Finding Our Way: Navigation & Remote Sensing

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Abstract

Sea turtles are tagged with satellite transmitters to monitor post-nesting migration and collect data on the turtle's immediate surroundings (i.e. sea surface temperature and ocean currents.) These data contribute to modeling changing global weather patterns in the ocean and the conservation of marine biodiversity.

Storyline

Research integrating living organisms and satellite technology lets scientists examine species in real-time. This technology is invaluable for pin pointing exact location of critically endangered organisms like whales, manatees, and sea turtles. For example, adult ridley sea turtles were once thought to have short intervals of annual return to nesting beaches and shorter and more coastal migrations between nesting and foraging areas. However,recent satellite tracking studies suggest adult ridley's travel to open water feeding areas as they migrate between breeding and nesting grounds. This implies that the migration pattern is variable and poorly understood for this species, and lends itself to being examined in an effort to better protect ridley sea turtles from imminent human actions(i.e.,fishing and recreational boating). Additionally, studying the migration patterns for this species in the Pacific Ocean can contribute to our understanding of how their migrations correspond to dispersal patterns of other marine organisms. For example, recent work by Pinou et al. (2007) identified a potentially parasitic epibiont (copepod) collected from a ridley turtle nesting on Mexico's Costalegre that had only been previously seen on sick Japanese loggerhead turtles (see attached manuscript). Thus, Project Migration investigates the migration patterns of ridley turtles that can help explain such evidence of trans-Pacific biogeography that reveals clandestine navigational strategies by sea turtles and alerts scientists to obscure inter species relationships that may indicate the health of marine ecosystems.

Project Migration takes Theodora Pinou and her students to Mexico to participate in international nest monitoring and sea turtle conservation initiatives where they help tag turtles and count nesting females in an effort to estimate the population sizes for several sea turtle species. This work permits them to simultaneously collect the epibiotic fauna clinging to the nesting turtles. These collecting events often reveal more than a dozen different groups,many representing new marine species that are currently curated at the Yale Peabody Museum of Natural History where Dr. Pinou is a Curatorial Affiliate in Vertebrate Zoology (see: www.yale.edu/inverts/imagegall/turtlepix/html).

Theodora Pinou and her graduate student Christine Lener (2007)demonstrated how tracking sea turtle migrations can provide a unique opportunity for teaching children about ecology, conservation,biodiversity,and technology. They showed how students could be taught to use satellite based mapping tools to generate migration maps that reflect sea surface temperature and currents as loggerhead turtles travel between their nesting and foraging grounds in the Atlantic Ocean. Results of their work showed that students considered apathetic towards school were suddenly inspired to use math to determine turtle swim rate and diving depths, and then excited to share maps they had generated that explained turtle travels over time (see attached manuscript).

Project Migration takes Pinou and Lener's initial educational program and expands it to train future teachers to include contextual learning of language and culture in science by pairing Connecticut and Mexican classrooms. Results from this work may help improve differentiated instruction practices in Connecticut classrooms that in turn can help retain Latino students in the sciences.