Tracking Tiny Sea Turtles

Kate L. Mansfield, National Academies Research Associateship Program and Florida Atlantic University, Department of Biological Sciences, and Jeanette Wyneken, Florida Atlantic University, Department of Biological Sciences

Despite decades of research, very little is known about most sea turtle species from the time they emerge from their nests as hatchlings through the first years they spend at sea. Very few in-water movement and behavior data exist for these sea turtle "lost years". Understanding where these threatened and endangered species go, and identifying their nursery areas and habitat use is necessary for species conservation and management. However, historically, the small size, rapid growth and oceanic lifestyle of these young turtles made tracking their long-term in-water behavior and movements difficult, if not impossible. Available technology was not suitable for tracking oceanic-stage sea turtles; traditional sea turtle satellite tags are typically larger and heavier than these young animals.

Photo by J. Abernethy

Jeanette Wyneken (left), Kate Mansfield (right) and the rest of the team.

In 2007, we began a collaboration to address these glaring data and technology gaps. Our goals were to extend in-water observations of young oceanic-stage sea turtles to two months or longer and to develop the methods that would allow us to describe the early dispersal and habitat utilization of these turtles' "lost years". Initially, with the assistance of a Large Pelagics Research Center grant, this collaboration resulted in a fun few years of creative scientific problem solving.

Using slightly modified Microwave Telemetry PTT-100 9.5g solar powered bird tags we first lab-tested a variety of different tag attachment methods including harnesses and traditional epoxy attachments before settling on a flexible silicone-based attachment. Including a unique combination of wetsuit material, aquarium silicone, manicure acrylic, and glue used to attach hair extensions or toupees, we developed a novel approach to remotely track small loggerhead (*Caretta caretta*) sea turtles. Despite rapid growth of lab-reared turtles, the attachment method we developed resulted in tags remaining attached to the turtles in excess of two months before being cleanly shed from the turtles' shells. We also worked with Dr. Dan Rittschof of Duke University to test clear anti-foulants with the goal of protecting the tags' solar cells from biofouling while in a marine environment.

In 2009, this method was field-tested on 6-8 month old lab-reared neonate loggerheads released off southeast Florida, resulting in track durations of approximately two to three months (for example, Fig. 1). We expect to release an additional 10 tagged turtles in 2010 with track data posted publically online at www.seaturtle.org/tracking late November 2010. The data generated from this research represent the first successful long-term satellite tracks for any oceanic-stage sea turtle.

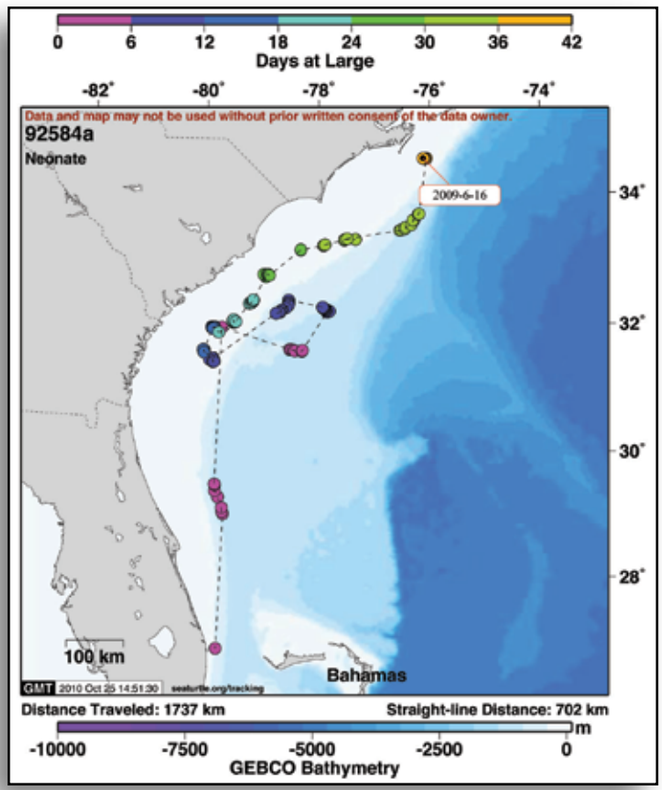

Fig. 1: Track of a lab-reared oceanic-stage loggerhead sea turtle released from southeast Florida in 2009.

Through 2011, we plan to lab-test the methods we developed for loggerheads on other sea turtle species and are continuing to work with Microwave Telemetry to develop and test different tag bases for a better fit on turtles' shells. Our preliminary track data have provided insight to how oceanic-stage loggerheads move through their environment and how they interact with large oceanographic features. We expect these results and our methods to be particularly valuable in addressing data gaps identified in sea turtle stock assessments, population models and management plans. This research will help identify how nearshore and offshore habitat is used by the early sea turtle age classes and should expand our understanding of sea turtle nursery areas and early dispersal patterns.

Photo by J. Abernethy

Loggerhead sea turtle in Gulf Stream.