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TITLE: Regional Management Units for Marine Turtles: A Novel Framework for Prioritizing Conservation and Research across Multiple Scales

AUTHOR: ['Bryan P. Wallace', 'Andrew DiMatteo', 'Brendan Hurley', 'Elena M. Finkbeiner', 'Alan B. Bolten', 'Milani Chaloupka', 'Brian J. Hutchinson', 'F. Alberto Abreu?Grobois', 'Diego Amorocho', 'Karen A. Bjorndal', 'Jérôme Bourjea', 'Brian W. Bowen', 'Raquel Briseño Dueñas', 'Paolo Casale', 'B. C. Choudhury', 'Alice Gabrielle de Sousa Costa', 'Peter H. Dutton', 'Alejandro Fallabrino', 'Alexandre Girard', 'Marc Girondot', 'Matthew H. Godfrey', 'Mark Hamann', 'Milagros López?Mendilaharsu', 'Maria Ângela Marcovaldi', 'Jeanne A. Mortimer', 'John A. Musick', 'Ronel Nel', 'Nicolas J. Pilcher', 'Jeffrey A. Seminoff', 'Sebastian Troëng', 'Blair Witherington', 'Roderic B. Mast']

ABSTRACT:

Resolving threats to widely distributed marine megafauna requires definition of the geographic distributions of both the threats as well as the population unit(s) of interest. In turn, because individual threats can operate on varying spatial scales, their impacts can affect different segments of a population of the same species. Therefore, integration of multiple tools and techniques--including site-based monitoring, genetic analyses, mark-recapture studies and telemetry--can facilitate robust definitions of population segments at multiple biological and spatial scales to address different management and research challenges.To address these issues for marine turtles, we collated all available studies on marine turtle biogeography, including nesting sites, population abundances and trends, population genetics, and satellite telemetry. We georeferenced this information to generate separate layers for nesting sites, genetic stocks, and core distributions of population segments of all marine turtle species. We then spatially integrated this information from fine- to coarse-spatial scales to develop nested envelope models, or Regional Management Units (RMUs), for marine turtles globally.The RMU framework is a solution to the challenge of how to organize marine turtles into units of protection above the level of nesting populations, but below the level of species, within regional entities that might be on independent evolutionary trajectories. Among many potential applications, RMUs provide a framework for identifying data gaps, assessing high diversity areas for multiple species and genetic stocks, and evaluating conservation status of marine turtles. Furthermore, RMUs allow for identification of geographic barriers to gene flow, and can provide valuable guidance to marine spatial planning initiatives that integrate spatial distributions of protected species and human activities. In addition, the RMU framework--including maps and supporting metadata--will be an iterative, user-driven tool made publicly available in an online application for comments, improvements, download and analysis.

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