
***SATELLITE TRACKING OF LOGGERHEAD, OLIVE RIDLEY, AND GREEN TURTLES IN THE SOUTH CHINA SEA: ARE MOVEMENT PATTERNS AND DIVING BEHAVIORS OF CAPTIVE TURTLES DIFFERENT FROM THEIR WILD COUNTERPARTS?**

Cheong Hoong Diong¹, Soon Hie Tan², Wai Hon Yap³, ILung Huang¹, Kwee Poo Yeo⁴, Siew Lee Lim¹, Itaru Uchida⁵, Marc R. Rice⁶, and George H. Balazs⁷

¹ *Division of Natural Sciences and Science Education, National Institute of Education, Nanyang Technological University, 1 Nanyang Walk, Singapore, 637616*

² *School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore 639798*

³ *Underwater World Singapore, 80 Siloso Road, Sentosa, Singapore, 098969*

⁴ *Centre for Clinical Pharmacology, National University of Singapore, Singapore, 117597*

⁵ *Port of Nagoya Aquarium, 1-3, Minato-machi, Nagoya, Aichi, Japan*

⁶ *Hawaii Preparatory Academy, 65-1692 Kohala Mountain Road, Kamuela, Hawaii, USA*

⁷ *Marine Turtle Research Program, NOAA NMFS, Pacific Islands Fisheries Science Center, Hawaii, USA*

Satellite telemetry has been increasingly used to study large-scale oceanic movements, migratory patterns, diving activities and foraging behaviors of sea turtles globally. The experimental turtles in tracking studies are mostly post-nesting females or individuals captured from a population and subsequently tagged for deployment at the capture location or at a different location. In this first satellite tracking study of turtles in the South China Sea, we attached two types of transmitters, the ST20 and ST24 (Telonics), singly or as doubles (paired transmitters) to 12 adult sea turtles which had been in captivity for 6 to 12 years. In all, 18 transmitters were deployed on two olive ridley, two loggerhead, and eight green turtles. The aim of our study was to characterize at-sea movement patterns, travel trajectories, diving activities, and navigational capabilities and to assess whether these behavioral traits are different from non-captive wild turtles. Tagged turtles were transported 670 km away from where they were held in captivity in Singapore and released in South China Sea. Transmissions derived from PTTs en route to the release site provided an assessment of Argos Location Class accuracy when analysed with shiplog GPS data. Patterns of movements in travel trajectories, total distances traveled, and average speed of travel, bore characteristics similar to wild turtles and were influenced by factors such as geostrophic currents and proximity to islands or landmass. Deployment of paired transmitters yielded information on the fate of some of the tags: 9 of 18 lost transmissions when the turtle was within 5 km from shore. Several dive types were evident from dive parameters in the last dive. Individual and species differences in diel pattern in the mean number of dives and maximum dive duration were observed. At sea movement patterns and diving behavior from this satellite tracking study suggest that captive

turtles have an innate ability to disperse and travel like their wild counterparts when they are released into the wild. Acknowledgments: captive turtles for the study were donated by Underwater World Singapore Pte Ltd and the Port of Nagoya Aquarium. The ship MV Kota Hadiah of Pacific International Lines transported the tagged turtles to the South China Sea for release. The research was conducted with the approval of the university IACUC ethics committee and supported by the University Academic Research Grant RP 05/06 to the first author. The Satellite Tracking and Analysis Tool (STAT) at SEATURTLE.ORG was used in this study.





NOAA Technical Memorandum NMFS-SEFSC-640

**PROCEEDINGS
OF THE THIRTIETH ANNUAL
SYMPOSIUM ON SEA TURTLE
BIOLOGY AND CONSERVATION**

24–30 April 2010
Goa, India

Compiled by:
Janice Blumenthal, Aliko Panagopoulou, and Alan F. Rees

U.S. DEPARTMENT OF COMMERCE
Dr. Rebecca M. Blank, Acting Secretary

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
Dr. Jane Lubchenco, Under Secretary for Oceans and Atmosphere

NATIONAL MARINE FISHERIES SERVICE
Eric C. Schwaab, Assistant Administrator for Fisheries

Technical Memoranda are used for documentation and timely communication of preliminary results, interim reports, or special purpose information, and have not received complete formal review, editorial control or detailed editing.



PROCEEDINGS OF THE THIRTIETH ANNUAL SYMPOSIUM ON SEA TURTLE BIOLOGY AND CONSERVATION



24–30 April 2010
Goa, India

Compiled by:
Janice Blumenthal, Alikı Panagopoulou, and ALan F. Rees

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southeast Fisheries Science Center
75 Virginia Beach Drive
Miami, FL 33149 USA

January 2013