ZSL
LET'S WORK FOR WILDLIFE

EDGE

EVOLUTIONARILLY DISTINCT & GLOBALLY ENDANGERED

Survival Blueprint

Pillar Coral, *Dendrogyra cylindrus*
The Bahamas

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1. STATUS REVIEW

1.1 Taxonomy:

Phylum: Cnidaria; Class: Anthozoa; Sub-class: Hexacorallia; Order: Scleractinia
Family: Meandrinidae; Genus: *Dengrogyra*

Common name: Pillar coral

1.2 Distribution and population status:

1.2.1 Global distribution:

Country	Population estimate (plus references)	Distribution	Population trend (plus references)	Notes
Florida, USA	Presence confirmed, Rare distribution, Population Estimate (Miller et al 2010)	Rare and uncommon however can occur in densely populated patches usually a result of fragmentation	Unknown	Threatened and protected by the US Endangered Species Act
US Virgin Islands	Presence confirmed, Rare distribution, Current Population Estimate (Rogers et al. 1984)	Rare and uncommon however can occur in densely populated patches usually a result of fragmentation	Unknown	Threatened and protected by the US Endangered Species Act
Curacao	Presence confirmed, Rare distribution, Population Estimate? (Bak & Engel 1979) (Vermeij et al. 2011)	Rare and uncommon however can occur in densely populated patches usually a result of fragmentation	Unknown	None
The Bahamas	Presence confirmed, Rare distribution, Population Estimate? Unpublished	Rare and uncommon however can occur in densely populated patches usually	Unknown	None

	AGRAA data and Unpublished data K. Sealey	a result of fragmentation		
Colombia	Presence confirmed, Rare distribution, Population Estimate (Acosta & Acevedo 2006)	Rare and uncommon however can occur in densely populated patches usually a result of fragmentation	Unknown	None
Puerto Rico	Presence confirmed, Rare distribution, Population Estimate (Irizarry-Soto &, Weil 2009)	Rare and uncommon however can occur in densely populated patches usually a result of fragmentation	Unknown	Threatened and protected by the US Endangered Species Act

1.2.2 Local distribution:

Country	Region / province	Site	Level of Protection	Population size	Reference(s)	Notes
The Bahamas	New Providence	Clifton Heritage Park	None	2 colonies identified	NSR Unpublished data	Highly threatened areas, excessive oil pollution, unhealthy colonies
	Cat Island	North Cat Island off Man o War point	None	20+ colonies	NSR Unpublished data	Healthy colonies with multiple pillars
		South Cat Island off of Port Howe	None	20+ Colonies	NSR Unpublished data	Healthy colonies with multiple pillars
	Exuma Cays	Exuma Cays Land	No Take Zone	6+ Colonies	NSR Unpublished data	Healthy Colonies where identified

		and Sea Park				
	Exuma	Moriah Harbour	None	2 colonies	NSR Unpublished data	NA
	Spanish Wells	Egg Island	None	2 colonies	NSR Unpublished data	NA
The Bahamas	Andros	Andros	None	Undetermined	AGRAA Raw Data	NA
	Abaco	Abaco	None	Undetermined	AGRAA Raw DATA	NA
	Acklines	Acklines	None	Undetermined	AGRAA Raw Data	NA

1.3 Protection status:
Dendrogyra cylindrus has recently been listed as a threatened species under the Unites States Endangered Species Act. The IUCN Red List has *D. cylindrus* listed as Vulnerable based on criteria A4ce ver 3.1. There is no current protection to *D. cylindrus* within The Bahamas.

1.4 Ecology, behaviour and habitat requirements:
An uncommon but conspicuous species (Veron 2000) that usually has a low abundance, it can however be locally abundant in shallow well circulated areas due to propagation by fragmentation (Aronson, Bruckner et al. 2008a). Colonies of *D. cylindrus* are generally found on flat or gently sloping back and fore reefs (Aronson, Bruckner et al. 2008a) however, isolated colonies can be found across a range of habitats (Brainard, Birkeland et al. 2011). Colonies can be found between 1m-25 m being most common between 5 m-15 m (Aronson, Bruckner et al. 2008a).

Dendrogyra cylindrus has an encrusting base on which cylindrical columns developed vertically. The columns can reach up to 2 m in height. The valleys are meandroid and the septo-costae are thick in two alternating orders; they do not join at the tops of valleys and thus leave a neat groove along the tops of walls. Colonies are generally grey-brown in colour and the tentacles remain extended during the day, which gives the columns a furry appearance (Veron 2000). As gonochoric spawners (Szmant 1986) with low population densities, this reproductive mode yields very little potential for successful fertilization and larval supply (Brainard, Birkeland et al. 2011). *D. cylindrus* has proven to be effective in propagation by fragmentation (Hudson and Goodwin 1997). Growth rates for *D. cylindrus* have been measured at 12 mm - 20 mm per year in Florida (Hudson and Goodwin 1997) and 8mm (0.8 cm) in other locations within the Caribbean (Hughes 1987, Acosta and Acevedo 2006). *D. cylindrus* has a relatively high photosynthetic rate where the stable isotope values suggest it receives substantial amounts of photosynthetic products translocated from its zooxanthellae (Muscatine, Porter et al. 1989).

1.5 Threat analysis:

Threat	Description of how this threat impacts the species	**Intensity of threat** *(low, medium, high, critical or unknown)*
Coastal development	Impacts pillar coral and reef systems through sedimentation from poorly managed construction sites and dredging operations. Clearing of land, filling of wetlands and the removal of coastal plants increase eutrophication. Toxins and oils entering coastal waters reduce water quality inhibiting photosynthesis.	Unknown
Overexploitation of harvested resources	Results in the reduction of herbivores that results in the flourishing of macroalgae that compete with pillar coral and other corals and removes suitable space for settlement of planktonic larvae.	Medium
Marine construction	Physically removes coral and destroys supporting habitats like seagrass beds or mangroves. Dredging causes sedimentation that impacts photosynthesis also smothering corals. Pollutants entering the water change coral reef community structure.	Low
Marine transport	often results in oil spills and fuel leaks harm zooxanthellae, this inhibits juvenile recruitment and reduces reef resilience. Groundings and anchors directly destroy reefs. Toxicants associated with antifouling paint impacts reproductive success. Contaminated bilge water introduces toxicants and invasive species.	High

Threat	Description of how this threat impacts the species	Intensity of threat *(low, medium, high, critical or unknown)*
Tourism	can result in excess nutrients entering the water from golf courses, pleasure crafts and hotels which causes eutrophication. Hotel construction causes sedimentation and chemical run off. Developing in undeveloped areas increases causes of sedimentation, eutrophication and removes coastal plants. Divers and pleasure crafts can break coral.	High
Poor waste management	impacts water quality, which causes algal growth and reduced photosynthesis	Unknown
Poor governance	perpetuates the lack of appreciation for ecosystem services. High poverty and the failure to monitor and manage resources leads to unsustainable behaviour that drives coral reef degradation and the loss of pillar coral.	High

1.6 Stakeholder analysis:

Country	Stakeholder	Stakeholder's interest in the species' conservation	Current activities	Impact *(positive, negative or both)*
The Bahamas, Grand Bahamas	Bahamas National Trust	Conservation, Education, MPA and Research	MPA	+
The Bahamas, Eleuthera	Cape Eleuthera Institute	Conservation and Research	Research	+
The Bahamas, Nassau	BREEF	Education, Conservation, Research	Education and Outreach	+
	The Nature Conservancy	Research, Conservation	MPA	+
	Save the Bays	Activism, Conservation	Policy	+
The Bahamas, Andros	BAMSI	Research, Education	Research	+

Country	**Stakeholder**	**Stakeholder's interest in the species' conservation**	**Current activities**	**Impact** *(positive, negative or both)*
The Bahamas, Nassau	GEF Small Grants	Funding	Funding	+
	The Blue Foundation	Funding	Funding	+
The Bahamas, San Salvador	Living Jules Foundation	Education and Outreach	Education and Outreach	+
The Bahamas, Abaco	Friends of The Environment	Education, conservation, research	Education and Outreach	+
USA	Judith Lang	AGRAA and Coral Expert	Research	+
The Bahamas, Nassau	Department of Marine Resources	Fisheries Management	Management	+
USA	Craig Dahlgreen	AGRAA and Coral expert	Research	+
USA	Patricia Kramer/ TNC	AGRAA and Coral Expert	Research	+
The Bahamas, Nassau	Young Marine Explorers	Education, Citizen Science and Research	Research, Monitoring and Education	+

1.7 Context and background information that will affect the success of any conservation action for this species:

	Description	Barriers to conservation	Opportunities for conservation
Socio-cultural effects and cultural attitudes	Fishing provides an important source of protein and represents a cultural activity	Overfishing is a threat to coral reefs especially the action of fishing on spawning aggregations of and overexploiting of top predators	Fuel prices have gotten so high that it is no longer economically viable for many artisanal fishermen to go fishing, especially since they have to go further to catch fish
Economic implications	There are direct ties with the Bahamian economy and coral reefs through tourism and fisheries.	Conflict has and continues on the valuation of resources. Development decisions are made that directly threat coral reefs. Many of these decisions are made to accomplish short term development goals but have lasting long term negative effects on coral reefs.	No direct opportunities were identified
Existing conservation measures	There is an initiative to protect 20% of Bahamian marine and near shore waters by 2020	The lack of management and enforcement for marine protected areas and fisheries laws inhibits true protection. Many MPA's become "Paper parks"	This is a great opportunity to protect coral reefs if management is decisions are evidenced-based and implementation is effective

Administrative/political set-up	Political will has been extremely low to make environmental concerns a priority. With increase in crime and unemployment, extra effort has been put into large scale development projects that often result in destruction of vital ecosystems	Corruption and lack of transparency and freedom of information perpetuates development decisions that negatively impacts coral reefs	If corruption is tackled current protection measures will commence to be effective
Local expertise and interest	A recent 10-year Disney grant has brought together key stakeholders	Lack of financial resources might weaken collaboration among stakeholders	Coral conservation is now a greater priority within the Bahamian environmental world
Cultural attitudes	Despite the cultural connection with the ocean, there is a disconnect between Bahamians and the value and importance of protecting coral reefs. There is a notion of abundance and that resources will always be there	This notion is the foundation for an "open resource pool" usage pattern and might be a barrier for compliance	The connection with the sea might facilitate behavioural change if appropriate programmes are designed and implemented
Appeal of species	Coral reefs are unknown to many people. Not many people have had first-hand encounters with corals. However, the pillar coral is a good flagship species	Engaging general public in coral conservation is very hard, as these species are not relatable ones	Novelty, when appropriately framed and delivered could be of great appeal for campaigning

2. ACTION PROGRAMME

Vision (30-50 years)	
To reverse the decline of coral reefs in The Bahamas and restoring the balance to a health and viable ecosystem.	
Goal(s) (5-10 years)	
To monitor the status and trends of Bahamian Reef systems through the coral conservation citizen science project that will provide relevant information that can be used within the scope of a national plan to inform management and policy and identify new and/or existing threats that can be mitigated through community action.	
Objectives	**Prioritisation** *(low, medium, high or critical)*
1. Revising the Coral Conservation Team Monitoring Protocol so that data gathered can be compared to the AGRAA method	**High**
2. Implement the Young Marine Explorers Conservation Program Curriculum	**High**
3. Design database with user interface to collect and analyse information gathered by coral conservation teams	**Medium**
4. Training, evaluation and refreshment for Coral Conservation Team	**Medium**

Activities	Country / region	Priority *(low, medium, high or critical)*	Associated costs (currency)	Time scale	Responsible stakeholders	Indicators	Risks	Activity type
Objective 1: Revising the Coral Conservation Team Monitoring Protocol so that data gathered can be compared to the AGRAA method								
Test and align Coral Conservation Team Monitoring Protocol with that of AGRAA and in alignment with national research needs	The Bahamas	High	$10,000 USD	One Year Beginning January 2016	Young Marine Explorers in Collaboration with the Bahamas National Trust, Judith Lang, Craig Dahlgreen and the Department of Marine Resources, Rajan Amin of ZSL	Quality of CCT surveys when compared to AGRAA Surveys and their ability to inform status and trends		
Objective 2: Implement the Young Marine Explorers Conservation Program Curriculum								
Build capacity and trains the life long citizen scientist who will join the Coral Conservation Team	The Bahamas	High	$50,000 USD / year/ 40 participants enrolled in a year long training program	Yearly Beginning September 20215	Young Marine Explorers	Number of students successfully completing the three year curriculum and matriculating into the Coral Conservation Team		Education and Training

Objective 3: Design database with user interface to collect and analyse information gathered by coral conservation teams								
An internet database with a user-friendly interface is necessary to organize and analyse information gathered by coral conservation team members	The Bahamas	Medium	?	Begin January 2017	Young Marine Explorers in collaboration with TBD			
Objective 4: Training and skills evaluation and refreshment for Coral Conservation Team								
Develop and publish training and skills evaluation material for replication and quality control of the coral conservation team	The Bahamas	Medium	?	TBD	Young Marine Explorers In collaboration with Kathleen Sullivan Sealey of University of Miami and Rajan Amin of ZSL			

3. LITERATURE CITED

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