Regional Assessment of the Seagrass *Halophila baillonii* Asch. 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 – baillonii

Common Names: Species code: Hl (English), Clover Grass (English)

Synonyms: No Synonyms

Taxonomic Note: The nomenclature for this species has been recently clarified and the clover grass should be referred to exclusively as *Halophila baillonii* (Creed and Samper-Villarreal, 2019). *Halophila baillonis* is no longer considered a synonym for *H. baillonii* (Creed and Samper-Villarreal, 2019). There is no taxonomic uncertainty regarding the identity of this species. *Halophila baillonii* has and continues to be often misidentified as *Halophila decipiens*, *Halophila johnsonii,* or *Halophila engelmannii* (Short et al., 2006; Short et al., 2010; Samper-Villarreal et al., 2018b; Creed and Samper-Villarreal, 2019). Both *H. decipiens* and *H. johnsonii* can be distinguished from *H. baillonii* as they only have two leaves per foliar shoot. While *H. engelmannii* is similar to *H. baillonii* in also having a cluster of leaf pairs at the top of an erect shoot, *H. engelmannii* can be identified as it has three to four pairs of leaves which are subsessile or very shortly petioled compared to two pairs of distinctly petioled leaves for *H. baillonii,* and that the leaves of *H. engelmannii* are more elongated and firmer than those of *H. baillonii* (den Hartog 1959; Eisman, 1980; van Tussenbroek et al., 2010).

Red List Status
VU - Vulnerable, B2ab(ii,iii)c(iii) (Guidelines for using the IUCN Red List Categories and Criteria v.14)
Extent of Occurrence (EOO) = 7 000 000 km²
Area of occupancy (AOO) = 232 km²

Red List Assessment

Assessment Information

Assessors: Samper-Villarreal, J., van Tussenbroek, B. & Creed, J.C.

Publication date: 16th May2025

Time period assessed: 2007-2020

[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

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Assessment Rationale

In congruence with the first assessment for this species (Short et al., 2010) it remains listed as Vulnerable under criterion B2 given its current known AOO is under 2,000 km² and meeting (a) severely fragmented populations at a limited number of locations; (b) a continuing decline in AOO (ii) and the quality of the habitat (iii); and including (c) populations suffer from high fluctuations in numbers (iii). *Halophila baillonii* is a rare species with fragmented populations. In its previous assessment, the species was only known from approximately seven locations and very little was known about this seagrass in general (Short et al., 2010). In the 2007 to 2020 time period, *H. baillonii* has been reported from several new locations, yet its distribution remains fragmented and its total area very limited. This species often grows in turbid and shallow waters with restricted visibility, which is one of the reasons why it is potentially underreported at many locations, and more sightings of new populations could increase in the future. This species is currently not considered present in Florida and surrounding area, where it was previously reported but most likely wrongly identified and confused with *H. engelmanni* (den Hartog, 1970). Populations of *H. baillonii* are often small and its usually turbid habitats provide an unstable environment resulting in disappearance or reduction of various populations likely due to natural causes (Cortés, 2001; Samper-Villarreal et al., 2020; Barquero Chanto, 2018). The dynamics of such populations over longer time frames need to be studied to understand possible metapopulation dynamics in stochastic environments of this species. Human induced threats include agriculture and aquaculture, boating, fishing, dredging, nutrient loading, coastal development, and sedimentation due to land runoff. *Halophila baillonii* being a rare species, with a highly fragmented distribution and highly variable populations, combined with its occurrence in shallow turbid estuaries, which are increasingly under human pressure, merit concern over its future distribution and population state. Even though it has been reported at new sites since 2007, the area of occupancy (AOO) is still estimated to be less than 2,000 km² as reported in the previous assessment (Short et al., 2010). We know even less of potential presence of deep-water meadows of this species, as we do of those of *H. engelmannii* in the Gulf of Mexico. Thus, further exploration of potential habitats in deeper waters may reveal new populations of *H. baillonii* in the future.

Distribution

Geographic Range

Halophila baillonii has a fragmented distribution. During the reassessment time period between 2007 and 2020 this species has been reported from a limited number of locations spanning the Eastern Tropical Pacific, Caribbean Sea and Atlantic Ocean. *Halophila baillonii* was reported prior to 2007 in Aruba, Bonaire, Saint Eustatius, Saba and Jamaica (den Hartog, 1959; Mallela et al., 2004; Short et al., 2010), on the Pacific coast of Panama (den Hartog, 1970; Phillips 1992). Prior to 2007, it was reported in the Caribbean of Colombia (Green and Short, 2003), Curaçao (den Hartog, 1959; 1970), Martinique and Guadaloupe (Asherson, 1875; den Hartog, 1970), and the U.S. Virgin Islands of St. Thomas and St. Croix (Hooker, 1874; Asherson, 1875; den Hartog, 1959; 1970). While there have been no recent sightings at these locations it is possible that *H. baillonii* still occurs at these sites.

Halophila baillonii was previously reported at locations where, with present-day knowledge, we consider it to have almost no probability of occurring. We do not consider the species is currently present in Florida and neighboring area. Previous identifications of *H. baillonii* in this area were most likely misidentifications of other *Halophila* species (Eisman, 1980). In Florida, *H. baillonii* has not been found despite extensive fieldwork and monitoring programs (pers. comms. B. Furman and J.W. Fourqurean). *Halophila baillonii* was reported from the Caribbean coast of Costa Rica (Dawson, 1962; Wellington, 1974); yet it has not been found in the 2007-2020 time period despite active searching efforts, and could have been misidentifications of *H. decipiens* (pers. obs. J. Samper-Villarreal). Further research actively looking for this species at locations where it was reported early on is currently needed, particularly given previous challenges in the correct identification of *H. baillonii*.

Recently, *H. baillonii* has been reported from new locations on the Pacific coast of Costa Rica (Samper-Villarreal et al., 2018a; 2018b; 2020) and Nicaragua (Cortés-Núñez et al., 2012) extending its range in the Eastern Tropical Pacific from the previous assessment (Short et al., 2010). *Halophila baillonii* has also been recently reported from new locations on the Caribbean coast of Guatemala (MacDonald Barrios, 2011), Honduras (Caviedes and Carrasco, 2016), and the Atlantic coast of Brazil (Barros et al., 2014; Magalhães et al., 2015; da Silva et al., 2018). Using an autonomous underwater vehicle, this species was reported growing on sediments at 41-47 m depth at an insular shelf off St Thomas, US Virgin Islands (Armstrong et al., 2006); yet without herbarium samples or photos provided from the study it is not possible to verify the validity of the report as *H. baillonii* at this time. This indicates the need for further studies of deep-water habitats (between 30-60m) within its geographic range.

There has been no recovery reported for this species in Bahía Culebra on the Pacific coast of Costa Rica, where seagrass loss followed a storm event in the mid-1990s (Cortés, 2001). Loss of seagrass has recently been noted at another location on the Pacific coast of Costa Rica, Bahía El Jobo, yet whether this recent loss is persistent or part of seasonal dynamics is yet to be clarified (Samper-Villarreal et al., 2020).

Elevation / Depth / Depth Zones

Depth Lower Limit (in metres below sea level): 15 m (Short et al. 2010).

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

Depth Zone: Shallow photic (0-50m)

Map Status

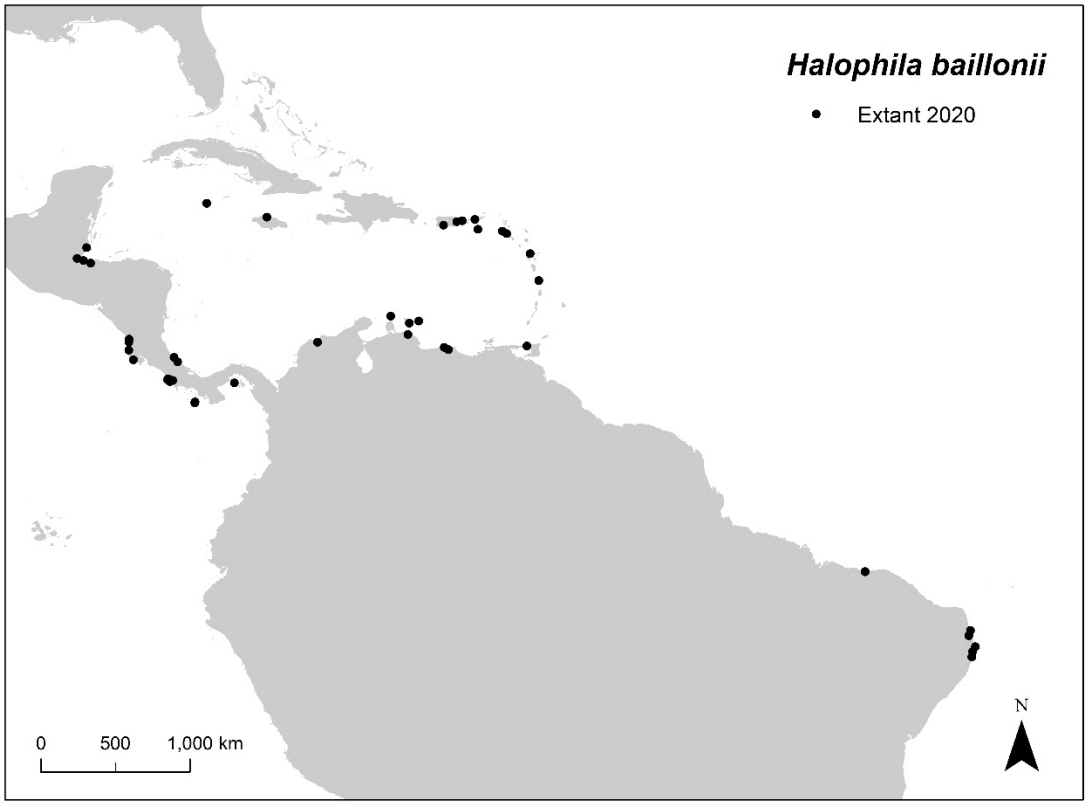
Map Status	How the map was created, including data sources/methods used:	Please state reason for map not available:	Data Sensitive?	Justification	Geographic range this applies to:	Date restriction imposed:
Done	-	-	-	-	-	-

Occurrence

Countries of Occurrence

Country	Presence	Origin	Formerly Bred	Seasonality
Aruba	Extant	Native	-	Unkown
Belize	Extant	Native	-	Resident
Bonaire, Sint Eustatius and Saba	Extant	Native	-	Unkown
Brazil	Extant	Native		Resident
Cayman Islands, British Oversees Territory	Extant	Native	-	Unkown
Colombia	Extant	Native	-	Unkown
Costa Rica	Extant	Native		Resident
Curaçao, Netherlands	Extant	Native	-	Unkown
Guadeloupe, French overseas region,	Extant	Native	-	Unkown
Guatemala	Extant	Native		Unkown
Honduras	Extant	Native		Unkown
Jamaica	Extant	Native		Unkown
Martinique, French overseas region	Extant	Native		Unkown
Nicaragua	Extant	Native		Unkown
Panama	Extant	Native		Unkown
Puerto Rico (U.S. Territory)	Extant	Native		Unkown
Trinidad	Extant	Native		Unkown
Venezuela, Bolivarian Republic of	Extant	Native	-	Resident

Virgin Islands, U.S.	Extant	Native	–	Unkown



FAO Area Occurrence

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

Population

Halophila baillonii is dioecious, and flowers and fruits have been found at various locations in Brazil and the Caribbean (Short et al., 2006; Barros et al., 2014; Costa, 2016). Sexual reproductive organs were absent in plants from the Pacific coast of Costa Rica (Barquero Chanto, 2018; Samper-Villarreal and Cortés, 2020; Samper-Villarreal et al., 2014; 2018a; 2020) until recently, when female flowers were found at two sites in the field (pers. obs. J. Samper-Villarreal) and flowering was noted to occur in an aquarium setting (van Barneveld Pérez, 2020). The cues for the induction of flowering and fruiting remain unclear. There are no records of seed banks and seed dormancy of this species. This species has a hard seed coat with reticulated testa (den Hartog, 1970); thus, dormancy is likely.

Halophila baillonii is a rare species throughout its range which can occur as small patches or in monospecific and mixed meadows. New sightings during this assessment period include new locations in the Eastern Tropical Pacific (Cortés-Núñez et al., 2012, Samper-Villarreal et al., 2018a; 2018b; 2020), the Caribbean (MacDonald Barrios, 2011; Caviedes and Carrasco, 2016, Beatriz Vera pers. com, Héctor Ruiz pers. com. and photo, K. Kingon pers. com. and photo), and the Atlantic coast of Brazil (Barros et al., 2014; Magalhães et al., 2015; da Silva et al., 2018). Whether these sightings represent new populations of *H. baillonii* or resident populations that have been sighted for the first time may be clarified in the future with further research and monitoring efforts at these sites.

Populations of *H. baillonii* are often small to begin with and the turbid habitats it occupies provide an unstable environment resulting in various populations having disappeared, possibly due to natural causes. While some populations are considered to be resident others may be ephemeral. Short term temporal variability has been shown to occur for presence and meadow extent of *H. baillonii* meadows along the Pacific coast of Costa Rica (Barquero Chanto, 2018) and in Brazil (Magalhães et al., 2015). Recently, loss of this seagrass was reported at Bahía El Jobo on the Pacific coast of Costa Rica, yet whether this loss is persistent or part of marked temporal variability remains unclear (Samper-Villarreal et al., 2020). There has been no report of recovery at a meadow that disappeared on the Pacific coast of Costa Rica in the mid-1990s (Cortés, 2001).

Population Information

Continuing decline in mature individuals?	Qualifier	Justification
-	Suspected	-

Continuing decline in number of subpopulations	Qualifier	Justification
-	Suspected	-

Habitats and Ecology

Halophila baillonii occurs as monospecific patches or meadows, as well as in mixed meadows with other seagrass species. It occurs intermixed with the seagrasses *Thalassia testudinum*, *Halophila decipiens*, and *Halodule wrightii*, as well as with rooted algae such as *Caulerpa* spp. (Short et al., 2010; Barros et al., 2014), *Penicillus* and *Udotea* (pers. obs. B. van Tussenbroek). On the Pacific coast of Costa Rica, *H. baillonii* can often be found mixed with *Halodule beaudettei* (Barquero Chanto, 2018; Samper-Villarreal et al., 2018a; Samper-Villarreal and Cortés, 2020). Its meadows can also extend into mangrove prop roots in Belize (Short et al., 2006).

Most known clover grass populations occur at shallow depths between 1-15 m. While this species has been reported from as deep as 41-47 m in the U.S. Virgin Islands (Armstrong et al., 2006), this report is yet to be verified. The occurrence of this species may vary depending on water clarity, with potentially shallower distributions for this species in more turbid waters (Samper-Villarreal and Cortés, 2020). This seagrass is most commonly found in muddy and fine sandy sediments (Barros et al., 2014; Samper-Villarreal et al., 2018a). Detailed information on the environmental conditions and thresholds for survival and recovery for this species is limited. Recently, the first mesocosm experiment for this species revealed that extreme salinity (15 and 35 ppt) and temperatures (23 and 33 °C) conditions are the least suitable for this species when compared to intermediate values (25 ppt and 28°C) commonly found at the collection site (van Barneveld Pérez, 2020).

A number of species rely on *H. baillonii* meadows for habitat and food. *Halophila baillonii* is consumed by *Trichechus manatus* (the American Manatee) (Short et al., 2006), which is a vulnerable species (Deutsch et al., 2008). The largest meadow of *H. baillonii* on the Pacific coast of Costa Rica appears to be a feeding habitat for *Chelonia mydas* (Green Turtle) (Bessesen and Saborío-R., 2012), an endangered species (Seminoff, 2004). A study at the same location in Costa Rica found consumption of *Halophila* sp. (most likely *Halophila baillonii*) by *Eretmochelys imbricata* (Hawksbill Turtle) (Méndez-Salgado, 2017; Méndez-Salgado et al., 2020), a species that is considered to be critically endangered (Mortimer, 2008). In Belize, meadows of this seagrass provide habitat for multiple species, such as the mussel *Brachidontes exustus*, the conch *Melongena melongena*, and the fishes *Eucinostomus melanopterus* and *Trachinotus falcatus,* may also feed on the seagrass (Short et al., 2006). In Honduras, 71 fish species were recorded in an *H. baillonii* meadow (Caviedes and Carrasco, 2016). Many species of invertebrates occur in *H. ballonii* meadows on the Pacific coast of Costa Rica (Cortés, 2001; Samper-Villarreal et al., 2014) and in Honduras (Caviedes and Carrasco, 2016). Juvenile nurse sharks (*Ginglymostoma cirratum*) are common residents in *H. baillonii* meadows in Belize (Short et al., 2006).

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. Marine Neritic -> Marine Neritic - Coral Reef	-	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	Years	-

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

Halophila baillonii is particularly vulnerable to threats given its severely fragmented distribution and how rare it is in many of the locations where it is reported. It has shown a lack of recovery following diminished water quality and increased wave action from a storm events on the Pacific coast of Costa Rica in the mid-1990s (Cortés, 2001) and more recently a decrease in meadow extent was recorded following Hurricane Otto in 2016 (Barquero Chanto, 2018). Reported recent loss of *H. baillonii* on the northern Pacific coast of Costa Rica was linked to potential nutrient loading, yet whether this loss is persistent or part of natural temporal variability remains unclear (Samper-Villarreal et al.,

2020). This species has been reported to be affected by water quality conditions linked to coastal development and watershed runoff in Belize (Short et al., 2006). Identified threats to this species include boating, fishing, agriculture and associated fertilizer and pesticide use, aquaculture, sedimentation, dredging, and nutrient loading (Sarmento de Carvalho, 2013; Barros et al., 2014; Magalhães et al., 2015; Caviedes and Carrasco, 2016; Barquero Chanto, 2018; Samper-Villarreal et al., 2018a; 2020). A recent mesocosm study showed that *H. baillonii* is sensitive to high and low levels of salinity and temperature (van Barneveld Pérez, 2020).

Conservation

This species is found in a Marine Protected Area (MPA) in Belize, an Environmental Protection Area in Brazil, and a Marine Management Area and a Responsible Fishing Marine Area in Costa Rica.

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