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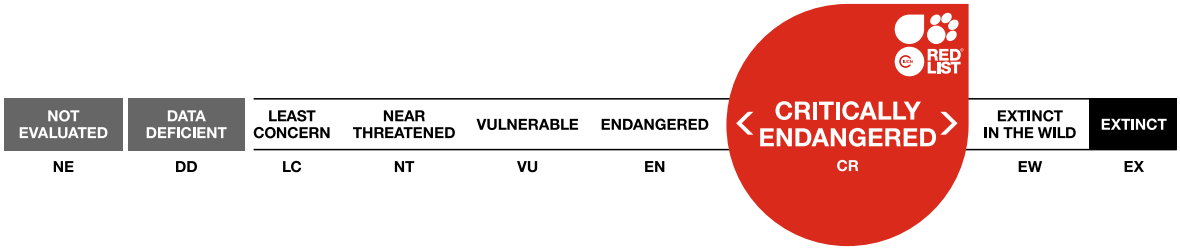
Dendrogyra cylindrus, Pillar Coral

Assessment by: Cavada-Blanco, F., Croquer, A., Vermeij, M., Goergen, L. & Rodríguez-Martínez, R.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Cnidaria	Anthozoa	Scleractinia	Meandrinidae

Scientific Name: *Dendrogyra cylindrus* (Ehrenberg, 1834)

Synonym(s):

- *Dendrogyra caudex* (Ehrenberg, 1834)
- *Dendrogyra sanctihilarii* Duchassaing & Michelotti, 1864
- *Dendrogyra spatiosa* (Ehrenberg, 1834)
- *Maendra caudex* Ehrenberg, 1834
- *Maendra cylindrus* Ehrenberg, 1834
- *Meandrina spatiosa* Ehrenberg, 1834

Common Name(s):

- English: Pillar Coral
- French: Corail de Pilaires
- Spanish; Castilian: Caramujo, Coral Pilar

Taxonomic Source(s):

Worms Editorial Board. 2022. World Register of Marine Species. doi:10.14284/170. Available at: http://www.marinespecies.org at VLIZ. (Accessed: 24 January 2022).

Assessment Information

Red List Category & Criteria: Critically Endangered A2bce ver 3.1

Year Published: 2022

Date Assessed: June 1, 2021

Justification:

This widely distributed coral species is conspicuous, but is uncommon to rare. It has low juvenile survivorship and is highly susceptible to bleaching, disease, and extensive reduction of coral reef habitat due to a combination of threats. The Florida Reef Tract subpopulation is functionally extinct at the northern edge of the species' range, where a population decline of 93% and the loss of 86% of genotypes between 2014 and 2020 have been recorded after the appearance of a novel coral disease, the Stony Coral Tissue Loss Disease (SCTLD) in 2014. In the southern and central Caribbean, high rates of fragmentation contributing to clonality, extremely low recruitment and site-level extinctions have been reported for the species. Though information on global-level abundance and population trends is scarce, an 80% or higher decline in both the number of colonies and live cover has been reported in 60% of the countries where trends in abundance have been assessed. Based on this, a population reduction of >80% over the past three generations (i.e. 1990 to present) is inferred. Despite area-based protection in a large portion of the species' range, most localized threats are ongoing and bleaching events are projected to increase in frequency due to climate change. Overall, the low adult abundance, high susceptibility to diseases, specially SCTLD, limited connectivity among subpopulations, and recruitment

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failure under favourable conditions indicate that population persistence in this species is severely compromised. Therefore, this species is listed as Critically Endangered A2bce.

Previously Published Red List Assessments

2008 – Vulnerable (VU)
https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T133124A3582471.en

Geographic Range

Range Description:

This species is distributed in the western Atlantic from the northeastern Yucatan Peninsula (Mexico) to western Florida in the Gulf of Mexico and from the Bahamas southward throughout the Caribbean to Trinidad and Tobago. It may be absent from portions of the southwestern Caribbean. It is reported to have been extirpated from Panama, even though recent fossils (<1,000 years old) have been found and reports of the species' presence in Panama through a personal communication exist (H. Guzman pers. comm. in Acosta and Acevedo 2006). A single colony in Bermuda is reported (T. Murdoch and Flatts pers. comm. 2010 in Brainard *et al*. 2011). The depth range is 1–20 metres, but the species most commonly occurs between 5–15 m (Goreau and Wells 1967, Acosta and Acevedo 2006, Bernal-Sotelo *et al*. 2019, Cavada-Blanco *et al*. 2020).

Country Occurrence:

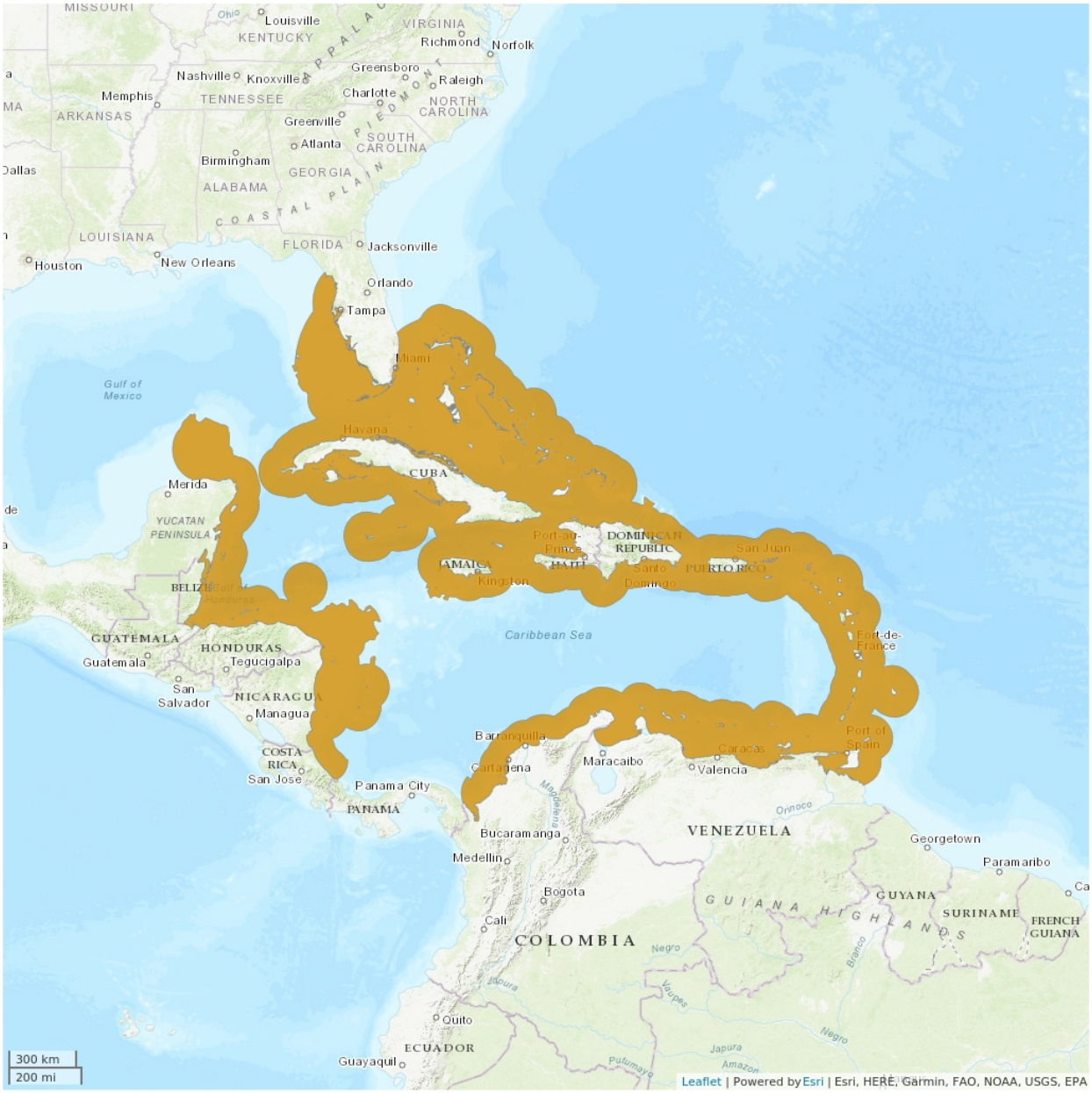
Native, Extant (resident): Anguilla; Antigua and Barbuda; Aruba; Bahamas; Barbados; Belize; Bonaire, Sint Eustatius and Saba (Bonaire, Saba, Sint Eustatius); Cayman Islands; Colombia; Costa Rica; Cuba; Curaçao; Dominica; Dominican Republic; Grenada; Guadeloupe; Guatemala; Haiti; Honduras; Jamaica; Martinique; Mexico; Montserrat; Nicaragua; Puerto Rico; Saint Barthélemy; Saint Kitts and Nevis; Saint Lucia; Saint Martin (French part); Saint Vincent and the Grenadines; Sint Maarten (Dutch part); Trinidad and Tobago; Turks and Caicos Islands; United States; Venezuela, Bolivarian Republic of; Virgin Islands, British; Virgin Islands, U.S.

Native, Possibly Extant (resident): Bermuda; Panama

FAO Marine Fishing Areas:

Native: Atlantic - western central

Distribution Map



Legend

EXTANT (RESIDENT)

Compiled by:

IUCN Marine Biodiversity Unit/GMSA 2021

The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

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Population

This species is uncommon but conspicuous. It is uncommon or rare in most of its range (Riegl *et al*. 2003, Karpouzli *et al*. 2004, Acosta and Llansó 2004, Ward *et al.* 2006, Bruckner and Bruckner 2006, Quinn and Kojis 2008, García-Sais *et al.* 2008, Hernández-Fernández *et al.* 2008, Clark *et al.* 2009, Scaps and Saunders 2011, Rodríguez-Martínez *et al*. 2012, Sheppard 2013). The species can be locally common in some localities (Geraldes 2003, Kaczmarsky *et al*. 2005, Acosta and Acevedo 2006, Rogers 2009, Bruckner and Hill 2009, Deleveaux *et al.* 2013, Neely *et al.* 2013, Yranzo *et al.* 2014, Marhaver *et al.* 2015, Bernal-Sotelo *et al*. 2019, Cavada-Blanco *et al*. 2020). In the Dominican Republic, it is considered rare but widespread, being reported along the southeast coast and northern reefs, particularly in well-developed reefs located within MPAs (Cortés-Useche *et al*. 2019).

Information on abundance for this species is scarce and scattered in time. The low frequency of occurrence and the distribution of colonies hinder most reef monitoring programs from capturing representative data about this species' abundance (Acosta and Acevedo 2006, Rogers 2009, Brainard *et al.* 2011, Cavada-Blanco *et al.* 2020). Isolated colonies (Szmant 1986, Neely *et al*. 2013, Marhaver *et al.* 2015, Cavada-Blanco *et al*. 2020), as well as abundance of 843 colonies/0.03 km^2 (Bernal-Sotelo *et al.* 2019) and monospecific patches of this species, stretching an area of 98.7 m^2 (Cavada-Blanco *et al.* 2020) has been reported. However, most of the data on abundance is restricted to the Southern Caribbean, the Islands of Providencia and San Andres in Central America and the Florida Keys (Acosta and Acevedo 2006, Neely *et al*. 2013, Marhaver *et al*. 2015, Chan *et al*. 2019, Bernal-Sotelo *et al*. 2019). Though restricted to a few subpopulations within the species' global range, data indicate a declining trend in the population of this species throughout the Caribbean of at least 80% or greater.

The highest reported abundance for the species corresponds to Archipelago Los Roques National Park (ALRNP), Venezuela (population of 1,794 colonies; Cavada-Blanco *et al*. 2020) in the southern Caribbean and the islands of San Andres and Providencia in the Seaflower Biosphere Reserve (SBR), off the Nicaraguan coast, Colombian Caribbean (846 colonies in 0.03 km^2; Acosta and Acevedo 2006, Bernal-Sotelo *et al.* 2019). In SBR, the number of colonies recorded within reef plots surveyed in 2002 and 2012 increased from 283 to 843 (Bernal-Sotelo *et al*. 2019). However, 94.32% of the increase in abundance was represented by fragments and the authors reported site-level extinctions in 50% of the plots surveyed. The Florida Reef Tract subpopulation is thought to be reproductively extinct with a total population estimated at 610 colonies (Lunz *et al.* 2016 in Chan *et al*. 2019, Neely *et al*. 2021). In the Florida Reef Tract, the number of colonies declined by 93% between 2014 and 2020 (Neely *et al.* 2021). A declining trend off the Yucatan Peninsula due to bleaching and outbreaks of Stony Coral Tissue Loss disease (Alvarez-Filip *et al.* 2019) is also suspected.

In Curaçao, its current abundance (in terms of percentage bottom cover) is 0.09% (SD: 0.13, n=145 sites in 2015 at 10 m depths (Waitt Institute 2017), on Aruba: 0.02% (SD: 0.07, n=53 sites in 2019) (Carmabi unpubl. data). The abundance of this species declined from 0.01% in 1973 to 0.00% in 2005 on Bonaire (de Bakker 2019). Recruitment rates are extremely low and no juveniles were ever observed on Curaçao (Bak and Engel 1979, Vermeij *et al*. 2011). Bonaire and Curaçao have some of the least degraded reefs in the Caribbean (Jackson *et al*. 2014) and the low adult abundance and recruitment failure under favorable conditions indicate that population persistence in this species is likely even more compromised in other locations.

Population growth through sexual recruits is crucial for this species, as it allows the maintenance of genetic diversity and increases fecundity in subpopulations (Marhaver *et al.* 2015). Studies as far back as the 1980s report recruitment of this species as very low (Rogers *et al*. 1984, Szmant 1986). In the past fifteen years, only a few studies have reported evidence of recruitment: Cavada-Blanco *et al*. (2020) reports 22 juvenile colonies in a surveyed area of 6.2 km^2 within Los Roques, Venezuela; Acosta and Acevedo (2006) and Bernal-Sotelo *et al.* (2019) report juvenile colonies (< 15 cm height) in all surveyed sites; and Rogers and Miller (2006) reported a recruit of the species in St. Johns, US Virgin Islands. No evidence of recruitment has been reported for the rest of the species' range, albeit spawning of colonies have been observed in Florida (Neely *et al.* 2013) and Curaçao (Marhaver *et al*. 2015) and gravid colonies in Los Roques (A. Croquer and F. Cavada-Blanco pers. obs. 2015). This has led to hypotheses that the species could be facing a bottle neck (Marhaver *et al.* 2015), as high clonality and low connectivity have also been reported in Florida (Chan *et al.* 2019). In the southern and central Caribbean, subpopulations of the species are dominated by “medium” size colonies (<1 m height; Bernal-Sotelo *et al*. 2019, Cavada-Blanco *et al.* 2020), which might suggest periods of no transition into larger size classes. This could be a strategy to maintain a positive rate of intrinsic population growth in low sexual recruitment (Lirman 2000, Lirman *et al*. 2003, Edmunds and Elahi 2007, Edmunds 2013, Foster *et al.* 2013). However, high rates of fragmentation - as those reported in Florida (Chan *et al.* 2019) and the SBR (Bernal-Sotelo *et al.* 2019) further increase the risk of local extinctions (Marhaver *et al.* 2015).

Current Population Trend: Decreasing

Habitat and Ecology **(see Appendix for additional information)**

Colonies of this species occur on windward and leeward reef habitats, including fringing reefs, barriers, reef patches and even in spur and grooves, that vary in the type of substrate (pavement, dead coral and sand) and the dominant benthic species (*Acropora cervicornis*, *A. palmata*, *Orbicella annularis*, *Agaricia* spp., *Pseudodiploria* spp., *Madracis* spp., macroalgae and octocorals-antipatharia) (Acosta and Acevedo 2006, Bernal-Sotelo *et al.* 2019, Cavada-Blanco *et al.* 2020, A. Croquer pers. obs. 2015). A colony has been reported near red mangrove roots (Rogers 2017). Higher abundance of colonies seems to occur in reef terraces and patches dominated by octocoral-antipatharia (Bernal-Sotelo *et al.* 2019, Cavada-Blanco *et al*. 2020).

This is the only living species in the genus. It is an EDGE species (Evolutionarily Distinct and Globally Endangered) and is the only one in the Caribbean exhibiting its polyps extended during daylight (Veron 2002, Brown and Bythell 2005). This species exhibits growth plasticity, with encrusting morphotypes in high-energy leeward terraces and massive ones in shallow sandy areas where air-exposure is experienced during low tide (F. Cavada-Blanco and A. Croquer pers. obs. 2015). Most common pillar morphotypes can be easily overturned due to bioerosion at the base; however, these colonies as well as detached pillars or fragments can resume vertical growth and produce new pillars (Geister 1972, F. Cavada-Blanco and A. Croquer pers. obs. 2015). Although the reef area covered by the species is low relative to other shallow reef-building corals, this species contributes to the structural complexity of the habitat (Acosta and Acevedo 2006), creating small reef patches by itself in some instances (Cavada-Blanco *et al.* 2020).This species is dioecious with an annual reproductive cycle (Szmant 1986). The species exhibits both asexual and sexual reproduction (Szmant 1986, Marhaver *et al*. 2015). Spawning occurs 3-5 days after the full moon of August (Neely *et al.* 2013) and September (Marhaver *et al.* 2015). It was thought to be a broadcast spawner, but recent research suggests the reproductive biology of the

species is not well known. Evidence from research conducted in Curaçao indicates the species might be sperm-casting with internal fertilisation of eggs inside female colonies after sperm is released by male colonies (Marhaver *et al.* 2015). This further highlights the importance of sex proportion and genetic diversity within close colonies for the species persistence. Szmant (1986) reported a sex ratio of 1:1 for one reef in Puerto Rico, but recent research report imbalanced sex ratios (8.5:1 male:female; Kabay 2016) and hermaphrodite colonies in Florida (Neely *et al*. 2018). The latter has been proposed as a reproductive strategy in small sex imbalanced subpopulations (Neely *et al.* 2018).
The age at first maturity of most reef-building corals is typically three to eight years (Wallace 1999). Based on this, we infer that the average age of mature individuals of this species is greater than eight years. Based on average sizes and growth rates, we also infer that the average length of one generation is 10 years. Longevity is not known, but is likely to be greater than 10 years. Therefore, any population decline rates estimated for the purposes of this Red List assessment are measured over a time period of 30 years.

Systems: Marine

Use and Trade **(see Appendix for additional information)**

This species is not utilized.

Threats **(see Appendix for additional information)**

This species is particularly susceptible to bleaching, disease, and other local threats (Aronson *et al*. 2008, Bernal-Sotelo *et al*. 2018, Cavada-Blanco *et al*. 2020). Stony coral tissue loss disease (SCTLD) poses the most immediate threat for this species, due to its high contagion. In Yucatan, Mexico, this species showed the highest prevalence for the disease among 11 reef-building species (Alvarez-Filip *et al.* 2019) and the local subpopulation has been reduced by almost 90% (L. Alvarez-Filip pers. comm. 2020). In Florida, SCTLD has caused a widespread loss in coral cover, affecting large areas (Muller *et al*. 2020) with reports of colony loss of 86% in two years for the species (Kabay 2016). While the prevalence of other diseases (i.e. Black Band, White Plague) in the southern Caribbean and the Seaflower Biosphere Reserve is relatively low, both abundance and partial mortality are related to the condition of the species' habitat (Cavada-Blanco 2018, Bernal-Sotelo *et al*. 2019), increasing the species susceptibility to local extinctions due to habitat degradation. In northern reefs of the Dominican Republic and in several locations of Haiti, extensive mortalities likely associated with SCTLD were observed in 2019 during Reef Check surveys (Ruben Torres pers. comm. 2020).

Caribbean reef-building coral populations have suffered considerable declines over the past 40 years due to the effects of diseases (Alvarez-Filip *et al*. 2011). White plague type 2 (WPD-II) was perhaps the first coral disease to become highly prevalent in populations of this species across the Caribbean. In Los Roques, Venezuela, a WPD-II epizootic event, almost extirpated this species from Madrizquí reef (Croquer *et al*. 2003, 2005). For the past four years, the novel stony coral tissue loss disease (SCTLD) has caused massive die-offs of colonies in Florida (Muller *et al.* 2020) and Mexico (Alvarez-Filip *et al.* 2019), and is now confirmed in the Greater Antilles (Irazabal and Rodriguez 2020). SCTLD has caused an 86% decline in colony abundance in Florida (Kabay 2016). In the Dominican Republic and Haiti, large numbers of dead colonies potentially affected by SCTLD were spotted in 2019, but the disease was not active (Ruben Torres pers. comm. 2020). Similarly, in the Yucatan Peninsula, this species had the highest prevalence among eleven susceptible species of reef-building corals (Alvarez-Filip *et al*. 2019). The

SCTLD can spread between 90 and 100 m per day (Muller *et al*. 2020), potentially decimating entire subpopulations of the species in less than a year. Therefore, the SCTLD currently represents the most important threat to the persistence of this species and other reef-building coral species in the Caribbean.

Localised threats can also drive declines in subpopulations of the species and ultimately lead to local range contractions (Sotelo-Bernal *et al*. 2019, Cavada-Blanco *et al*. 2020). Variability in health status and abundance among reefs within the same MPA in Providencia Island (Colombia) and Los Roques (Venezuela), suggest that overfishing, damaging fishing practices, poorly managed tourism and land-based pollution can reduce colony abundance and deteriorate the species' habitat. With low recruitment and potentially low diversity of genets within subpopulations, recovery from human-caused episodic events and natural disasters such as hurricanes may be slow for the species, and in some instances, cause functional or reproductive extinction (Neely *et al*. 2021).

Global stressors have placed coral reefs at a high risk of collapse (Hughes *et al*. 2017, Franca *et al.* 2020). Increased sea surface temperature as a result of anthropogenic climate change, has also increased the frequency of bleaching events (Hughes *et al*. 2018). The pace at which climate change impacts coral reefs does not allow reef-building corals to recover (Pandolfi *et al*. 2011), causing a rapid decline globally with changes in the composition and structure of coral reefs (Franca *et al.* 2020). Projections using IPCC scenarios suggest that marine heatwaves will increase in frequency and extent, with some scenarios projecting annual severe bleaching to be experienced by all tropical shallow reefs by the end of this century (UNEP 2020). Habitat deterioration and loss by bleaching events can also cause important declines in the species' population. Both abundance and occurrence of colonies of this species are significantly affected by the type of habitat and its condition (Cavada-Blanco *et al*. 2020). Because the species has a low frequency of occurrence, a widespread bleaching event can potentially eliminate local subpopulations.

Conservation Actions **(see Appendix for additional information)**

Conservation of this species is mostly represented by area-based protection through marine protected areas (MPAs) with differing categories of protection across the species global range. However, representativeness of the species is not guaranteed as some MPAs might not include part of the species' national range (Anderson *et al.* 2012) and management effectiveness, severity and scope of local threats vary within and between MPAs (Bustamante *et al*. 2014, Suchley and Alvarez-Filip 2018). Some of the MPAs where the presence of this species has been confirmed include the Florida Keys National Marine Sanctuary (US), Biscayne National Park (US), and Buck Island Reef National Monument (US), the Hol Chan Marine Reserve (Belize), Exuma Cays Land and Sea Park (Bahamas), Seaflower Biosphere Reserve (Colombia), Archipelago Los Roques National Park (Venezuela), Cuare Wildlife Refuge (Venezuela), Boca de Canasi Managed Floristic Reserve, Ciego de Avila National Park (Cuba), Bonaire National Marine Park (Bonaire), La Parguera and Mona and Desecho Island Natural Reserve (Puerto Rico), among others. All corals are listed on CITES Appendix II, which controls their trade to avoid uses that might endangered the species survival. However, adoption of the appendix varies among parties in terms of both legal frameworks and enforcement to regulate extraction and trade. The species has been included within national Red Lists and other schemes used to prioritise threatened species. Some of these include México, Cuba, Dominican Republic, Nicaragua, the Netherlands Antilles and the Endangered Species Act in the U.S., which extends to Puerto Rico and the US Virgin Islands. The threat category assigned to the species varies among countries. Ex-situ conservation measures for reintroduction in restoration projects

have started in some parts of the species' range (A. Croquer pers. comm. 2020). Fundación Dominicana de Estudios Marinos has significantly contributed with assisted sexual propagation for this species. From 2019 to 2020, they have collected eggs and sperm in Bayahibe, they have successfully fertilized to produce millions of larvae for assisted settlement and outplant thousands of spats into restoration sites (Sellares Blasco *et al.* 2021, Villalpando *et al.* 2021). In 2020, FUNDEMAR reported the first ever recorded recruit reared in the laboratory that survived the first 8 month bottleneck in the field (Villalpando *et al.* 2021).

More research in reproductive ecology including other subpopulations of the species' global range are needed. Recommended measures for conserving this species include: (1) research in reproductive ecology, genetic diversity and connectivity among subpopulations that are representative of the entire global range; (2) research into the epizootiology and dynamics of the SCTLD and potential interventions methods to decrease the disease contagion and colony mortality; (3) updated assessments of the species status within national distribution ranges and the establishment of national monitoring programmes adequate to detect changes on the species status in a timely manner as part of a coordinated regional effort; (4) increase representativeness of the species within absolute reserves and no-take zones throughout its range; (5) improve management efficacy and conservation value of existing MPAs to reduce local threats; (6) integrate land-marine management to reduce land-based pollution; and (7) continue efforts of assisted sexual propagation to restore natural populations with different genotypes.

Credits

Assessor(s): Cavada-Blanco, F., Croquer, A., Vermeij, M., Goergen, L. & Rodríguez-Martínez, R.

Reviewer(s): Obura, D.O., Polidoro, B., Gutierrez, L., Kemppinen, K. & Linardich, C.

Authority/Authorities: IUCN SSC Coral Specialist Group

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External Resources

For Supplementary Material, and for Images and External Links to Additional Information, please see the Red List website.

Appendix

Habitats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Habitat	Season	Suitability	Major Importance?
9. Marine Neritic -> 9.2. Marine Neritic - Subtidal Rock and Rocky Reefs	Resident	Marginal	-
9. Marine Neritic -> 9.8. Marine Neritic - Coral Reef	Resident	Suitable	Yes

Threats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
1. Residential & commercial development -> 1.2. Commercial & industrial areas	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
1. Residential & commercial development -> 1.3. Tourism & recreation areas	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
4. Transportation & service corridors -> 4.3. Shipping lanes	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale) [harvest]	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.3. Unintentional effects: (subsistence/small scale) [harvest]	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.6. Motivation Unknown/Unrecorded	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
6. Human intrusions & disturbance -> 6.1. Recreational activities	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.2. Species disturbance		

8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.1. Unspecified species	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance 2. Species Stresses -> 2.3. Indirect species effects -> 2.3.2. Competition		
8. Invasive and other problematic species, genes & diseases -> 8.2. Problematic native species/diseases -> 8.2.1. Unspecified species	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance 2. Species Stresses -> 2.3. Indirect species effects -> 2.3.2. Competition		
8. Invasive and other problematic species, genes & diseases -> 8.4. Problematic species/disease of unknown origin -> 8.4.2. Named species (Aurantimonas coralicida)	Ongoing	-	-	Low impact: 3
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
9. Pollution -> 9.1. Domestic & urban waste water -> 9.1.3. Type Unknown/Unrecorded	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.2. Industrial & military effluents -> 9.2.3. Type Unknown/Unrecorded	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.2. Soil erosion, sedimentation	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.4. Type Unknown/Unrecorded	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
9. Pollution -> 9.5. Air-borne pollutants -> 9.5.3. Ozone	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
11. Climate change & severe weather -> 11.3. Temperature extremes	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance 2. Species Stresses -> 2.3. Indirect species effects -> 2.3.8. Other		
11. Climate change & severe weather -> 11.4. Storms & flooding	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		

Conservation Actions in Place

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Action in Place
In-place land/water protection
Occurs in at least one protected area: Yes

Conservation Actions Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Action Needed
1. Land/water protection -> 1.1. Site/area protection
2. Land/water management -> 2.1. Site/area management
2. Land/water management -> 2.3. Habitat & natural process restoration
3. Species management -> 3.2. Species recovery
3. Species management -> 3.4. Ex-situ conservation -> 3.4.1. Captive breeding/artificial propagation
3. Species management -> 3.4. Ex-situ conservation -> 3.4.2. Genome resource bank

Research Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed
1. Research -> 1.1. Taxonomy
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
1. Research -> 1.4. Harvest, use & livelihoods
1. Research -> 1.5. Threats
1. Research -> 1.6. Actions
3. Monitoring -> 3.1. Population trends

Additional Data Fields

Distribution
Lower depth limit (m): 20
Upper depth limit (m): 1
Population
Population severely fragmented: No

Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 10

The IUCN Red List Partnership

The IUCN Red List of Threatened Species™ is produced and managed by the IUCN Global Species Programme, the IUCN Species Survival Commission (SSC) and The IUCN Red List Partnership.

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