Regional Assessment of the Seagrass *Halodule bermudensis* Hartog 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 - bermudensis

Common Names: Species code: Hr (English), Species code: Hi (English)

Synonyms: No Synonyms

Taxonomic Note: Originally named *Halodule wrightii, Halodule bermudensis* was described by den Hartog in 1964 from material collected in 1913 and 1922 in Bermuda and it has not been reported in Bermuda or elsewhere since. The current taxonomic status of this species is unclear, as can be said for most other *Halodule* species, until studies which combine examination of type material, descriptions of leaf tip morphology and genetic analyses are carried out (no flowers or seeds known [den Hartog 1964]). Extensive searches have been carried out in Bermuda for *H. bermudensis* over the last 16 years but it had not been found as of 2020 (K. Coates personal observation). Therefore, unless genetic analysis of type material is possible, the taxonomic status of *Halodule bermudensis* is valid based on morphological characteristics. *Halodule* specimens from Bermuda collected since 2012 revealed specimens of *Halodule* sp. that were morphologically more similar to *H. beaudettei* (K.A. Coates, personal observation), but forming a genotype that is distinct from *Halodule wrightii* from the Gulf of Mexico (Larkin et al. 2017).

Red List Status
CR Critically Endangered (IUCN version 14) A2 (a); B1, B2a,B2b(i,ii,iii)

Red List Assessment

Assessment Information

Assessor(s): Creed, J.C., Coates, K.A., Samper-Villarreal, J. & van Tussenbroek, B.I.

Publication date: 16th May 2025

Time period assessed: 2007-2020

Assessment Rationale

Halodule bermudensis is endemic to Bermuda in the Atlantic Ocean. The only published record of collections of this morphological form of the genus is the original description (den Hartog, 1964), which includes specimens collected in 1913 at Gibbet Island and in 1922 at Walsingham Bay. Furthermore, specimens collected in 1951 from Hungry Bay, along Bermuda's south shore and identified as *H. wrightii* (Bernatowicz, 1952) also have the *H. bermudensis* leaf tip form (K.A. Coates, personal observation). The specific distinctness of this taxon may be questioned based on current criteria for distinguishing species of the genus *Halodule* as leaf tip morphology has been reported to be highly variable on single plants of the genus at a few locations in Florida (see Phillips 1967). It is possible that the genetic character of *H. bermudensis* could be determined from preserved type specimens, and this compared to other populations, including those in Florida. Lectotype and isolectotypes have recently been determined (Ferrer-Gallego & Boisset, 2020).

Halodule bermudensis is listed here as Critically Endangered due to its very limited previously known extent of occurrence (EOO = 4km²; <100km² =B1) and Area of occupancy (AOO = 12km², three populations; B2a) and inferred population reduction (B2b(i,ii,iii) the causes of which have not ceased (direct observation A2(a)). This is because seagrass abundance declined drastically at 16 of 17 monitoring locations spread across the Bermuda Platform during the period 2007–2017 due to overgrazing by sea turtles (Fourqurean et al. 2019).

The currently questioned taxonomic status (i.e., whether the species is distinct from *H. wrightii*) remains and it is very important to determine the validity of this species since its extremely limited range in Bermuda currently qualifies it for the Critically Endangered category. It is highly recommended, if possible, that genetic analyses coupled with morphological analyses of leaf tip characteristics of collection specimens are carried out in order to best determine its taxonomic status and its threat of extinction.

[1] This regional assessment also constitutes the global assessment for this species, given that its global distribution is limited to the Tropical Atlantic Seagrass Bioregion

[2] **Citation:** Creed, J.C., Coates, K.A., Samper-Villarreal, J. & van Tussenbroek, B.I. (2025). Regional Assessment of the Seagrass *Halodule bermudensis* Hartog in the Tropical Atlantic Seagrass Bioregion (Bioregion 2) for the IUCN Red List. https://doi.org/10.5281/zenodo.15441522

Distribution

Geographic Range

Halodule bermudensis is endemic to Bermuda in the Atlantic Ocean. The species was originally collected from Walsingham Bay and Gibbet Island, Flatts, Bermuda. The only published records of this morphological form of the genus are from collections made in 1922 (Jespersen, Walsingham Bay) and 1913 (Collins, Gibbet Island) (den Hartog 1964). There are also specimens at the University of Michigan Herbarium that are like *H. bermudensis* (K.A. Coates, personal observation), which were collected at Hungry Bay, south shore, Bermuda, in 1951 (as *H. wrightii* in Bernatowicz, 1952). Thomas et al. (1992) listed it at Evans Pond, Southampton Parish, but it is unlikely this was *H. bermudensis*, as its determination was based on a figure that represented the form of *Halodule* currently common in Bermuda (K.A Coates, personal observation; Manuel 1986).

Elevation / Depth / Depth Zones

Depth Lower Limit (in metres below sea level): 2
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	-	-	-	-	Tropical Atlantic Seagrass Bioregion (Bioregion 2)	Assessment period

Occurrence

Countries of Occurrence

Country	Presence	Origin	Formerly Bred	Seasonality
Bermuda	Extant	Native	-	Resident



FAO Area Occurrence

	Presence	Origin	Formerly Bred	Seasonality
31. Atlantic - western central	Unknown	Native	-	Unknown

Population

There is no specific population information available for *Halodule bermudensis* as no records of current populations are known.

Population Information

Continuing decline in mature individuals?	Qualifier	Justification
-	Suspected	-

Continuing decline in number of subpopulations	Qualifier	Justification
-	Suspected	-

Habitats and Ecology

Halodule bermudensis has only been identified from three very shallow subtidal locations, where the seagrass is exposed at extreme low tides. It is not certain what the conditions in Walsingham Bay were in 1922, but it is now a shallow, very sheltered bay with mangroves and shoreline outflows from alkaline ponds. Also, as it is low energy, the sediments tend to be fine and soft. The second location, Gibbet Island, is much more exposed and the sediments are sandy - quite different from Walsingham Bay. The third, likely location at Hungry Bay also was shallow, with fine sand or mud sediments. No reproductive plants of *Halodule bermudensis* have ever been seen.

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	-
9.9. Marine Neritic -> Marine Neritic - Seagrass (Submerged)	-	Suitable	-
12.2. Marine Intertidal -> Marine Intertidal - Sandy Shoreline and/or Beaches, Sand Bars, Spits, Etc	-	Suitable	-
12.6. Marine Intertidal -> Marine Intertidal - Tidepools	-	Suitable	-

Life History

Generation Length	Justification	Data Quality
2	Although flowers or seeds have never been seen this is based on genets of similar species	-

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

Threats

Pollution, boating (anchoring site), and shoreline development are the threats present in the area (Coates et al. 2010). Coastal development for moorings and docks are also potential threats (Coates et al. 2010). Seagrass distribution has generally declined in Bermuda and threats may include herbivory by juvenile green turtles and parrotfishes and below-normal productivity (Murdoch et al. 2007). Overgrazing by Green Sea turtles has been demonstrated as a threat to seagrasses throughout Bermuda (Fourqurean et al. 2019).

Conservation

There are no species-specific conservation measures currently in place. The species is listed as endemic to Bermuda and Level 2 - Critically Endangered in the Protected Species Amendment Order 2016 (Government of Bermuda 2016). A marine park was created in an area very close to the type location of *H. bermudensis*, however, the presence of the species in Walsingham Bay was not taken into account when the park boundaries were finalized and Walsingham Bay is not actually included in the marine park. A seagrass management plan is currently being developed (Coates et al. 2010) and extensive arrays of seagrass protection cages are being deployed on the Bermuda platform since 2020 (K.A. Coates, personal observation).

If found in the wild, more research will be needed regarding the taxonomy, distribution, life history and ecology of this species. Population trends will need to be monitored to re-establish a baseline.

Acknowledgements

We thank Fredrick T. Short and Brooke K. Sullivan for their comments on the assessment.

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