

## First record of a Caribbean green turtle (*Chelonia mydas*) grazing on invasive seagrass (*Halophila stipulacea*)

LEONTINE E. BECKING<sup>1,\*</sup>, TINEKE C.J.M. VAN BUSSEL<sup>2,3</sup>, ADOLPHE O. DEBROT<sup>1</sup>, MARJOLIJN J.A. CHRISTIANEN<sup>4</sup>

<sup>1</sup>Institute for Marine Resources and Ecosystem Studies (IMARES), Wageningen UR, P.O. Box 57, 1780 AB Den Helder, The Netherlands

<sup>2</sup>VU University Amsterdam, Faculty of Earth and Life Sciences, De Boelelaan 1085, 1081 HV Amsterdam, The Netherlands

<sup>3</sup>Sea Turtle Conservation Bonaire, PO Box 492 Kralendijk, Bonaire

<sup>4</sup>Department of Marine Evolution and Conservation, Centre of Evolutionary and Ecological Studies (CEES), University of Groningen, PO Box 11103, 9700 CC Groningen, The Netherlands

\*Corresponding author: lisa.becking@wur.nl

**ABSTRACT.** –From Bonaire, we here provide the first documented case of the green turtle feeding on the invasive seagrass, *Halophila stipulacea*, in the Caribbean. The seagrass is rapidly invading existing seagrass meadows and altering key foraging habitat of this endangered marine reptile throughout the eastern Caribbean. We expect that more records of green turtles feeding on this invasive species will gradually follow from throughout the region and that the green turtle might alter its foraging behavior in response to the changing species composition of its foraging habitat.

**KEYWORDS.** –invasive, seagrass, green turtle, ecological adaptation

Lac Bay is a clear-water shallow tropical lagoon on the east coast of the island Bonaire, Caribbean Netherlands. The bay, which contains the largest seagrass beds of the Caribbean Netherlands, is a locally important foraging area for green sea turtles (*Chelonia mydas*). At present the native seagrass species in Lac Bay are threatened by a rapid expansion of the invasive seagrass *Halophila stipulacea* (Forsskål 1775) (Willete et al. 2014). There is raised concern that the green sea turtles that graze in Lac Bay might avoid the invasive seagrass *Halophila*, which originates from the Red Sea and western Indian Ocean.

To assess whether green turtles are willing to graze on *H. stipulacea*, twenty cafeteria experiments (adapted from de Iongh 1996) were set up randomly from October-December 2013 within an area in Lac Bay, which has high year-round green turtle grazing pressure (Sea Turtle Conservation Bonaire pers. comm). Three seagrass tethers, each with a thick bush of one of the three dominant seagrass species (*Thalassia testudinum*, *Halophila stipulacea*, and *Syringodium filiforme*) were placed on sticks in the sand (Fig. 1). A GOPRO camera was placed at 2 m. distance from the sticks and was left to film unattended as long as the

battery lasted (1-2 hrs). In total, 18 turtles were observed, with five grazing events, one of which on *H. stipulacea* (Fig. 1) and two each on *T. testudinum*, and *S. filiforme*. Throughout the study area we observed grazed plots in (mixed) *H. stipulacea* meadows.

Invasive species are a burgeoning threat to ecosystems world-wide, including the Caribbean marine environment (Lopez and Kraus 2006). A key question is how and how strongly native biota will respond to the invading species. To our knowledge, this is the first documented record of green turtle feeding on *H. stipulacea* in the Caribbean. This observation may not be surprising considering the fact that *H. stipulacea* forms an important food species for the green turtle throughout the native Indo-Pacific distributional range of the seagrass species (Turkozan & Durmus 2000, Spalding et al. 2003, Christianen et al. 2013). We speculate that green turtles will respond in their diet to the changing species composition of the foraging habitat that is getting more dominated by a pioneer community.

*Acknowledgements.*—Funding was provided by the Dutch Ministry of Economic Affairs. Logistical support provided by Mabel Nava,



FIG. 1. Caribbean green turtle grazing on *H. stipulacea* during a cafeteria experiment in Lac Bay, Bonaire, 29 Oct 2013.

Sabine Engel, Sue Willis, Gevy Soliana, Wijnand de Wolf, staff at Sea Turtle Conservation Bonaire and STINAPA.

#### LITERATURE CITED

- de Iongh, H. H. 1996. Plant-herbivore interactions between seagrasses and dugongs in a tropical small island ecosystem. PhD thesis, Leiden University, the Netherlands.
- Lopez, V. and U. Krauss. 2006. National and Regional Capacities and Experiences on Marine Invasive Species, Including Ballast Waters, Management Programmes in the Wider Caribbean Region - a Compilation of Current Information. CABI, Trinidad & Tobago, UNEP. 103 pp.
- Spalding, M., M. Taylor, C. Ravilious, F. Short and E. Green. 2003. Global overview: the distribution and status of seagrasses. In *World Atlas of Seagrasses*, eds. E. P. Green and F. T. Short, 5-26. Berkeley: University of California Press.
- Turkozhan, O. and H. Durmus. 2000. A feeding ground for juvenile green turtles, *Chelonia mydas*, on the western coast of Turkey. *British Herpetological Society Bulletin* 71:1-5.
- Willette, D. A., J. Chalifour, A. O. D. Debrot, M. S. Engel, J. Miller, H. A. Oxenford, F. T. Short, S. C. C. Steiner and F. Védie. 2014. Continued expansion of the trans-Atlantic invasive marine angiosperm *Halophila stipulacea* in the Eastern Caribbean. *Aquatic Botany* 112:98-102.
- Christianen, M. J. A., P. M. J. Herman, T. J. Bouma, L. P. M. Lamers, M. M. van Katwijk, T. van der Heide, P. J. Mumby, B. R. Silliman, S. L. Engelhard, M. van de Kerk, W. Kiswara and J. van de Koppel. 2014. Habitat collapse due to overgrazing threatens turtle conservation in marine protected areas. *Proceedings of the Royal Society B* 281:20132890.