

A Preliminary Home-Range Analysis of Loggerhead Sea Turtles Released in Virginia, USA

Gwen G. Lockhart¹ and Susan G. Barco²

¹Virginia Aquarium & Marine Science Center, Virginia Beach, VA, US

²Virginia Aquarium & Marine Science Center, Virginia Beach, VA, USA & UNC Wilmington, Wilmington, NC, USA

We conducted a home-range analysis on 23 loggerheads that the Virginia Aquarium has tracked since 2011. Of the 23 - 17 were rehabilitated and six were wild caught. All rehabilitated animals were released in Virginia, 13 were released in the Atlantic Ocean, six from beaches located in Virginia Beach, and five from Chesapeake Bay beaches. Three wild caught loggerheads were captured using a dip net and released approximately 115km offshore of Virginia Beach, VA. Two wild caught turtles were recovered from pound net heads on the Eastern Shore of Virginia and released near their recovery locations. The remaining wild caught turtle was captured in netted swimming enclosure on the James River. We released 12 loggerheads May-June, five July-August, five September-October, and one in November. Location data collection periods ranged from 20 to 299 days. All transmitters were applied to the second and/or third vertebral scutes using Sita Anchor-Fix™ epoxy. We deployed six Sea Mammal Research Unit and eight Wildlife Computers tags. We applied the Movebank (<http://www.movebank.org>) Douglas filtering algorithm to all records and set the parameters to select the records with the best accuracy within 24 hour time frames. Location points collected in the first 48 hours post-release were removed.

We estimated each turtle's home-range by creating Utilization Distributions (UD) and 95% probability contours (PC), using Home-Range Tools for ArcGIS® Version 2.0.0004 for ArcGIS10™. The reference bandwidth for each loggerhead was used as a smoothing parameter. We used a fixed normal Gaussian bivariate kernel to calculate for all UD's with a 250x250m cell size. We summed the intersecting areas of 95% PC's and used quantile classification to divide the results into three groups. Polygons with the highest numbers of intersects (n=15-20) were identified as areas of intensive-use. We assigned geographic zones to each intensive-use area based on state and water body and calculated area (km²) of area.

The entire home-range (520,607km²) stretched from New Jersey to Florida, including Delaware and Chesapeake Bays. We identified 88 intensive-use areas equaling 15,848km², 46% of which was located in the ocean waters off North Carolina, 22% was in the ocean waters off Virginia, 21% was inside Chesapeake Bay, and 10% was in the North Carolina sounds. Since the turtles were originally found in Virginia, we expected Virginia waters to rank as intensive-use areas. These results highlight the importance of Virginia and North Carolina ocean waters for loggerhead sea turtles that utilize the Chesapeake Bay estuarine habitat. While North Carolina ocean waters were used most intensively in this analysis, it is also important to note the wide geographic area included in Virginia turtle's home-ranges. The methods described here will be used to compare sea turtle movement on different temporal and spatial scales.

Lockhart, G.G., and S.G. Barco. 2015. A preliminary home-range analysis of loggerhead sea turtles released in Virginia, USA. Oral presentation at Southeast Regional Sea Turtle Meeting, Jekyll Island, Georgia, 4-7 February 2015.