

## A new tracking technology based on the Internet of Things for the identification of sea turtle habitats

Pierre Gogendeau<sup>1</sup>, Serge Bernard<sup>2</sup>, Vincent Kerzerho<sup>2</sup>, Laurent de Knyff<sup>2</sup>, Jérémie Chanut<sup>3</sup>, Anne Elise Nieblas<sup>3</sup>, Jérôme Bourjea<sup>4</sup>, Stéphane Ciccione<sup>5</sup>, Mayeul Dalleau<sup>6</sup>, Sylvain Bonhommeau<sup>1,\*</sup>

<sup>1</sup> IFREMER DOI, rue Jean Bertho, 97420 Le Port, La Réunion

<sup>2</sup> Université Montpellier, LIRMM UMR 5506, CC477, 161 rue Ada, 34095 Montpellier Cedex 5 – France

<sup>3</sup> Company for open ocean observations and logging, 61 rue Haute, 97436 Saint Leu, La Réunion

<sup>4</sup> Ifremer, MARBEC Univ. Montpellier, CNRS, Ifremer, IRD, Sète, France

<sup>5</sup> Kélonia – Réunion des musées régionaux, 46 Rue du Général de Gaulle, 97436 Saint-Leu, La Réunion

<sup>6</sup> Centre d'Etude et de Découverte des Tortues Marines (CEDTM), 58 rue du Général de Gaulle Appt. 6 Rés. Plage aux tortues, 97436 Saint Leu, La Réunion

\* corresponding author: [sylvain.bonhommeau@ifremer.fr](mailto:sylvain.bonhommeau@ifremer.fr)

### ABSTRACT

Wildlife monitoring provides critical information for species management and conservation. In the case of marine species, strong environmental (e.g. pressure, salinity) and transmission constraints require specific technological developments. Most often, the tags used are expensive (> \$3000 per object) and technological innovation is led by companies that develop these devices. On the one hand, the cost does not allow deployments on large numbers of individuals and thus the quantitative results are not robust. On the other hand, the scientific questions asked depend on the equipment available and not the other way around. We describe here a tag to track the movements of marine turtles using a transmission system used for the Internet of Things (LoRa) and based on open-source and open-hardware developments that allow the future integration of sensors chosen by scientists. The first deployments of these beacons in Martinique and on the island of Europa allowed us to observe the respiration cycles consistent with the knowledge of these species. The first geolocation tests using information received by ground stations show the ability of this technology to provide information on the movements of these individuals on a fine scale. The development of a network of large-scale receiving stations would thus make it possible to monitor these protected species at a cost of less than \$300 per beacon and answer key management and conservation questions.