



NOAA Technical Memorandum NMFS-SEFSC-631

PROCEEDINGS OF THE THIRTY-FIRST ANNUAL SYMPOSIUM ON SEA TURTLE BIOLOGY AND CONSERVATION



10 to 16 April 2011
San Diego, California, USA

Compiled by:
T. Todd Jones & Bryan P. Wallace

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

May 2012
(Updated November 2012)



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May 2012
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The President's Report may be found in its entirety in the Marine Turtle Newsletter 130:30-33, 2011 entitled 'President's Report for the 31st Annual Symposium on Sea Turtle Biology and Conservation 'The Next Generation of Research and Conservation', 10-16 April 2011, San Diego, California, USA.'

by Jeffrey Seminoff, President, ISTS

<http://www.seaturtle.org/mtn/archives/mtn130/mtn130p30.shtml>

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Proceedings of the 31st Annual Symposium on Sea Turtle Biology and Conservation

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IOSEA Marine Turtle Meeting	Douglas Hykle
IUCN Marine Turtle Specialist Group Annual Meeting	Roderic Mast, Nicolas Pilcher, Brian Hutchinson
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Pacific Islands Region and Partners Meeting	Irene Kelly
Pacific Leatherback Turtle Conservation Fund Meeting	Asuka Ishizaki
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Science of Advocacy Meeting	J. Nichols, Todd Steiner
WIDECAST (Caribbean) Regional Meeting	Karen Eckert
Freshwater Turtle & Tortoise Symposium	Chuck Shaffer
NMFS Scientific Research and Enhancement Permits	Amy Hapeman
3 rd Workshop on Data Analysis in Marine Turtle Research	Tomo Eguchi
3 rd Workshop on Sea Turtle Stable Isotope Research	Karen Arthur, Kim Reich, Bryan Wallace
Marine Turtle Conservation Fund (MTCF) - Grant Writing Workshop	Earl Possardt
Marine Turtles, Hooks, and Related Lesions Workshop	Mariluz Parga
Public Participation in Turtle Conservation Workshop	Samantha Burgess
San Diego Schoolchildren Education Workshop	Frances Kinney, Barbara Andrews
San Diego Teacher Education Workshop	Frances Kinney, Barbara Andrews
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There were 181 student presentations – 58 papers and 123 posters with \$5,500 US awarded to 12 recipients. The awards committee was composed of Lisa Campbell, Matthew Godfrey, and Jeanette Wyneken. Student judges: Karen Arthur, Larisa Avens, Ray Carthy, Paolo Casale, Emma Harrison, Craig Harms, Jennifer Keller, Mike James, Cynthia Lagueux, Kate Mansfield, Catherine McClellan, Zoe Meletis, Terry Norton, Dave Owens, Andrea Phillott, Nick Pilcher, Peter Pritchard, Kim Reich, Erin Seney, Kelly Stewart, Tony Tucker, Roldan Valverde, and Thane Wibbels. The awards were financed by the International Sea Turtle Society. (Note that as in previous years, the judges decided not to award prizes in certain categories, based on their ranking system)

Breeding Biology

Best Oral Presentation

Anthony Rafferty, Pilar Santidrián Tomillo, James Spotila, Frank Paladino, Richard Reina. Embryonic death is linked to maternal identity in the leatherback turtle (*Dermochelys coriacea*). (Monash Univeristy) \$500

Runner Up Oral Presentation

Jeanne Garner, Tomo Eguchi, Duncan MacKenzie, Scott Jacques. Evaluating steroid hormone data in association with reproductive parameters in a population of endangered leatherback sea turtles and the application to conservation and management. (Texas A&M University) \$250

Best Poster Presentation

Hannah B. Vander Zanden, Karen A. Bjorndal, Alan B. Bolten. Nutrient transport by green turtles. (University of Florida) \$500

Conservation through Social, Economic, Cultural, & Legal Pathways

Best Oral Presentation

Courtney Shephard. Optimizing U.S. Endangered Species Act protection by integrating recovery planning, Section 7 Consultations, and incidental take authorizations: A sea turtle case study. (Duke University). \$500

Foraging, Physiology, & Movements

Best Oral Presentation

Simona Ceriani, James D. Roth, Daniel Evans, Llewellyn M. Ehrhart. Satellite tracking confirms the use of stable isotopes to infer foraging grounds of loggerhead turtles (*Caretta caretta*) nesting on Florida's East coast. (University of Central Florida). \$500

Runner Up Oral Presentation

Alexander R. Gaos, Rebecca L. Lewison, Ingrid L. Yañez, Wallace J. Nichols, Andres Baquero, Michael Liles, Mauricio Vasquez, Jose Urteaga, Bryan Wallace, Jeffrey A. Seminoff. Satellite telemetry reveals novel insights into the biology and conservation of hawksbill turtles (*Eretmochely imbricata*) in the eastern Tropical Pacific. (San Diego State Univeristy). \$250

Foraging, Physiology, & Movements

Best Poster Presentation

Morgan Young, Michael Salmon, Richard Forward. Visual wavelength discrimination by the loggerhead turtle. (Florida Atlantic University). \$500

Health & Rehabilitation

Best Poster Presentation

Virginie Plot, Jean-Patrice Robin, Thomas Jenkins, Sabrina Fossette, Jean-Yves Georges. Physiological state and condition in nesting leatherback turtles in French Guiana. (Université Strasbourg) \$500

Population Assessment

Best Oral Presentation

Brian M. Shamblin, Mark G. Dodd, Kristina L. Williams, Michael G. Frick, Terry M. Norton, Stephanie Ouellette, Rebecca Bell, Douglas M. Hoffman, Debra Barnard-Keinath, Gale G. Bishop, Scott Coleman, Stacia Hendricks, Tammy Smith, Campbell J. Naim. Genetic mark-recapture of the female loggerhead population nesting in Georgian 2008-2009: Abundance, nest site fidelity, and relatedness. (University of Georgia). \$500

Best Poster Presentation

Vanessa Bezy, Roldan A. Valverde. Comparison of methodologies for estimating the nest density of olive ridley arribadas at Ostional, Costa Rica. (UNC – Wilmington). \$500

Threats

Best Oral Presentation

Qamar Schuyler, Kathy A. Townsend, Justin Marshall. To eat or not to eat? The roles of choice and vision in ingestion of marine debris by sea turtles. (University of Queensland). \$500

Best Poster Presentation

Leigh Ann Harden, Amanda S. Williard. Using spatially explicit predator-prey model to investigate bycatch risk of terrapins in crab pots. (UNC – Wilmington). \$500

ISTS AWARDS 2011

Award certificates were designed by Dawn Witherington.

President's Award

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Ed Drane Award for Volunteerism (new award)

Ed Drane

Life Time Achievement Award

Sally Murphy

Karen Bjorndal

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Champions Awards

Jepson Prince

Sinkey Boone

Colum Muccio

Grass Roots Awards (new award)

Ingrid Yañez

KEYNOTE PRESENTERS

Peter C. H. Pritchard

The Eastern Pacific: Where the Turtles are all Different

Karen A. Bjorndal

Planning Our Future: Expanding the Known, Learning the Unknown, and Minimizing the Unknowable

VIDEO PRESENTATIONS - WILD AND SCENIC FILM FESTIVAL

Your Unknown Killings

Jayesh Shirakhane

Port of San Diego, NOAA Project

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The Heartbreak Turtle Today

Sea Turtle Restoration Project, presented by Carole Allen

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Arun Krishna

Sanctuary in the Sea: a Gulf of the Farallones Experience

Bob Talbot

Sea Turtle Conservation with Grupo Tortuguero

Roger Roth, presented by Wallace J. Nichols

Foraging, Physiology, and Movements

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MOVEMENTS OF JUVENILE LOGGERHEADS IN THE SOUTHWESTERN ATLANTIC*

Caren Barceló¹, Andrés Domingo², Philip Miller³, Leonardo Ortega², Bruno Giffoni⁴, Gilberto Sales⁴, Lianne McNaughton⁵, Maria Marcovaldi⁴, Selina S. Heppell¹, and Yonat Swimmer⁶

¹ Oregon State University, Corvallis, Oregon, USA

² Dirección Nacional de Recursos Acuáticos, Montevideo, Uruguay

³ Centro de Investigación y Conservación Marina (CICMAR), Canelones, Uruguay

⁴ Projeto TAMAR, Fundação Pró Tamar / ICMBio, Salvador, Bahia, Brazil

⁵ Joint Institute for Marine and Atmospheric Research, University of Hawaii

⁶ NOAA Fisheries, Honolulu, Hawaii, USA

In the Southwestern Atlantic (SWA) off the coasts of Uruguay and Brazil, juvenile and sub-adult loggerhead sea turtles (*Caretta caretta*) are very abundant and frequently incidentally captured by pelagic longline fisheries. There is a need to improve our understanding of turtle behavior and habitat use in this region to identify high use areas and reduce fishery interactions. We used satellite telemetry to characterize the broad-scale behavioral patterns, inter-seasonal variability and general high use areas of 27 bycatch juvenile and subadult loggerheads turtles released from pelagic longline fishery between July 2006 and March 2010 (mean CCL: 61.8±6.9 cm, range: 49-83 cm). The mean turtle tracking duration was 259±159 days, during which time turtles moved between latitudes of 25 to 45°S and longitudes 35 to 54°W. Turtles traveled a mean minimum distance from release location of 6,050±3,630 km. The areas of highest use for all the tracked turtles were located over the continental shelf and slope within the Uruguayan and Brazilian EEZs, as well as oceanic international waters off the continental slope of southern Brazil. Maximum dive depth recorded varied by turtle between 100 and 300m depths, and two turtles demonstrated dives to depths close to the bottom within the 200m isobath. The overall mean SST encountered by tracked turtles was 19.8±2.3°C (range: 10.21°C-28.4°C) and turtles showed an affinity for mesotrophic/eutrophic chlorophyll a values (mean: 0.458±1.012 mg m⁻³). Latitudinal movements varied by season and sea surface temperature, however seasonal differences were observed with bathymetry or Chl a concentrations. We also present preliminary results from a first-passage time analysis performed on these data to determine whether turtles exhibit distinct scales of movement, and whether those scales of movements are associated with mesoscale environmental features. Overall, in concert with other studies conducted in the region, our analyses demonstrate the need to focus further regional and international collaborative efforts on habitat use research for the management of sea turtles in this area.

MOVEMENTS AND HIGH-USE AREAS OF WESTERN PACIFIC LEATHERBACK TURTLES*

Scott R. Benson¹, Tomo Eguchi², Peter H. Dutton², David G. Foley³, Helen Bailey⁴, Creusa Hitipeuw⁵, Betuel Samber⁶, Ricardo Tapilatu⁷, Vagi Rei⁸, Peter Ramohia⁹, John Pita⁹, and Barbara Block¹⁰

¹ Protected Resources Division, Southwest Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, c/o Moss Landing Marine Laboratories Norte, Moss Landing, CA, USA

² Protected Resources Division, Southwest Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, La Jolla, CA, USA

³ Environmental Research Division, Southwest Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Pacific Grove, CA, USA

⁴ Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science, MD, USA

⁵ World Wide Fund for Nature-Indonesia, Jakarta, Indonesia

⁶ KSDA II Papua, Forestry Department, Sorong, Papua Barat, Indonesia

⁷ Marine Laboratory, The State University of Papua (UNIPA), Manokwari, Papua Barat, Indonesia

⁸ Office of Environment and Conservation, Boroko, National Capital District, Papua New Guinea

⁹ The Nature Conservancy, Honiara, Solomon Islands

¹⁰ Tuna Research and Conservation Center, Stanford University, Hopkins Marine Station, Pacific Grove, CA, USA

The western Pacific leatherback (*Dermochelys coriacea*), one of three genetically distinct stocks in the Indo-Pacific region, has declined markedly during past decades. This diverse metapopulation nests year-round at beaches of several western Pacific island nations and has been documented through genetic analysis and telemetry studies to occur in multiple regions of the Pacific, including waters of the eastern and central North Pacific, the western South Pacific, the South China Sea, and the Sea of Japan. The objective of this study is to synthesize results of 126 satellite telemetry deployments conducted on leatherbacks at western Pacific nesting beaches and at one eastern Pacific foraging ground during 2000-2007, to provide a large-scale picture of movements, high use areas, and habitat associations and to support ecosystem-based management and conservation. Nesting beach deployments were conducted in Papua New Guinea (PNG) and Solomon Islands during boreal winter (December-February), and in Papua Barat, Indonesia (PBI) during boreal summer (July-August) and winter. Deployments at distant foraging grounds off California, USA were conducted during September. A Bayesian switching state-space model (SSSM) was applied to raw Argos-acquired surface locations to estimate daily positions for each turtle. The SSSM provided a posterior distribution of behavioral mode for each daily location, from which a probability of transit ($P_{\text{transit}, t}$) was derived to infer behavior (transiting vs. foraging). Monthly areas of high use were identified for post-nesting periods using kernel density estimation. There was a clear separation of migratory destinations for boreal summer vs. boreal winter nesters, and leatherbacks used multiple large marine ecosystems (LMEs) as foraging destinations. Individuals nesting in PBI during boreal summer moved either to the temperate North Pacific Ocean, including the Kuroshio Extension or the California Current, or to tropical waters of the South China Sea, remaining north of the equator at all times. Foraging habitats included diverse pelagic and coastal regions exhibiting a wide range of mechanisms that are known or expected to aggregate leatherback prey, including mesoscale eddies, coastal retention areas, and current boundaries. In contrast, individuals tagged at the same PBI beaches during January-February and leatherbacks tagged in PNG and the Solomon Islands moved into tropical and southern hemisphere LMEs, including the East Australia Current, the New Zealand Shelf, and tropical Indonesian seas. These regions are also characterized by mesoscale eddies, stationary fronts, or coastal retention areas. Western Pacific leatherbacks thus exploit diverse ecological processes that can aggregate gelatinous prey in different ways throughout the Pacific basin. Use of the most distant, temperate LME (California Current) required a 10-12 month trans-Pacific migration and commonly involved multiple years of migrating between high-latitude summer foraging grounds and low-latitude eastern tropical Pacific wintering areas without returning to western Pacific nesting beaches. In contrast, tropical foraging destinations in the South China Sea and Indonesian seas were reached within 5-7 months and appeared to support year-round foraging, potentially allowing a more rapid return to nesting beaches. Based on these considerations, we hypothesize that demographic differences are likely among nesting females using different LMEs.

HOME RANGE AND FORAGING ECOLOGY OF JUVENILE HAWKSBILL SEA TURTLES AROUND ROATÁN, HONDURAS

Melissa D. Berube^{1,2}, Stephen G. Dunbar^{1,2,3}, Klaus Rützler⁴, and William K. Hayes¹

¹ Department of Earth and Biological Sciences, Loma Linda University, Loma Linda, CA 92350

² Turtle Awareness and Protection Studies (TAPS), Reef House Resort, Roatán, Honduras

³ Protective Turtle Ecology Center for Training, Outreach and Research, Inc. (ProTECTOR)

⁴ Smithsonian Institution, National Museum of Natural History

The hawksbill (*Eretmochelys imbricata*) is one of seven species of sea turtle. It is listed as critically endangered and has suffered population declines of 80 % worldwide, and 95 % in the Caribbean. Understanding habitat use, migration routes, and foraging ecology are important for conservation efforts and implementing management strategies. The objectives of this study were to determine the home range of juvenile hawksbills, the abundance of available dietary items in resident juvenile versus non-resident sites, and the diet of juvenile hawksbills on inshore reefs in Honduras. This study was initiated to determine if there is a link between home range size, food availability, and diet for juvenile hawksbills in Honduras. We found that the home range of juvenile hawksbills in the study area is small. Minimum

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