Regional Assessment of the Seagrass *Halodule wrightii* Asch. in the Tropical Atlantic Seagrass Bioregion (Bioregion 2) for the IUCN Red List [1,2]

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PLANTAE - TRACHEOPHYTA - LILIOPSIDA - ALISMATALES - CYMODOCEACEAE - *Halodule* - *wrightii*

Common Names: Shoalgrass (English), Species code: Hw (English)

Synonyms: *Diplanthera wrightii*

Taxonomic Note: *Halodule wrightii* is a well-established species, although the taxonomic status of several other *Halodule* species in the Atlantic and Indo-Pacific remains unclear. The taxonomy of *Halodule* species is based primarily on leaf tip morphology, because observations of its sexual reproductive structures have been lacking or infrequent (den Hartog, 1964; Kuo and Den Hartog, 2001). Furthermore, *Halodule* spp. are phenotypically plastic, and the use of leaf tip morphology as a diagnostic character has been repeatedly questioned (Ito and Tanaka, 2011; Wagey and Calumpong, 2013), and, in some cases, leaf tip shape has been shown to vary among shoots from the same rhizome (Phillips, 1967; Wheeler et al., 2020). Genetic studies are currently underway to provide greater clarity regarding the taxonomy of this species and those very closely related, and future synonymizing of the latter with *H. wrightii* is possible.

Red List Status
LC - Least Concern, (IUCN version 3.1)
Extent of Occurrence (EOO) in Bioregion 2= 9054605 km²
Area of occupancy (AOO) in Bioregion 2= 1152 km²

[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.

[2] **Citation:** Samper-Villarreal, J., Bandeira, S.O., Creed, J.C., Frade, D.G., Furman, B.T., El-Hacen, E.-H.M., Serrão, E.A. & van Tussenbroek, B.I. (2025). Regional Assessment of the Seagrass *Halodule wrightii* Asch. in the Tropical Atlantic Seagrass Bioregion (Bioregion 2) for the IUCN Red List. https://doi.org/10.5281/zenodo.15587549

Red List Assessment

Assessment Information

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Time period assessed: 2007-2020

Assessment Rationale

This assessment was carried out by analyzing the information on the species *Halodule wrightii* during the 2007-2020 time period. The species is widespread and abundant in the Caribbean Sea and Gulf of Mexico, it is the dominant species in Brazil and the tropical coast of western Africa. It has also been reported in the Eastern Tropical Pacific. The overall population trend for this species is stable, and possibly increasing in some parts of its range due to variations in water temperature and salinity. This species is highly tolerant to a range of environmental conditions, such as high nutrient loads, high salinities, and ocean acidification. Locally, shoalgrass has been affected by the continuing abundance of the invasive seagrass *Halophila stipulacea*, parasites, damage from boating activities, destructive fishing practices, excessive nutrient loads and pollutants, and harmful algal blooms. Given its wide distribution and abundance, as well as its resilience to multiple stressors, *H. wrightii* remains of Least Concern, in congruence with the previous assessment for this species (Short et al., 2010).

Distribution

Geographic Range

In the Tropical Atlantic Seagrass Bioregion, *H. wrightii* has a tropical and subtropical distribution, found in the eastern and western Atlantic, the Caribbean, Gulf of Mexico and the Eastern Tropical Pacific. During this assessment time period of 2007-2020, *H. wrightii* was reported in El Salvador on the Pacific (Ramírez et al., 2017), and at Bermuda (Larkin et al., 2008; Digiantonio et al., 2020) and from the northern parts of Florida down to the Keys (Digiantonio et al., 2020). *Halodule wrightii* is also abundant in the Gulf of Mexico, e.g. Florida, Alabama, Mississippi, Louisiana, and Texas (Larkin et al., 2008; Walker and Campbell, 2009; Wilson and Dunton, 2018; Darnell et al., 2021) and in Veracruz (Rivera-Guzmán et al., 2014), also in Campeche (Pérez-Espinosa et al., 2019) and Yucatán (Espinoza-Avalos, 1996) bordering the Gulf of Mexico. This species has been reported from the Caribbean coast of Mexico, Costa Rica, Colombia, and Venezuela (Molina Hernández and van Tussenbroek, 2014; Mariño et al., 2018; Samper-Villarreal et al., 2018; López-Sánchez et al., 2020; Piñeros Pérez, 2020). *Halodule wrightii* is also found on many Caribbean Islands, e.g., Bonaire, Curacao, Dominica, Grenada, and others (Willette and Ambrose, 2009; Willette et al., 2014; Scheibling et al., 2018). In Brazil, *H. wrightii* is the most widespread seagrass species, particularly in the northeast which has higher temperatures (Marques and Creed, 2008; Copertino et al., 2016). The southern limit of this species in Brazil is in Florianópolis (Copertino et al., 2016). This species has been expanding its range into the Brazilian subtropical region, a phenomenon which may be linked to climate change (Barros et al., 2014). In Africa (Eastern Atlantic), a review of all records is available in Chefaoui et al. 2021 (supplementary materials). This species has been reported in Cabo Verde (Creed et al., 2016), São Tomé e Príncipe (Alexandre et al., 2017), Angola, Gabon (Tavares et al. 2022), The Gambia, Sierra Leone and Guinea (Sidi Cheikh et al 2023) and it is common in Mauritania and Senegal (Cunha and Araújo, 2009, Chefaoui et al. 2021, Sidi Cheikh et al 2023). In the eastern Atlantic, the northern limit of *H. wrightii* is found at Banc d´Arguin in Mauritania (Cunha and Araújo, 2009) and the southern limit is in Angola (Tavares et al., 2022). Along the African coast, predictive models suggest that its distribution will expand greatly in the Banc d'Arguin in the next few decades although under more drastic climate scenarios it could suffer a regression in the warmer regions of the coast of western Africa (Chefaoui et al., 2021).

Notes on H. wrightii presence in other bioregions:

- *Halodule wrightii* is also found further North on the Atlantic coast of USA in North Carolina (Seagrass Bioregion 1) which constitutes its northern limit in the Western Atlantic (Biber et al., 2009; Digiantonio et al., 2020).
- This species is also found in the Pacific in Baja California (Seagrass Bioregion 4) at Bahía Balandra in Bahía La Paz (Campos-Dávila et al., 2019). It was recorded for the first time at Guerrero Negro, further north on the coast of Baja California in 2019, which would constitute the northern limit in the eastern Pacific for this species (Latitude 27°53´N; unpublished data Van Tussenbroek, Wong & Santa María-Gallegos). In this area, *H. wrightii* is found mixed with benthic *Sargassum* spp. (Mexican Pacific; unpublished data Van Tussenbroek, Wong & Santa María-Gallegos).
- Atlantic Africa is less surveyed for seagrasses; therefore, it is likely that this species might occur across all countries in this region between its biogeographical limits in Mauritania and Angola.
- At the time this assessment was finalized, previous reports of *H. wrightii* in the Indian Ocean (Seagrass Bioregion 6) were thought to correspond to *Halodule univervis* based on molecular evidence (Lusana & Legendo 2023; E.Serrao, S.Bandeira, unpublished data for Mozambique).

Elevation / Depth / Depth Zones

Depth Lower Limit (in metres below sea level): 18 m (Short et al., 2010). In western Africa, in very turbid waters found in most of its range its maximum depth range is frequently 1 m below the lowest low tide (E. Serrao, personal observations in the Banc d'Arguin, the Bijagós Islands and Mussulo Bay, Angola), but reaches >10 m depth in the offshore islands of São Tomé e Príncipe and locally in other regions depending on sufficient irradiance levels (e.g, in parts of the Senegal open coast and in the Banc d'Arguin if not shaded by denser larger seagrasses, E. Serrao, unpublished data).

Depth Upper Limit (in metres below sea level): 0

Depth Zone: Shallow photic (0-50m)

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	-	-	-	-	-	-

Occurrence

Countries of Occurrence [3]

Country	Presence	Origin	Formerly Bred	Seasonality
Angola	Extant	Native	-	Resident
Antigua and Barbuda	Extant	Native	-	Resident
Aruba	Extant	Native	-	Resident
Bahamas	Extant	Native	-	Resident

[3] This listing includes countries from this regional assessment and those reported for Bioregion 2 in the previous global assessment of *Halodule wrightii* (Short et al. 2010).

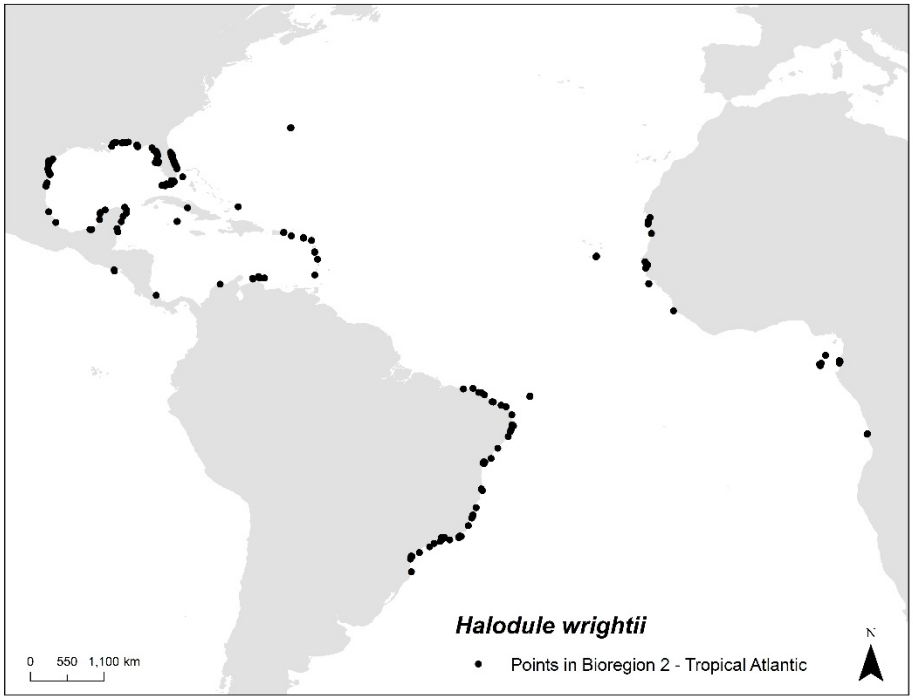
Barbados	Extant	Native	-	Resident
Belize	Extant	Native	-	Resident
Bermuda	Extant	Native	-	Resident
Bonaire	Extant	Native	-	Resident
Brazil	Extant	Native	-	Resident
Cape Verde	Extant	Native	-	Resident
Cayman Islands	Extant	Native	-	Resident
Colombia	Extant	Native	-	Resident
Costa Rica	Extant	Native	-	Resident
Cuba	Extant	Native	-	Resident
Curaçao	Extant	Native	-	Resident
Dominica	Extant	Native	-	Resident
Dominican Republic	Extant	Native	-	Resident
El Salvador	Extant	Native	-	Resident
Equatorial Guinea	Extant	Native	-	Resident
Gabon	Extant	Native		Resident
Grenada	Extant	Native	-	Resident
Guadeloupe	Extant	Native	-	Resident
Guatemala	Extant	Native	-	Resident
Guinea	Extant	Native	-	Resident
Guinea-Bissau	Extant	Native	-	Resident
Haiti	Extant	Native	-	Resident
Honduras	Extant	Native	-	Resident
Jamaica	Extant	Native	-	Resident
Martinique – Lesser Antilles	Extant	Native	-	Resident
Mauritania	Extant	Native	-	Resident
Mexico	Extant	Native	-	Resident
Montserrat	Extant	Native	-	Resident
Nicaragua	Extant	Native	-	Resident
Panama	Extant	Native	-	Resident
Puerto Rico	Extant	Native	-	Resident
Saint Kitts and Nevis	Extant	Native	-	Resident
Saint Lucia	Extant	Native	-	Resident
Saint Martin (French part)	Extant	Native	-	Resident
Saint Vincent and the Grenadines	Extant	Native	-	Resident
São Tomé and Príncipe	Extant	Native	-	Resident
Sierra Leone	Extant	Native	-	Resident
Sint Maarten (Dutch part)	Extant	Native	-	Resident
Senegal	Extant	Native	-	Resident
The Gambia	Extant	Native		Resident
Trinidad and Tobago	Extant	Native	-	Resident

Turks and Caicos Islands	Extant	Native	-	Resident
United States	Extant	Native	-	Resident
Venezuela, Bolivarian Republic of	Extant	Native	-	Resident
Virgin Islands, British	Extant	Native	-	Resident
Virgin Islands, U.S.	Extant	Native	-	Resident

FAO Area Occurrence

	Presence	Origin	Formerly Bred	Seasonality
21. Atlantic - northwest	Extant	Native	-	Resident
31. Atlantic - western central	Extant	Native	-	Resident
34. Atlantic - eastern central	Extant	Native	-	Resident
41. Atlantic - southwest	Extant	Native	-	Resident
47. Atlantic - southeast	Extant	Native	-	Resident
77. Pacific - eastern central	Extant	Native	-	Resident

Regional Assessment Map [4]



[4] This map only includes reports for the 2007-2020 time period, reports from the previous assessment (Short et al. 2010) have not been included.

Population

Halodule wrightii is a locally abundant and widespread seagrass. It is the dominant species in Brazil and tropical Atlantic Africa (Short et al., 2010), except in Mauritania where temperate species are more abundant (Chefaoui et al. 2021). In Brazil, near its southernmost limit in the Eastern Atlantic, populations are dynamic, with regular appearance and disappearance of meadows in a somewhat predictable pattern, often present as patchy meadows that rarely flower (Sordo et al., 2011; Copertino et al., 2016). Near the southern limit for *H. wrightii* in Brazil, biomass and morphological features vary, such as smaller leaves and lower number of leaves per shoot, thinner rhizomes and a greater internodal distance (Sordo et al., 2011).

In 2007, a shoalgrass meadow disappeared at a tropical island in northeastern Brazil (Itamaracá, Pernambuco) (Pitanga et al., 2012). Loss and decline of *H. wrightii* populations at Rasa da Cotinga Island in Brazil occurred in 2006, just before the start of this assessment period (Sordo et al., 2011).

Population Information

Continuing decline in mature individuals?	Qualifier	Justification
-	-	-

Continuing decline in number of subpopulations	Qualifier	Justification
-	-	-

Habitats and Ecology

Halodule wrightii is a small and colonizing seagrass. It has a high shoot turnover rate and can form seed banks with small dormant seeds with a hard seed coat in the sediment. This species has a high capacity of recovery from disturbances yet limited resistance capacity (Kendrick et al., 2012; Kilminster et al., 2015; O´Brien et al., 2018). This species has been previously described as widely distributed, typically found in sandy and muddy sediments, and highly tolerant to wide ranges of salinity, temperature, turbidity or nutrient concentrations (Short et al., 2010).

Shoalgrass can grow intermixed with other seagrasses such as *Ruppia* spp. in the Gulf of Mexico and Caribbean (Cho and May, 2008; den Hartog et al., 2016), *Thalassia testudinum* and *Syringodium filiforme* in the Caribbean (Kenworthy et al., 2018; Furman et al., 2019; Molina-Hernandez and van Tussenbroek, 2014), *Halophila decipiens* in Brazil and the Gulf of Mexico (Espinoza-Avalos, 1996; Barros et al., 2014), and intermixed with *Cymodocea nodosa* in the shallow subtidal, and with *Zostera noltei* on the lower margins of intertidal flats in Mauritania and Senegal (Cunha and Araújo, 2009, Chefaoui et al. 2021, Sidi Cheikh et al 2023). This species is also found mixed with marine macroalgae such as rooted Bryopsid green algae (calcifying or uncalcified) in the Caribbean (unpublished data van Tussenbroek), the green algae *Caulerpa cupressoides* in Mauritania, *Caulerpa racemosa* and *Caulerpa sertularioides* on the Senegal open coast, and *C. sertularioides, C. cupressoides* and the red alga *Spyridia* in Guine-Bissau (E. Serrao unpublished data). It can be covered by epiphytic algae, such as the filamentous red alga *Dasya* and the filamentous brown alga *Hincksia mitchelliae* (Sordo et al., 2011; Barros et al., 2013; Alexandre et al., 2017). Epiphyte loads on shoalgrass leaves are affected by epiphyte grazer abundance, such as amphipods (Myers and Heck Jr, 2013).

Many organisms consume *Halodule wrightii* directly, including mammals, turtles, birds, fish and invertebrates. It is consumed by both the Antillean manatee (*Trichechus manatus*) in the Americas (Rodrigues et al., 2021) and by African manatees (*Trichechus senegalensis*) in west Africa (Keith Diagne, 2014). The green sea turtle *Chelonia mydas* can consume it to a large extent (Leemans et al., 2020), representing up to 43% of their stomach contents at a foraging location in Brazil (Guebert-Bartholo et al., 2011; Gama et al., 2016), and being present in more than 60% of stomach contents of green turtles in Guinea-Bissau (Diaz-Abade et al. 2021). Green turtles have been proposed as the most likely vector for dispersal of *H. wrightii* along the coast of Africa (Tavares et al., 2022). Some ducks feed exclusively on *Halodule wrightii* at wintering sites (Michot et al., 2008). Feeding essays in Florida showed that the pinfish *Lagodon rhomboides*, filefish *Stephanolepis hispidus*, emerald parrotfish *Nicholsina usta*, and the sea urchin *Lytechinus variegatus* are common seagrass consumers, with sea urchins consuming up to 71% of *H. wrightii* (Prado and Heck Jr, 2011). Male flowers of *H. wrightii* are consumed by the juvenile fish *Sphoeroides spengleri* (Tetraodontidae), *Canthigaster rostrata* (Tetradontidae), *Sparisoma rubripinne* (Scaridae) and *Acanthurus bahianus* (Acanthuridae)

(van Tussenbroek and Muhlia-Montero, 2013). In Cape Verde, the most common animal found in *H. wrightii* meadows was the marine gastropod *Turritella bicingulata* (Creed et al., 2016). The amphioxus *Branchiostoma californiense* has been found in *H. wrightii* meadows in the Gulf of California (Campos-Dávila et al., 2019). *Halodule wrightii* plays an important role in seasonal and sediment profile variations of molluscan assemblages (Barros and Rocha-Barreira, 2013) and can induce sediment accumulation, forming banks up to 20 cm in height (Alexandre et al., 2017). This seagrass is thus clearly a significant component of marine food webs where it occurs.

Sexual reproduction of *H. wrightii* occurs throughout its geographical range. Not many studies report sexual reproduction because sexual reproductive structures are cryptic and ephemeral thereby challenging their documentation (den Hartog, 1964; Phillips and Menez, 1988; Kowalski and DeYoe, 2016). While not much is known about *H. wrightii* seed banks, a recent study at 815 sites in the northern Gulf of Mexico revealed spatial variability in seed reserves, ranging from 0 to 5290 seeds m^{-2}. In their study, specific sites were identified as having high seed density or being seed "hot spots", with adjacent high genetically diverse shoalgrass communities six years after seed sampling (Darnell et al., 2021). Genetic data along its range for the western coast of Africa show that they reproduce both sexually and clonally (Tavares et al., 2022).

Halodule wrightii has shown to be useful for restoration efforts in Florida given its fast colonization and growth rates, while also facilitating *T. testudinum* recovery with the aid of bird roosting stakes which provide a slight increase in nutrient availability (Kenworthy et al., 2018; Furman et al., 2019). Massive restoration efforts in Tampa Bay, Florida, have increased *H. wrightii* frequency of occurrence from 20% in 1998 to 37% in 2007 and to 46% by 2015 (Sherwood et al., 2017).

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	-
9.8.2. Marine Neritic -> Marine Neritic - Coral Reef -> Back Slope	-	Suitable	-
9.8.4. Marine Neritic -> Marine Neritic - Coral Reef -> Lagoon	-	Suitable	-
9.8.5. Marine Neritic -> Marine Neritic - Coral Reef -> Inter-Reef Soft Substrate	-	Suitable	-
9.9. Marine Neritic -> Marine Neritic - Seagrass (Submerged)	-	Suitable	-
9.10. Marine Neritic -> Marine Neritic - Estuaries	-	Suitable	-
12.2. Marine Intertidal -> Marine Intertidal - Sandy Shoreline and/or Beaches, Sand Bars, Spits, Etc	-	Suitable	-
12.4. Marine Intertidal -> Marine Intertidal - Mud Flats and Salt Flats	-	Suitable	-
12.6. Marine Intertidal -> Marine Intertidal - Tidepools	-	Suitable	-
12.7. Marine Intertidal -> Marine Intertidal - Mangrove Submerged Roots	-	Suitable	-

Life History

Generation Length	Justification	Data Quality
1	-	-

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?
No

Systems

System: Marine

Threats

Halodule wrightii is a very tolerant species, being able to withstand and outcompete other seagrass species under various stress factors (Short et al., 2010). *Halodule wrightii* can survive hypersaline conditions, such as those found at Lower Laguna Madre with mean annual salinities (PSU) of ~ 40, and up to ~ 50 to 70 during drought periods (Larkin et al., 2008; Wilson and Dunton, 2018; Larkin et al., 2020). Shoalgrass can also survive ocean acidification conditions in mesocosms studies, thereby compensating the negative effects of decreased pH levels (Schneider et al., 2018). Under grazing pressure by green sea turtles, cover of the seagrass *T. testudinum* decreases while *H. wrightii* cover increases (Molina-Hernández and van Tussenbroek, 2014).

This species has variable responses to hurricanes. In the Caribbean, pioneer species with lesser rooting capacity such as *S. filiforme* and *H. wrightii* are usually lost during hurricanes (van Tussenbroek et al., 2008). In other cases, *H. wrightii* may be able to withstand hurricanes, such as Hurricane Katrina in the USA (Cho and May, 2008; Anton et al., 2009) and extensive fresh water input as seen at Laguna Madre in 2010, which led to a decline in seagrass cover of most other seagrass species (Kowalski and DeYoe, 2016). This species can withstand conditions of high turbidity and lower salinities and temperatures (Copertino et al., 2016). However, loss of a meadow near the southernmost limit in Brazil linked to cold front (storm) conditions, indicates a threshold of tolerance to these stress factors (Sordo et al., 2011; Copertino et al., 2016). In Brazil, a shift over time from *H. wrightii* meadows to the green benthic alga *Ulva* has been linked to El Niño effects (Guebert-Bartholo et al., 2011; Gama et al., 2016). On the western coast of Africa, this seagrass species is predicted to expand inside the Banc d'Arguin and northwards, with climate change (Chefaoui et al., 2021).

This seagrass species is particularly tolerant to high nutrient concentrations, allowing it to outcompete other seagrass species (Fourqurean et al., 1995), most likely due to its higher capacity to grow faster under increasing nutrient input compared to other seagrasses (Bertelli et al., 2020). In a study along a gradient of anthropogenic impact in Brazil, *H. wrightii* leaves were longer at mid and high levels of impact, with leaf C:N:P concentrations, epiphyte abundance and nitrogen isotopes ($\delta^{15}N$) useful indicators of higher impact, while shoot density and biomass were less useful (Bertelli et al., 2020). *Halodule wrightii* has also replaced the dominant Caribbean seagrass *T. testudinum* following boat groundings in Florida and manatee feeding in Puerto Rico, which has been attributed to its fast colonization of bare sediments following disturbance (Di Carlo and Kenworthy, 2008).

High nutrient loads beyond the coping capability of *H. wrightii* can negatively impact this species. In the Indian River Lagoon (IRL) in Florida, there was a large scale die off of *H. wrightii* from 2009 to 2018, which was linked to changes

in catchment discharge that led to increased water residence times and subsequent eutrophication from agriculture and urbanization, with higher water turbidity and persistent algal blooms (Reynolds et al., 2019). In 2006 at the IRL, cyanobacterial blooms of *Lyngbya majuscula* (more recently identified as *Dapis* in Florida) formed extensive mats on *H. wrightii* beds, which not only affected the shoalgrass but also its associated fauna (Tiling and Proffitt, 2017). Long-term decline of *H. wrightii* at La Mancha Lagoon in Mexico, has also been linked to eutrophication (Rivera-Guzmán et al., 2014). In Brazil, overgrowth of *H. wrightii* by the algal epiphyte *H. mitchelliae* has been linked to a decline in shoalgrass meadows (Papini et al., 2011). In northern Brazil, loss of *H. wrightii* in 2007 was attributed to the discharge of untreated sewage, urban and commercial development, boat anchoring, fishing, and solid waste (Pitanga et al., 2012).

Halodule wrightii has parasites such as the flagellate protist *Plasmodiophora diplantherae* causing swelling of its rhizome internodes (Walker and Campbell, 2009; Alexandre et al., 2017). This endoparasite is known to occur in the genus *Halodule* across its distribution (Walker and Campbell, 2009), including in *H. wrightii* samples from Florida, Mississippi, Louisiana, and São Tomé and Príncipe (Walker and Campbell, 2009; Alexandre et al., 2017).

The continued expansion of the introduced and invasive seagrass *Halophila stipulacea* to the Caribbean region could negatively affect native seagrass species locally, including *H. wrightii* as was seen in bays in Grenada, Dominica, Martinique, Bonaire and Venezuela (Willette and Ambrose, 2009, 2012; Willette et al., 2014; Scheibling et al., 2018; Vera et al., 2014). In Bonaire and Sint Maarten, *H. stipulacea* acquired “invasive” properties in already severely disturbed areas (Van Tussenbroek et al., 2016). In Grenada, *H. wrightii* cover in 1974 was as high as 65% while in 2016 it had been effectively replaced by dense *H. stipulacea*. This replacement towards the invasive *H. stipulacea* may have been facilitated by open spaces created by natural and anthropogenic disturbances, such as anchor damage, increased wave action or storms which lead to the erosion of *H. wrightii* meadow (Scheibling et al., 2018).

Conservation

Halodule wrightii continues to be protected in numerous marine protected areas throughout its range as reported previously (Short et al., 2010). In Mexico, this species is protected under NOM-059 (Norma Oficial Mexicana; https://www.dof.gob.mx/nota_detalle_popup.php?codigo=5578808).

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