governmental and non-governmental agencies, institutions, and organizations are involved in conservation awareness for coral reef resources. These entities provide an active conservation constituency and are integral to the recovery of both species.

D. SUMMARY ASSESSMENT:

Overall, elkhorn and staghorn coral populations continue to decline. Currently, each population is only a small percentage of its historic abundance throughout both species' range. The recovery of elkhorn and staghorn corals will require habitat protection measures, a reduction in threats caused by human activity, additional research, and time.

### **III. PRELIMINARY RECOVERY STRATEGY**

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#### **A. RECOVERY PRIORITY NUMBER WITH JUSTIFICATION:**

Elkhorn and staghorn corals should be assigned a recovery priority of 7, based on assigning the magnitude of threat as moderate, recovery potential is low-moderate, and the potential for economic conflicts.

#### **B. RECOVERY VISION STATEMENT:**

Elkhorn and staghorn populations should be large enough so that reproducing individuals comprise numerous populations across their historical geographic range (wider Caribbean) and also should be large enough to protect the species' genetic diversity. Threats to the species and habitat loss and degradation will be sufficiently abated to ensure a high probability of survival into the future.

#### **C. BRIEF ACTION PLAN:**

The focus of the initial phase of recovery will be the protection of the current species distribution, protection of their habitat, and finding additional populations. This will be accomplished by using a range of protection tools available and will be based on the ecological requirements of the species and what is needed to fully protect its habitat. Public awareness through various outreach efforts may play a role in generating voluntary protection actions.

The recovery effort should be based on existing conservation efforts. Specific actions that will be undertaken early in the process may include the following:

- Identify the specific areas used by the species requiring habitat conservation and assign priorities to each of them
- Continue research to determine distribution, abundance, habitat requirements, causal factors of disease, and genetic status
- Continue and expand efforts to provide information to educate the public about the needs of the species.

### **IV. PREPLANNING DECISIONS**

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A recovery plan will be prepared for *Acropora palmata* and *A. cervicornis* pursuant to section 4(f) of the Endangered Species Act. The scope of the plan will be two species.

The *Acropora* recovery team will develop the recovery plan. The *Acropora* recovery team is being assembled. Jennifer Moore, with NOAA Fisheries' Southeast Regional

Office, will coordinate the recovery efforts. The recovery team will coordinate their planning efforts with the Southeast Regional Administrator of NOAA Fisheries.

## V. REFERENCES

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