Sea turtles 'lost years' mystery starts to unravel

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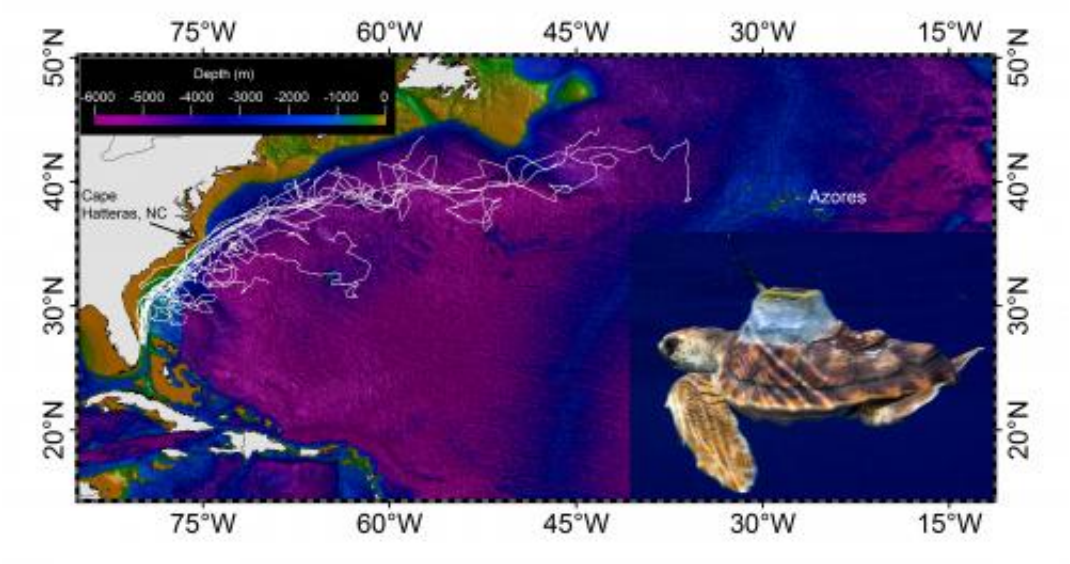

This shows the North Atlantic tracking routes of 17 juvenile loggerhead sea turtles. Credit: Jiangang Luo - turtle track imagery, Jim Abernethy - turtle photo

Small satellite-tracking devices attached to sea turtles swimming off Florida's coast have delivered first-of-its-kind data that could help unlock they mystery of what endangered turtles do during the "lost years."

The "lost years" refers to the time after turtles hatch and head to sea where they remain for many years before returning to near-shore waters as large juveniles. The time period is often referred to as the "lost years"

because not much has been known about where the young turtles go and how they interact with their oceanic environment—until now.

"What is exciting is that we provide the first look at the early behavior and movements of young sea turtles in the wild," said UCF biologist Kate Mansfield, who led the team. "Before this study, most of the scientific information about the early life history of sea turtles was inferred through genetics studies, opportunistic sightings offshore, or laboratory-based studies. With real observations of turtles in their natural environment, we are able to examine and reevaluate existing hypotheses about the turtles' early life history. This knowledge may help managers provide better protection for these threatened and endangered species."

Findings from the study appear today in the journal *Proceedings of the Royal Society B*.

A team of scientists from the UCF, Florida Atlantic University, University of Miami (UM) Rosenstiel School of Marine and Atmospheric Science, and University of Wisconsin, tracked 17 loggerhead turtles for 27 to 220 days in the open ocean using small, solar-powered satellite tags. The goal was to better understand the turtles' movements, habitat preferences, and what role temperature may play in early sea turtle life history.

Some of the findings challenge previously held beliefs.

While the turtles remain in oceanic waters (traveling between 124 miles to 2,672 miles) off the continental shelf and the loggerhead turtles sought the surface of the water as predicted, the study found that the turtles do not necessarily remain within the currents associated with the North Atlantic subtropical gyre. It was historically thought that loggerhead turtles hatching from Florida's east coast complete a long, developmental migration in a large circle around the Atlantic entrained

in these currents. But the team's data suggest that turtles may drop out of these currents into the middle of the Atlantic or the Sargasso Sea.

The team also found that while the turtles mostly stayed at the sea surface, where they were exposed to the sun's energy, the turtles' shells registered more heat than anticipated (as recorded by sensors in the satellite tags), leading the team to consider a new hypothesis about why the turtles seek refuge in Sargassum. It is a type of seaweed found on the surface of the water in the deep ocean long associated with young sea turtles.

"We propose that young turtles remain at the sea surface to gain a thermal benefit," Mansfield said. "This makes sense because the turtles are cold blooded animals. By remaining at the sea surface, and by associating with Sargassum habitat, turtles gain a thermal refuge of sorts that may help enhance growth and feeding rates, among other physiological benefits."

More research will be needed, but it's a start at cracking the "lost years" mystery.

The findings are important because the loggerhead turtles along with other sea turtles are threatened or endangered species. Florida beaches are important to their survival because they provide important nesting grounds in North America. More than 80% of Atlantic loggerheads nest along Florida's coast. There are other important nesting grounds and nursing areas for sea turtles in the western hemisphere found from as far north as Virginia to South America and the Caribbean.

"From the time they leave our shores, we don't hear anything about them until they surface near the Canary Islands, which is like their primary school years," said Florida Atlantic University professor Jeannette Wyneken, the study's co- PI and author. "There's a whole lot that

happens during the Atlantic crossing that we knew nothing about. Our work helps to redefine Atlantic loggerhead nursery grounds and early loggerhead habitat use."

Mansfield joined UCF in 2013. She has a Ph.D. from the Virginia Institute of Marine Science and a master's degree from the Rosenstiel School of Marine and Atmospheric Science at the University of Miami. She previously worked at Florida International University, through the Cooperative Institute for Marine and Atmospheric Studies (CIMAS) in association with the National Oceanographic and Atmospheric Administration and the National Marine Fisheries Services. She was a National Academies NRC postdoctoral associate based at NOAA's Southeast Fisheries Science Center, and remains an affiliate faculty in Florida Atlantic University's biology department where Wyneken is based.

With colleagues at each institution Mansfield conducted research that has helped further the understanding of the sea turtle "lost years" and sea turtle life history as a whole. For example she and Wyneken developed a satellite tagging method using a non-toxic manicure acrylic, old wetsuits, and hair-extension glue to attach satellite tags to small turtles. Tagging small turtles is very difficult by traditional means because of their small size and how fast they grow.

More information: Paper: rspb.royalsocietypublishing.or … .1098/rspb.2013.3039

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