Identifying Migratory Pathways And Foraging Habitat Use By Loggerhead Turtles (*Caretta caretta*) Nesting On Florida's East Coast

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Introduction

Nesting trends in Florida's loggerhead turtles have been the subject of concern among the scientific community, conservationist and the general public. Florida's beaches play a key role in the persistence of this species as they host the largest loggerhead rookery in the western hemisphere and the second largest in the world. The nesting population at the Archie Carr National Wildlife Refuge (Carr Refuge) is important for the Northwest Atlantic loggerhead population as it accounts for about 25% of all the loggerhead nests occurring in Florida (Ehrhart et al. 2003) (Fig 1).

An updated analysis of Florida's loggerhead nesting trend by the Florida Fish and Wildlife Conservation Commission indicates a nesting decline of 25% from 1998 to 2010, though it appears that the 22-year trend (1989 to 2010) may be stabilizing (FWCC, Witheringthon pers. comm.).

Figure 1. Location of the Archie Carr National Wildlife Refuge, Florida, USA, site of loggerhead sea turtle satellite deployments.

Fishery by-catch and food resource decline were listed as the top two threats likely responsible for the decline of Florida's loggerheads (Witherington et al. 2009).

Considering the decline in Florida's loggerhead nest numbers, it is essential to gain more information on migratory pathways and foraging grounds used between reproductive seasons in order to develop appropriate management strategies.

Methods

Between 2008 and 2010, fourteen loggerheads nesting at the Carr Refuge were fitted with satellite tags. Suitable turtles to be tracked were located at night during the nesting season (May to July). A satellite tag was attached to the anterior of the carapace in the region of the first and second vertebral scutes using either strips of fiberglass and resin (Schroeder and Balazs protocol, Fig 2a), or a cool setting two-part adhesive epoxy (Fig 2b).

Figure 2a. Loggerhead with fiberglass and resin attachment.

Figure 2b. Loggerhead with two-part epoxy attachment.

Of the fourteen turtles, thirteen transmitted long enoungh to categorize movements and behavior based on location and surface time. Categories included inter-nesting, post-nesting migrations, and shallow water feeding and resting.

Results

Satellite tracking identified three major migratory pathways and foraging areas (Fig 3). Nearly half of the individuals migrated north, revealing for the first time that the U.S. Altantic coast constitutes an extremely important feeding area for nesting loggerheads from Florida. Over the course of the year these northern migrating turtles showed seasonal movements (Fig 4).

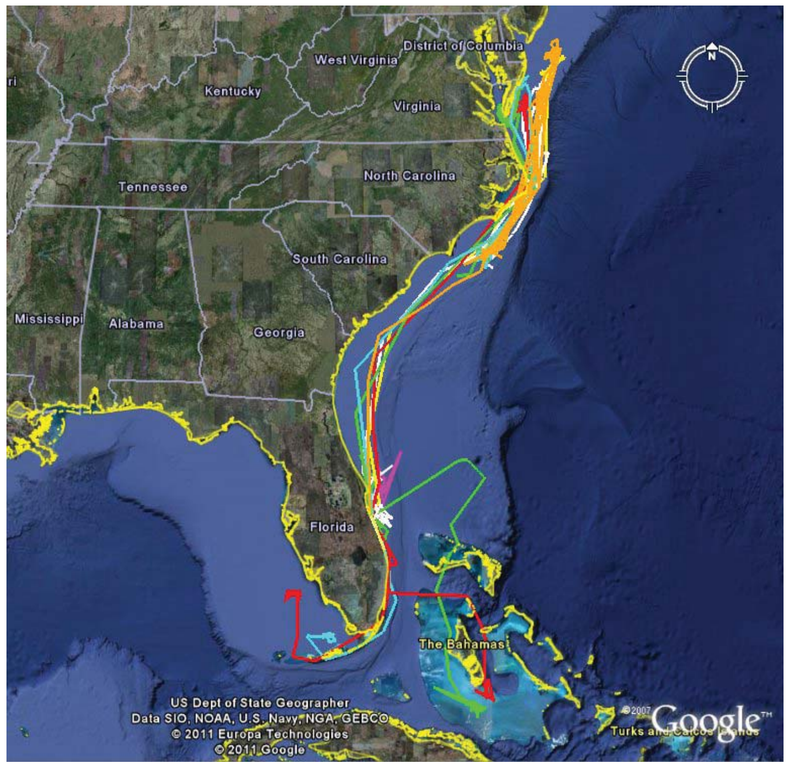

Figure 3. Loggerheads tracked from the Carr Refuge utilized three major migratory pathways and foraging areas: a seasonal North-South migratory pattern between Virginia and North Carolina; a residency in southern foraging areas; and a residency in an area adjacent to the nesting beach.

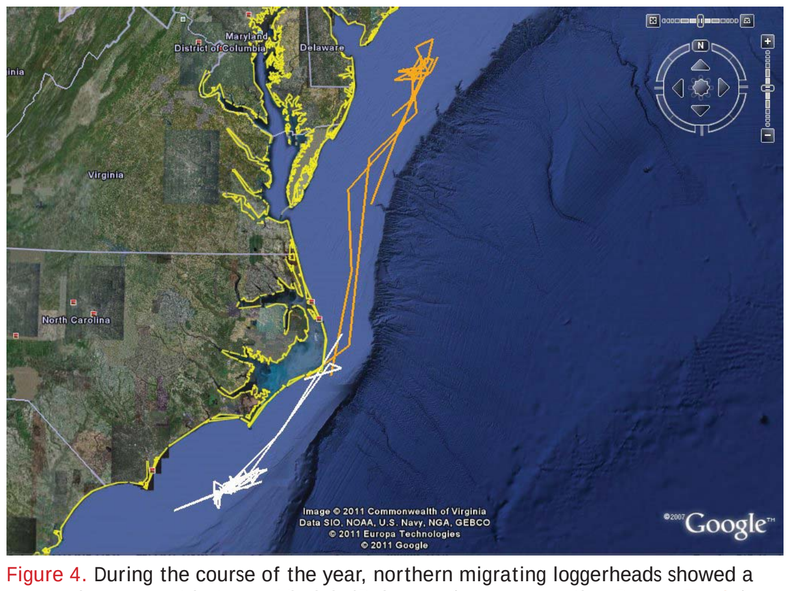

Figure 4. During the course of the year, northern migrating loggerheads showed a seasonal movement between Virginia/Delaware (warmer months, Orange Tracks) and North Carolina (cooler months, White Tracks)

The remaining loggerheads either moved south or remained in the shallow waters off the east central Florida coast with no evidence of nesting activity (Fig 5).

Discussion

While in-water studies have consistently captured sub-adult loggerheads (less than 90 cm SCL) in the northern foraging areas, there has been little documentation of these areas being important as a year round feeding area for Florida's nesting loggerheads except for a few flipper tag returns (Dodd & Byles 2003, Foley et al. 2008, Schroeder et al. 2003).

With the recent trends in Florida's loggerhead nesting numbers, it has become even more important to identify all of the pathways and areas being used by its nesting turtles as well as the threats to these turtles based on commercial fisheries methods, fishing seasons, and by-catch data.

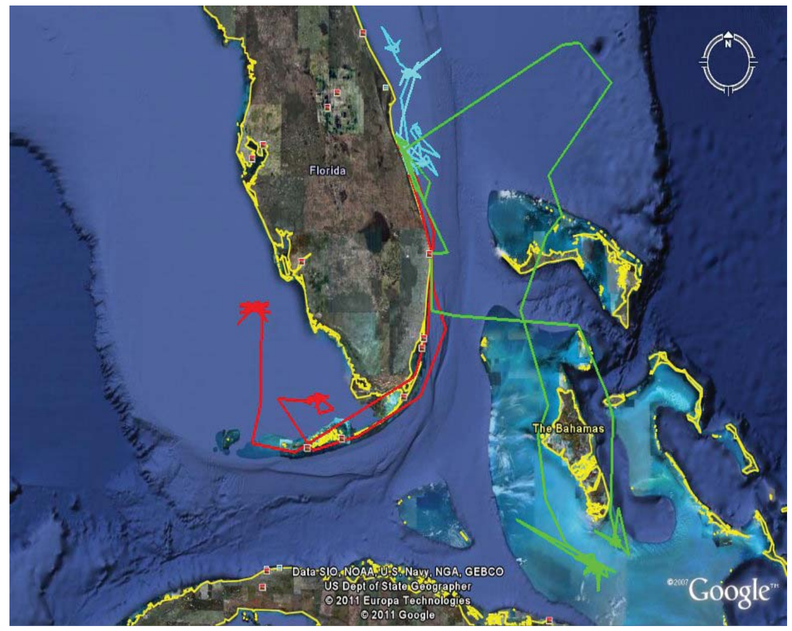

Figure 5. Loggerheads moving south showed a year-round residency at Bahamas (Green Tracks) and Florida Bay/Florida West Coast (Red Tracks). The remaining loggerheads remained in the shallow waters off the east central Florida coast with no evidence of nesting activity (Blue Tracks).

As an additional benefit of the project, the tracking data were included in STC's Tour de Turtles (TdT, *tourdeturtles.org*) online educational outreach program. The TdT helps increase awareness about sea turtles, their habitats and threats to their survival. In the past, the Florida tracked turtles have helped raise awareness about coastal development, coastal armoring, beach front lighting, marine pollution, nest predation and commercial longline fisheries. The program directly educates the public by using the satellite tracking research to teach the general public about sea turtle biology, ecology and migration in a fun and interesting way.

These results are of importance to the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Florida Fish and Wildlife Conservation Commission in evaluating current protections. Further analysis by overlaying commercial fishing areas with migration pathways and foraging areas, will help increase protections of loggerhead sea turtles at both the National and State levels through better regulations to reduce fisheries by-catch.

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