Regional Assessment of the Seagrass *Halophila decipiens* Ostenf. in the Tropical Atlantic Seagrass Bioregion (Bioregion 2) for the IUCN Red List[1,2]

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PLANTAE - TRACHEOPHYTA - LILIOPSIDA - ALISMATALES - HYDROCHARITACEAE - Halophila - decipiens
Common Names: Paddle Grass (English), Species code: Hd (English)
Synonyms: No Synonyms
Taxonomic Note:

This species has often been confused with *Halophila ovalis*. and *Halophila stipulacea*. *Halophila decipiens* is monoecious, has serrate leaf tips and hairs on both sides of its leaves.

Red List Status
LC - Least Concern, (IUCN version 3.1)

Red List Assessment

Assessment Information

Assessor(s): Creed, JC, Furman BT, Peralta, AC

Publication date: 16 May 2025

Time period assessed: 2007-2020

Assessment Rationale

Halophila decipiens has a tropical and subtropical, circumglobal distribution and can be locally abundant. In deeper waters, *H. decipiens* has few major threats; however, coastal development, reduced water quality (Short et al 2010), invasive species, overgrazing, storms and hurricanes can affect seagrass beds in shallower and some deeper >20m) areas. The population trend in the Tropical Atlantic bioregion is stable, with range expansion such as Brazil (Gorman et al 2016) and east Florida, USA (Virnstein and Hall 2009) balancing sporadic declines due to sedimentation (limitation of light - Kenworthy 1993) storms and hurricanes (Fonseca et al 2008; Virnstein and Hall 2009), overgrazing (Fourqurean et al 2019) and invasive species (Willette and Ambrose 2009; Willette et al 2014; Muthukrishnan et al 2017). *Halophila decipiens* remains listed as Least Concern for the 2007-2020 assessment period for the Tropical Atlantic Seagrass Bioregion (Bioregion 2).

[1] This regional assessment does not constitute the global assessment for this species, given that its global distribution is not limited to the Tropical Atlantic Seagrass Bioregion

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Distribution

Geographic Range

Halophila decipiens occurs mostly in the tropics and is circumglobal.

In the Western Atlantic, this species occurs along the West Florida Shelf in the eastern Gulf of Mexico and the East Florida coast where it recently expanded its northern distribution (to 28°01′N, Virnstein and Hall 2009). It also occurs throughout the Caribbean Sea down to Venezuela, in Bermuda and in northeast to southeast Brazil, where it appears to be expanding pole-ward (to 23.83°S, Gorman et al 2016).

Elevation / Depth / Depth Zones

Depth Lower Limit (in meters below sea level): 62
Depth Upper Limit (in meters below sea level): 0
Depth Zone: Shallow photic (0-50m), Deep Photic (51-200m)

Map Status

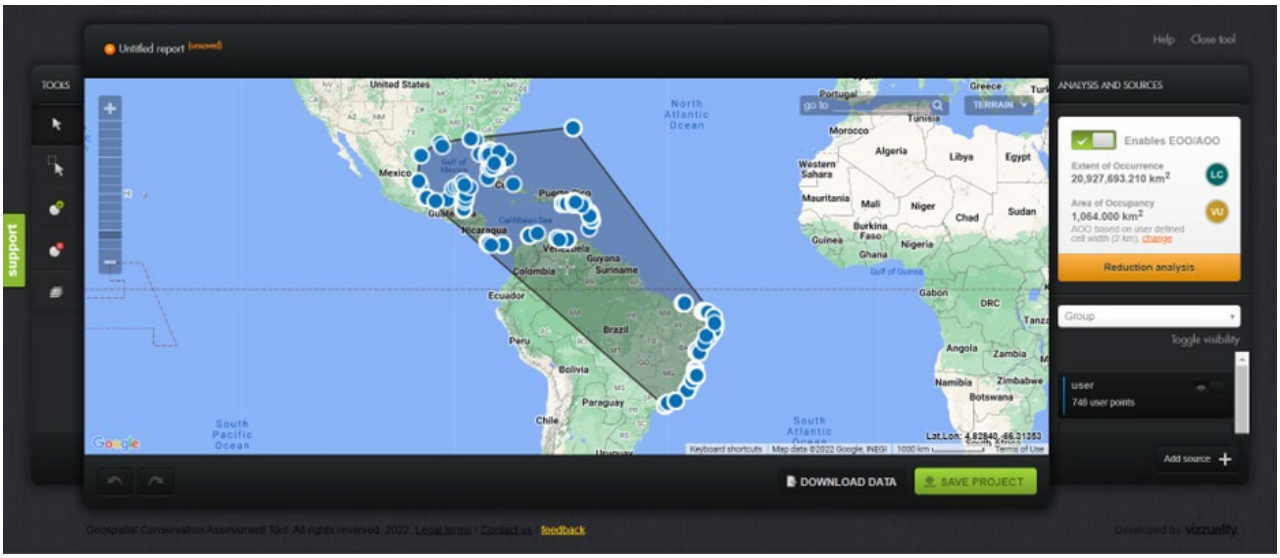
Map Status	How the map was created, including data sources/methods used:	Please state reason for map not available:	Data Sensitive?	Justification	Geographic range this applies to:	Date restriction imposed:
Done	-	-	-	-	Tropical Atlantic Seagrass Bioregion (Bioregion 2)	Assessment period

Occurrence

Countries of Occurrence

Country	Presence	Origin	Formerly Bred	Seasonality
Barbados	Extant	Native	-	Resident
Belize	Extant	Native	-	Resident
Bonaire, Sint Eustatius and Saba	Extant	Native	-	Resident
Bonaire, Sint Eustatius and Saba -> Bonaire	Extant	Native	-	Resident
Bonaire, Sint Eustatius and Saba -> Saba	Extant	Native	-	Resident
Bonaire, Sint Eustatius and Saba -> Sint Eustatius	Extant	Native	-	Resident
Brazil	Extant	Native	-	Resident
Colombia	Extant	Native	-	Resident
Costa Rica	Extant	Native	-	Resident

Cuba	Extant	Native	-	Resident
Curaçao	Extant	Native	-	Resident
Dominican Republic	Extant	Native	-	Resident
Honduras	Extant	Native	-	Resident
Grenada	Extant	Native	-	Resident
Guadeloupe	Extant	Native	-	Resident
Jamaica	Extant	Native	-	Resident
Mexico	Extant	Native	-	Resident
Panama	Extant	Native	-	Resident
Puerto Rico	Extant	Native	-	Resident
Saint Martin (French part)	Extant	Native	-	Resident
Saint Vincent and the Grenadines	Extant	Native	-	Resident
Sint Maarten (Dutch part)	Extant	Native	-	Resident
Trinidad and Tobago	Extant	Native	-	Resident
United States (Florida)	Extant	Native	-	Resident
Venezuela, Bolivarian Republic of	Extant	Native	-	Resident
Virgin Islands, U.S.	Extant	Native	-	Resident



FAO Area Occurrence

	Presence	Origin	Formerly Bred	Seasonality
31. Atlantic - western central	Extant	Native	-	Resident
41. Atlantic - southwest	Extant	Native	-	Resident

Population

Halophila decipiens is widespread and locally abundant. It can have dense cover but low biomass (Short et al 2010). It may occur in very deep waters [up to 85m according to den Hartog (1970), 62m in Brazil (Oliveira et al 1983)]; however, most knowledge is restricted to shallow water populations and more research is needed to better understand the dynamics of deeper subpopulations (Fonseca et al 2008). Within the Tropical Atlantic Bioregion it has expanded its range both north and south since the last IUCN assessment (Virnstein and Hall 2009; Gorman et al 2016). It has suffered a number of localized temporary reductions in biomass in some locations, but has increased in others. Its regional population trend is therefore thought to be stable (Short et al 2010).

Halophila decipiens can occur in both annual and perennial populations. It can propagate through budding, but primarily relies on a buried seed bank for population re-establishment in seasonally fluctuating or high disturbance environments (Hammerstrom et al 2006; Bell et al 2008; Schubert and Demes 2017). It is a highly fecund, annual and opportunistic species (Kenworthy 1993) that may be favored by disturbance (McMillan 1988), but is unable to compete once the other species are established (Preen et al 1995; Short et al 2010; Steiner et al 2010).

A range extension was reported for *H. decipiens* in the Indian River Lagoon, east coast of Florida, USA (21.5 km north, Virnstein and Hall 2009). Because patch sizes were small, the expansion was thought to be recent (survey carried out in 2007) and due to unusually clear water conditions due to drought, recent mild/warmer winters and the transport of propagules due to numerous previous hurricanes (Virnstein and Hall 2009).

Although Virnstein and Hall (2009) suggest that the east Florida northern limit will advance and contract, in Brazil the southern range of *H. decipiens* has extended incrementally. The southern limit of *H. decipiens* in the Tropical Atlantic bioregion has been recognized since 1931 (Oliveira et al 1983) as Urca inlet, Rio de Janeiro, Brazil, where Casares and Creed (2008) reported a mean biomass of 1.83 $g.m^{-2}$. More recent observations in 2010 pushed this southern limit 207 km south to Ubatuba, Brazil (Ferreira 2012; Ferreira et al 2015); in 2015 another population was reported in São Sebastião, Brazil, a further 60km south, a range expansion into warm-temperate waters of the southwestern Atlantic (Gorman et al 2016). The *Halophila decipiens* meadows at São Sebastião, Brazil, were exclusively mono-specific, being found over a fairly shallow range of 3–6.7 m. Shoot density varied among sites (~400 to 2100, depending on the location), with leaf pair counts typically higher in sandy-mud areas than those in sand or silty-mud (Gorman et al 2016). The mean above-ground biomass estimated during 2018 (38.7 $g.m^{-2}$) was substantially greater than that evaluated three years earlier (27.0 g.m-^{2}), although the relative degree of increase varied among sites. There was a similar trend for below-ground biomass, in which the initial estimates from 2015 (35.4 $g.m^{-2}$) were much less than those obtained during 2018 (74.4 $g.m^{-2}$) (Gorman et al 2020).

Localized declines in *H. decipiens* have been reported in the Caribbean at Dominica, Martinique and St. Lucia (Willette and Ambrose 2009; Willette et al 2014) due to the continued expansion of, and competition with, the trans-Atlantic invasive congener seagrass *Halophila stipulacea*. In Sint Eustatius, Caribbean Netherlands, *H. decipiens* may have become locally extinct due to this invasive seagrass (Van der Loos et al 2017) and in the US Virgin Islands it has declined in abundance at 78 of 84 monitoring points due to the invasion of *Halophila stipulacea* (Muthukrishnan et al 2017). In Belize (where it grows mixed with *H. baillonii*) and in Honduras populations are stable (Brigitta van Tussenbroek personal communication).

In Bermuda *H. decipiens* tends to occur alone, occupying sites in deeper and more turbid water than the other seagrass species. *H. decipiens* is not abundant or common in Bermuda: out of 55 sites sampled only 3.6% had this species present (in 1997 - 2004); of these, 50% of sites sampled had less than six shoots per m^2 (Murdoch et al 2007). In another survey *H. decipiens* was found at 10% of surveyed sites (Manuel et al 2013). Assessments of elemental content, stable isotopic composition and leaf morphology have indicated that recently populations of *H. decipiens* have suffered significant decline due to grazing by the green turtle (*Chelonia mydas*) (Fourqurean et al 2019). Overgrazing has been driving the generalized decline in the seagrasses on the Bermudan Shelf from 2007-2017.

Hurricanes are known to cause shifts in *H. decipiens* bed location and population biomass, but populations tend to recover rapidly (Bell et al 2008, Steiner et al 2010). In some areas the rearranging of large areas of sand can lead to a greater frequency of *H. decipiens* but lower density coverage (Fonseca et al 2008; Virnstein and Hall 2009). In this respect, population recovery is facilitated by the seagrass' plasticity, short life cycle, high reproductive output and the apparent existence of a moveable seed bank allowing large-scale dispersal of plant propagules (hundreds of meters) followed by clonal growth of the seagrass over very small distances (m) (Bell et al 2008; Fonseca et al 2008; Virnstein and Hall 2009; Schubert and Demes 2017).

In the Gulf of Mexico, *H. decipiens* is found in deeper water along much of the West Florida Shelf (Continental Shelf Associates and Martel Laboratories 1985; Continental Shelf Associates 1991; Hammerstrom et al 2006, Iverson and Bittaker 1986, Short et al 2010). In estuarine settings, it is known to occur from the Ten Thousand Islands to Tampa Bay, Florida, USA (Tampa Bay Estuary Program, unpublished data, Yarbro and Carlson 2016), and sporadically in nearshore waters as far north as Saint George Sound (Keough and Chernoff 1987). On the US Atlantic Coast, it is found in Lake Worth Lagoon and the southern Indian River Lagoon (Yarbro and Carlson 2016). In the Mexican part of the

Gulf of Mexico, it is found at Veracruz (CONANP, 2017), and sparsely distributed at various sites along N-Yucatan Peninsula (Espinoza-Avalos, 1996).

During 1972 to 1973, this species was reported to have a mean dry biomass of 3.8 $g.m^{-2}$ along the northwest Cuban shelf at depths of up to 24.3 m, being 65 % less abundant than its congeneric *H. engelmannii*. It was reported to be the second least abundant seagrass species studied in Cuba (Buesa 2021).

Population Information

Continuing decline in mature individuals?	Qualifier	Justification
-	-	

Continuing decline in number of subpopulations	Qualifier	Justification
-	-	

Habitats and Ecology

Halophila decipiens is typically found on coarse sediments, sand, and muddy bottoms. It can be found in deep waters but is also found in the shallows, especially under docks, in turbid areas or at the edge of patches of other more dominant seagrasses. *Halophila decipiens* can grow in areas with high sedimentation. It is monoecious and can produce approximately 30 seeds per fruit (Short et al 2010).

In the Caribbean, it can be found to a depth of around 40 m (Steiner et al 2010), but in the southwest Atlantic (Brazil) has been reported up to 62m (Oliveira et al 1983). This species tends to form deep monospecific seagrass beds but does grow at the shallower and lateral margins of other dominant seagrasses such as *S. filiforme* (Steiner et al 2010), in very shallow turbid sites on the east coast of Florida, USA (Virnstein and Hall 2009), the Gulf of Mexico (Slone et al 2013), the Caribbean (Schubert and Demes 2017; Martínez-Daranas and Suárez 2018) and Brazil (Gorman et al 2016; Howard et al 2018). In northeast Brazil it is reported to grow mainly in rock pools formed at low tide (Silva et al 2018). It may also grow in mixed stands with *Halophila baillonii, Halophila stipulacea, Halodule wrightii, Halodule beaudettei*, *Halodule emarginata* and *Thalassia testudinum* (Short et al 2006; Willette and Ambrose 2009; Barros et al 2014; Willette et al 2014; Silva et al 2018; Brigitta van Tussenbroek personal communication). It can be seasonal and has a large seed bank (Bell et al 2008; Short et al 2010; Schubert and Demes 2017). It is a rapid re-colonizer when beds are disturbed by storms, hurricanes, grazing or trawls (Fonseca et al 2008; Virnstein and Hall 2009; Short et al 2010).

In Brazil, patches of *H. decipiens* have been shown to have a higher biodiversity (total mean density, richness, and diversity) of associated macrofauna (invertebrates) than nearby unvegetated patches, probably due to higher productivity and more complex habitat (Casares and Creed 2008; Pavone et al 2020).

IUCN Habitats Classification Scheme

Habitat	Season	Suitability	Major Importance?
9.4. Marine Neritic -> Marine Neritic - Subtidal Sandy	-	Suitable	-
9.5. Marine Neritic -> Marine Neritic - Subtidal Sandy-Mud	-	Suitable	-
9.6. Marine Neritic -> Marine Neritic - Subtidal Muddy	-	Suitable	-
9.8.3. Marine Neritic -> Marine Neritic - Coral Reef -> Foreslope (Outer Reef Slope)	-	Suitable	-
9.8.5. Marine Neritic -> Marine Neritic - Coral Reef -> Inter-Reef Soft Substrate	-	Suitable	-

9.8.6. Marine Neritic -> Marine Neritic - Coral Reef -> Inter-Reef Rubble Substrate	-	Suitable	-
9.9. Marine Neritic -> Marine Neritic - Seagrass (Submerged)	-	Suitable	-
9.10. Marine Neritic -> Marine Neritic - Estuaries	-	Suitable	-

Life History

Generation Length	Justification	Data Quality
1	Recruitment time	-

Breeding Strategy

Does the species lay eggs?
No

Does the species give birth to live young
No

Does the species exhibit parthenogenesis
No

Does the species have a free-living larval stage?
No

Does the species require water for breeding?
Yes

Systems

System: Marine

Use and Trade

It is exploited for use as an ornamental in marine aquaria in Brazil (Gurjão and Lotufo 2018).

Threats

Halophila decipiens has few major threats, partly because it is found in deeper waters. Coastal development can locally affect seagrass beds in more shallow areas, as can reduced water quality. Trawls and increasingly frequent storms and hurricanes can disturb beds, but these are usually re-colonized rapidly (Fonseca et al 2008; Virnstein and Hall 2009; Short et al 2010).

This species has numerous natural grazers such as turtles, dugongs/manatees and fish, and if in high numbers these can result in overgrazing of biomass (Short et al 2010; Fourqurean et al 2019). Localized declines in *H. decipiens* have been reported in numerous studies in the Caribbean due to the continued expansion of the invasive non-native *Halophila stipulacea* (Willette and Ambrose 2009; Willette et al 2014; Muthukrishnan et al 2017). In Sint Eustatius, Caribbean Netherlands, *H. decipiens* may have become locally extinct due to competitive exclusion (Van der Loos et al 2017). The arrival of *H. stipulacea* is synergistic with overgrazing and can actually lead to increased grazing on the native seagrasses, as demonstrated recently by Christianen et al (2019).

Conservation

No specific conservation measures are in place for *H. decipiens*, partly due to its habitat in deeper waters. The Red List for Cuban Flora classifies *H. decipiens* as "Threatened" (Martínez-Daranas and Suárez 2018). It is found in some Marine Protected Areas (MPAs) (e.g., Belize; US Virgin Islands - Virgin Islands National Park) but it is usually outside MPAs because of its depth range (Short et al 2010; Muthukrishnan et al 2017). Currently, a seagrass management plan is being developed in Bermuda (Short et al 2010; Kathryn Coates personal communication).

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