Aquatic Botany 151 (2018) 25–29

Contents lists available at ScienceDirect

Aquatic Botany

journal homepage: www.elsevier.com/locate/aquabot

Short communication

New sighting of seagrasses in the Eastern Tropical Pacific (Bahía Potrero, Costa Rica)

Jimena Samper-Villarreal[a,*], Gustavo Rojas-Ortega[b], Jose Luis Vega-Alpízar[b,c], Jorge Cortés[a,d]

[a] Centro de Investigación en Ciencias del Mar y Limnología (CIMAR), Ciudad de la Investigación, Universidad de Costa Rica, San Pedro, 11501-2060 San José, Costa Rica
[b] Programa de Maestría en Ciencias Marinas y Costeras, Universidad Nacional, Heredia, Apdo, 36-3000, Heredia, Costa Rica
[c] Estación de Biología Marina: Lic. Juan Bertoglia Richards, Escuela de Ciencias Biológicas, Universidad Nacional, Puntarenas, Costa Rica
[d] Escuela de Biología y Museo de Zoología, Universidad de Costa Rica, San Pedro, 11501-2060 San José, Costa Rica

ARTICLE INFO

Keywords:
Seagrass
Clover grass
Halodule
Halophila
Leaf area
Biomass
Blue carbon
Grain size

ABSTRACT

Seagrass meadows provide a multitude of ecosystem services, yet they are currently threatened and declining worldwide due to anthropogenic impacts. Current knowledge of seagrass presence in the Eastern Tropical Pacific (ETP) is scarce, in part due to challenges in finding the small seagrass species found and their dynamic and possibly ephemeral nature, with only very limited reports of currently extant meadows. Here, we characterize seagrasses at a new location, Bahía Potrero, on the northern Pacific coast of Costa Rica. Seagrasses were sighted at this location on four occasions between 2015 and 2017. Two seagrass species were found, *Halophila baillonis* and *Halodule beaudettei*. Seagrasses were present at ~ 3–6 m depth at mean sea level (local tidal range ~ 3 m). Biomass and sediment cores were collected in 2017, total biomass was 3.9 ± 4.0 g DW m^{-2} and density 569 ± 493 shoots m^{-2}. Leaf length was 1.1 ± 0.29 cm, width 0.5 ± 0.08 cm, and area 1.4 ± 0.67 cm^2. Above ground biomass $\delta^{13}C$ was -11.7 ± 0.8‰ and $\delta^{15}N$ 5.4 ± 0.8‰, while below ground was -11.7 ± 1.3‰ and 5.3 ± 0.8‰. Sediment $\delta^{13}C$ was -21.2 ± 0.6‰ and $\delta^{15}N$ was 8.6 ± 0.4‰. Sediments were dominated by very fine sand, with 1.6 ± 0.3% organic carbon content and 23.0 ± 7.9% inorganic carbon. Carbon content standardized to 10 cm sediment depth was 20.5 ± 5.1 Mg OC ha^{-1} and 295.1 ± 109.8 Mg IC ha^{-1}. Given the numerous threats that seagrasses are under and the lack of information on seagrasses in the ETP it is critical to increase our knowledge on seagrasses in this region for adequate management and conservation initiatives.

1. Introduction

Seagrass meadows are coastal ecosystems which provide a multitude of ecosystem services (Orth et al., 2006; Nordlund et al., 2016). Seagrasses in the Eastern Tropical Pacific (ETP) are part of the Tropical Atlantic bioregion, according to Short et al. (2007). The species of seagrasses reported for the ETP are *Ruppia maritima*, *Halophila baillonis*, *Halodule beaudettei,* and *Halodule wrightii* (Cortés, 2001; Van Tussenbroek et al., 2010; Samper-Villarreal et al., 2014, 2018b). Seagrasses in the ETP have been reported previously at limited locations from Mexico to Panama (Short et al., 2007; Van Tussenbroek et al., 2010). However, seagrass meadows in the ETP can be more difficult to find than their Caribbean counterparts as they are formed by smaller species, they tend to occur in more turbid waters, at a larger tidal range (3 m ETP; 0.5 m Caribbean), and they can be ephemeral (Samper-Villarreal et al., 2018b). As such, the only reports of current seagrass presence in the ETP are on the Pacific coast of Costa Rica (Samper-Villarreal et al., 2014, 2018b), Nicaragua (Cortés-Núñez et al., 2012), and El Salvador (Ramírez et al., 2017).

Seagrasses are currently threatened and are declining worldwide due to anthropogenic impacts (Waycott et al., 2005; Orth et al., 2006). In the ETP a meadow previously reported from the Pacific coast of Costa Rica consisting of *H. baillonis* and *R. maritima* disappeared in the mid-1990s following a severe storm (Cortés, 2001). Given the dynamic nature of seagrass meadows in the ETP, scarce seagrass sightings, our current limited knowledge, and the threat to seagrass meadows worldwide further research on these meadows is currently warranted.

Here, we characterize seagrasses found at a new location in the ETP, Bahía Potrero in the northern Pacific coast of Costa Rica, providing further information on seagrass distribution in the ETP and providing information on sediment, carbon and environmental conditions during sampling.

* Corresponding author.
E-mail address: jimena.sampervillarreal@ucr.ac.cr (J. Samper-Villarreal).

https://doi.org/10.1016/j.aquabot.2018.07.010
Received 27 March 2018; Received in revised form 4 July 2018; Accepted 21 July 2018
Available online 22 July 2018

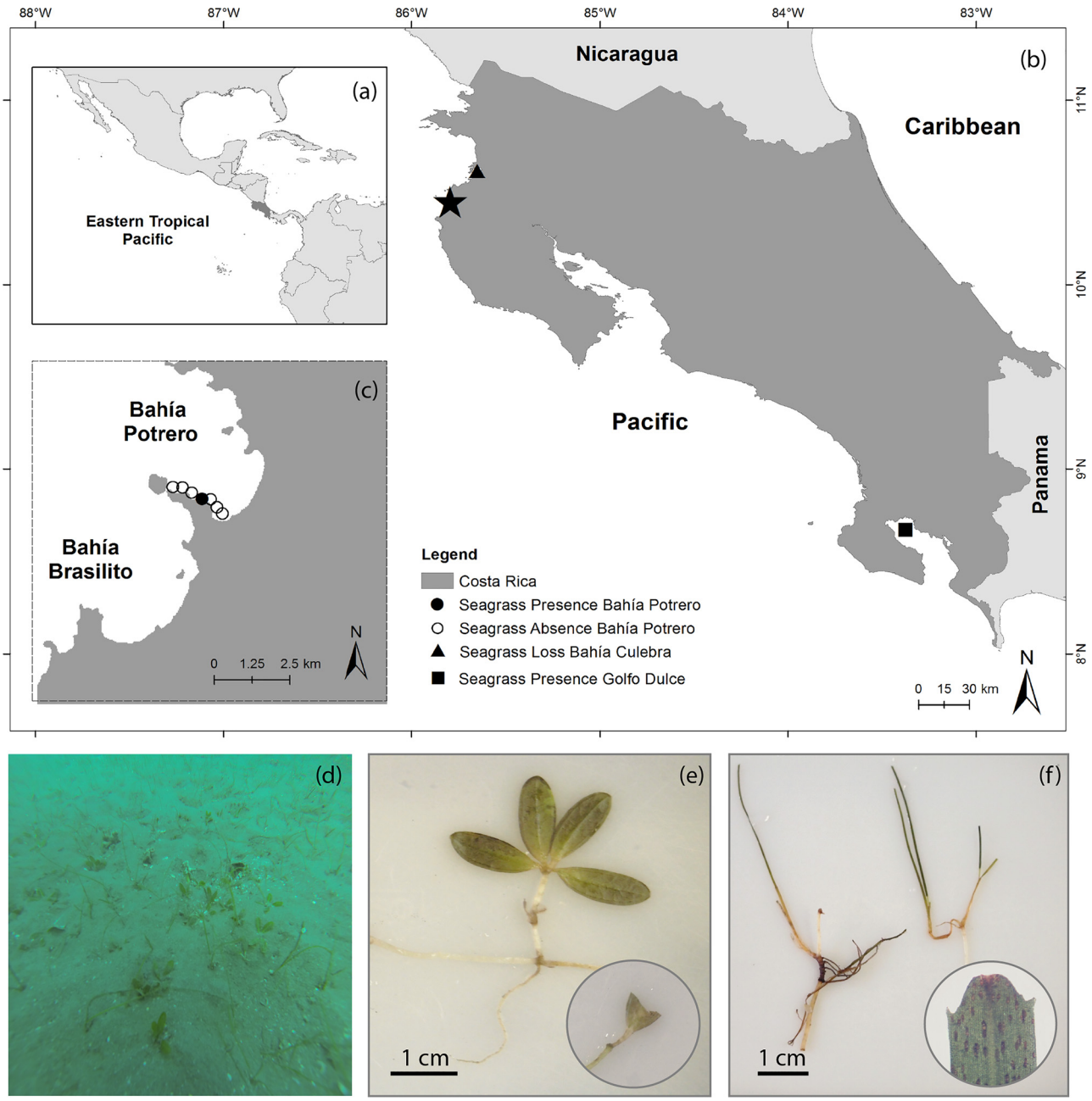

Fig. 1. Seagrasses at Bahía Potrero in the Eastern Tropical Pacific. (a) Location of Costa Rica in the region; (b) study site (star) at Bahía Potrero on the northern Pacific coast of Costa Rica; (c) close up of Bahía Potrero with seagrass survey areas and seagrass location; (d) typical cover of seagrasses at Bahía Potrero; (e) *Halophila baillonis* with close up of herbivory on leaf; and (f) *Halodule beaudettei* with close up of typical leaf tip.

2. Methods

2.1. Study site

The southern section of Bahía Potrero, on the Pacific coast of Costa Rica (10°26′33.85″N, 85°47′23.30″W; Fig. 1), was initially surveyed in 2015 as part of an environmental assessment for the intended reactivation of a local marina. Seagrasses were first sighted at one location on 1 March 2015, then sighted again at this location and species identified on 18 July 2015. Subsequently, seagrass presence was surveyed preliminarily on 22 February 2016, and seagrasses were characterized on 17–18 March 2017. Semidiurnal tidal range on the northern Pacific coast of Costa Rica is approximately 3 m (Samper-Villarreal et al., 2012).

2.2. Seagrass survey

Seagrass presence and absence was surveyed on February 2016 by dividing the southern section of Bahía Potrero, which is an area of similar environmental conditions to the location of the initial seagrass sighting, into seven similar sized areas. Within each area, the GPS coordinates of the central point was noted, ca. 100 m from the coastline (Fig. 1). At each point water depth and Secchi depth were recorded. A 60 mL subsuperficial water sample was collected at each point and salinity measured using a manual refractometer. From the central point at each location haphazard transects of approximately 75 m length and spot checking were carried out in all directions ≤ 5 m depth at low tide by a group of three spotters to verify presence or absence of seagrasses. The adjacent Isla Plata was not accessible due to weather conditions at the time of sampling.