

SATELLITE-TRACKED MOVEMENTS OF LEATHERBACK SEA TURTLES, *DERMOCHELYS CORIACEA*, FROM SOUTHEASTERN BRAZIL.



Antonio P. Almeida¹, Scott A. Eckert², Soraya C. Bruno³, Juarez T. Scalfoni¹, Bruno Giffoni³ & João Carlos A. Thomé¹
1. Projeto TAMAR/ICMBIO, Brazil; 2. WIDECAS, Ballwin, MO, USA; 3. Fundação Pró-TAMAR, Brazil

INTRODUCTION

Comprehension on the habitat use during migratory movements can help to understand the differences in the conservation status of different populations, and to drive the needed conservation efforts. In Southwestern Atlantic, however, information regarding habitat use and migratory movements is restricted to few tag recoveries. This first satellite telemetry study of leatherbacks nesting in Brazilian grounds aimed to understand the internesting and post nesting movements of females tracked from an endangered and severely depleted rookery.



Figure 1. Location of the nesting area in southeastern.

The nesting ground on the northern coast of the State of Espírito Santo, southeastern Brazil (around 19°S), comprises the only known leatherback regular nesting site in Brazil (Figure 1). Annual nest number varies between 6 and 92; nesting area comprises a 160km coastline, but more than 90% of the nests are found in the first 80 km (Thomé et al., 2007). The entire coastline is divided in 1-km sectors; in the southern 37 km the area is protected under an Indigenous Land (km 1-23) and a Federal Conservation Unit (Reserva Biológica de Comboios, km 23-37). The remaining area is mostly occupied by farming, with a relatively well preserved coastline; some villages are located along the coast (Pontal do Ipiranga, km 92; Guriri, km 145 and Conceição da Barra, km 159).



Figure 2. The mouth of Doce river, in the central portion of nesting area, showing the beaches of Comboios (lower) and Povoação (upper area).

METHODS

Satellite transmitters (KiwiSat 101, Sirtrack, New Havelock, New Zealand) were attached to three leatherback females during the 05/06 nesting season. One additional female was tagged after caught by a driftnet, around 90 miles of the coast of the State of São Paulo.

Transmitters were powered by four C-size lithium batteries (0,5 Watt output), and were configured to work 24 hours on during the first 30 days, and 24 hours on/48 hours off after this period. Transmissions, processed via ARGOS location system (<http://argosinc.com>) reported location information, surface temperature at the time of transmission, battery voltage, number and duration of transmissions. Each transmitter was attached to a flexible harness.



Figure 3. Nesting leatherback tagged at the nesting area in Linhares, southeastern Brazil.

Geographic information systems plotting software (ArcGIS9.1, Environmental Systems Research Institute, Inc.) was used to map turtle movements and calculate high use areas and movement pathways. To define important habitats for each turtle we calculated fixed kernel home ranges using Hawth's Analysis Tools for ArcGIS. High use areas were defined using 50% utilization distribution (UD) of Kernel Home Range estimation. To reduce temporal autocorrelation and sampling bias, data sets were filtered using the best single location per day hybrid-filtered data set (Dave Douglas, USGS) and the internesting period data were assessed separately from postnesting period data. Additional information from direct observations recorded during beach patrolling were used to complement information regarding internesting behavior.



Figure 4. Leatherback tagged after captured by driftnets off the State of São Paulo, southeastern Brazil.

RESULTS

All tagged females returned to at least one nesting attempt after transmitter deployment. Transmissions covered the entire subsequent nesting period (except for the turtle dead in the net).

No patterns were evident among movements between individual consecutive nesting attempts, except all turtles showed south-north or north-south shifts in the location of emergences.

Additional information from tagging showed a permanence of up to 73 days in the nesting area, and the range of individual movements encompassing all nesting locations was 36-66 km.

The kernel 75% utilization distribution (UD) of the interesting habitat for the three turtles delineates a region centered to the mouth of Doce river over 60 km from shore and extending approximately 150 km to the north and south (Figure 5).

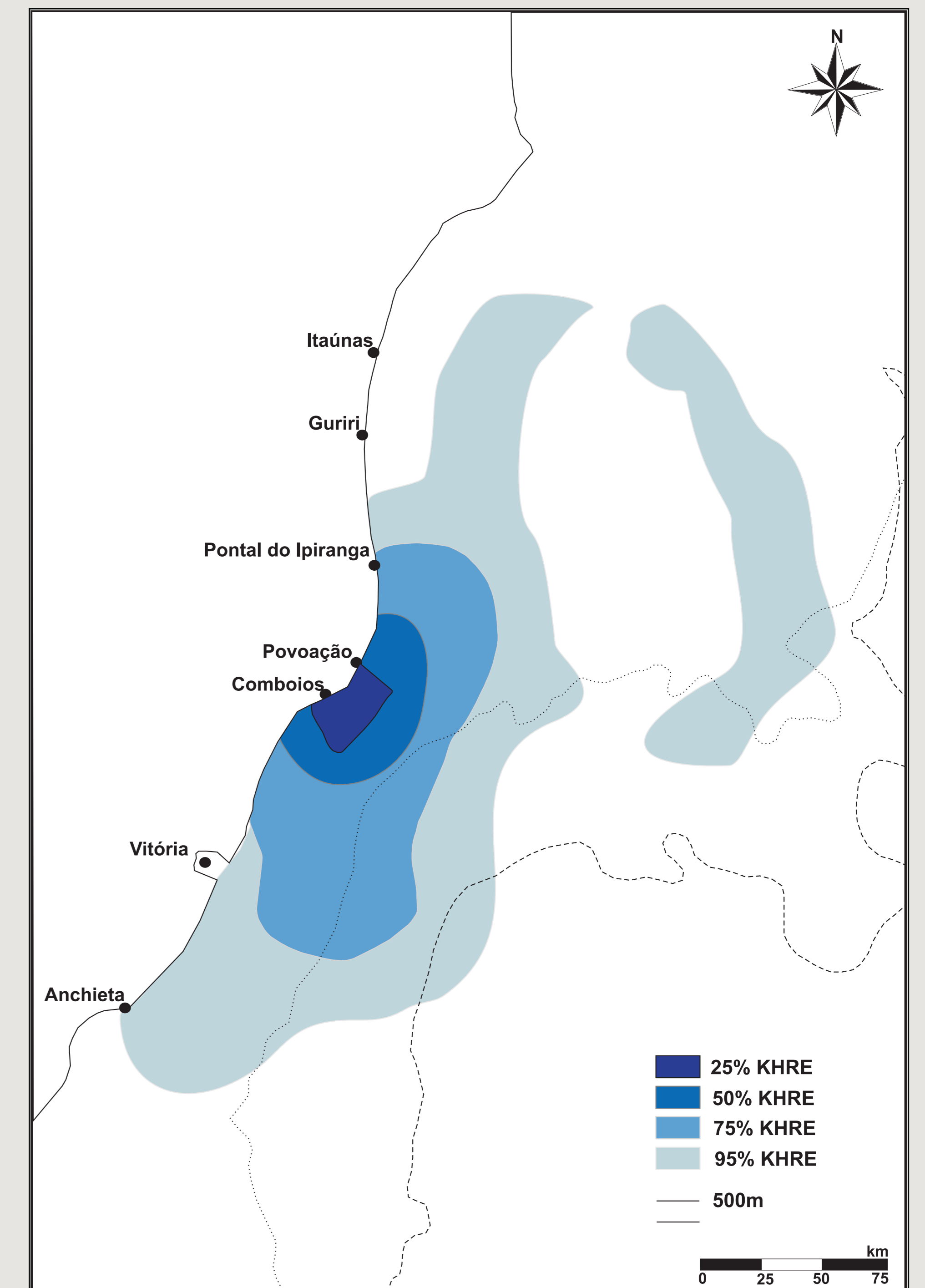
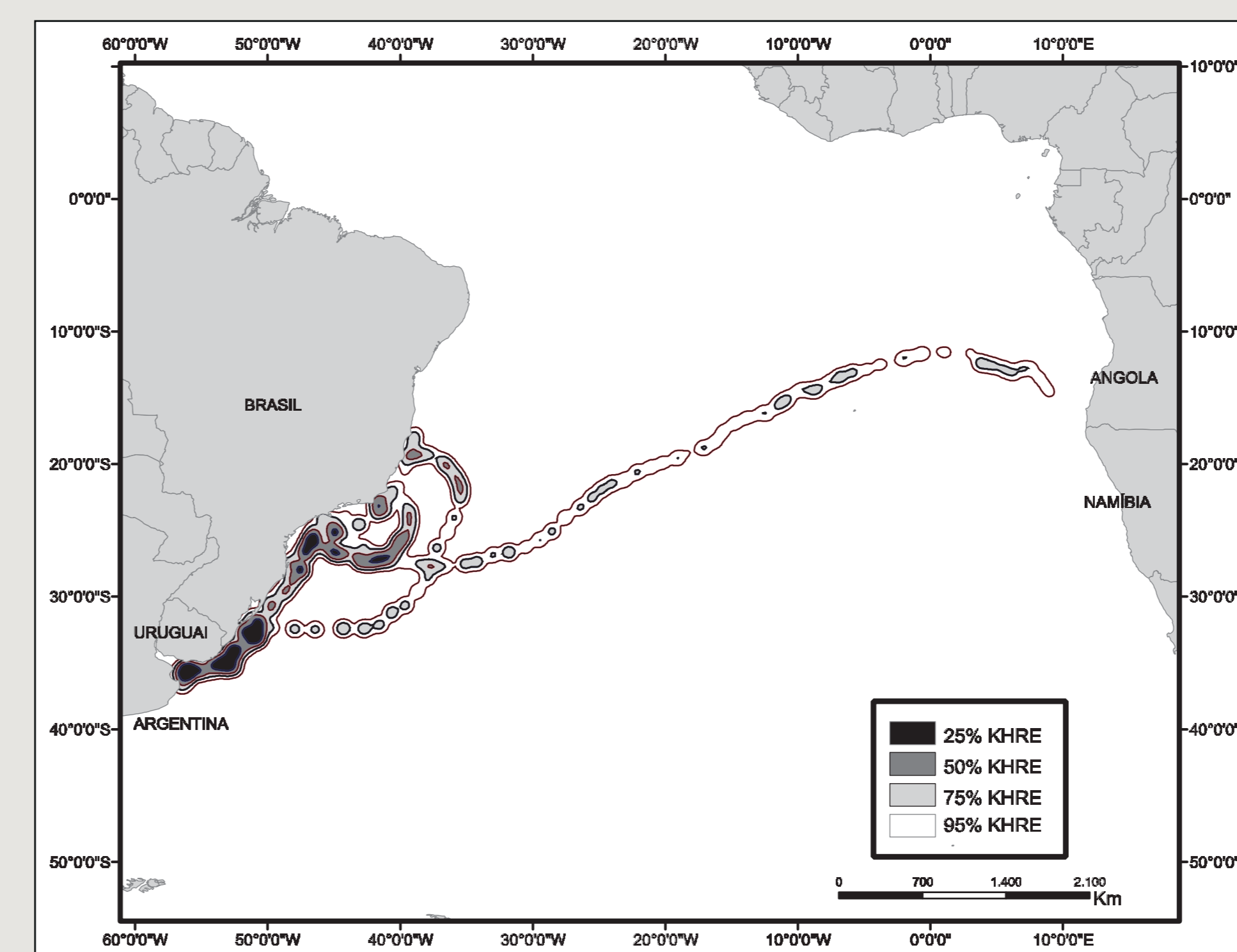


Figure 5. Kernel-estimated home-range utilization distributions (KHRE) of interesting locations for 3 leatherback turtles tracked by satellite telemetry from nesting beaches in northern State of Espírito Santo.



Both individual kernel utilization distribution (Figure 6) and daily travel rates showed the presence of intermittent shifts that fit to a foraging behavior during the coastal movements.

The kernel utilization distribution for the three tracked turtles highlights the presence of a large foraging area encompassing the southeastern and southern Brazilian coast, mainly the region of the coast of the State of Rio Grande do Sul and the La Plata river estuary (i.e. between Uruguay and Argentina).

Figure 6. Kernel-estimated home-range utilization distributions (KHRE) of post-nesting locations for 2 leatherback turtles tracked by satellite telemetry from nesting beaches in northern State of Espírito Santo and one turtle caught in a drift net off the State of São Paulo.

DISCUSSION

Satellite telemetry studies regarding internesting movements of leatherbacks are available for different populations in the Atlantic Ocean. Interesting behavior of the turtles in southeastern Brazil showed a similar pattern, with extended movements between consecutive nesting events.

Different strategies seems to be used by gravid females from Atlantic and Pacific populations; Pacific coast of Costa Rica, supposedly do not feed during internesting period, and there are evidences of foraging during nesting season in some Atlantic populations. The broad movements highlighted in this study suggest the same behavior for leatherbacks nesting in southeastern Brazil.

The spatial interval between landings of individual turtles was very longer than those reported for other populations, reaching more than 60 kilometers. Also, range of in-water movements was very longer than the spatial range of nesting emergences for each turtle. During these movements, turtles were subject to incidental capture, both in coastal gillnet or longline and driftnet fisheries; in fact, turtle BR 48823 died after entanglement in the mouth of Doce River.

Leatherbacks tracked from nesting grounds in Brazil seems to fit the pattern of moving to a temperate feeding area, after traveling along the continental shelf. One of the turtles also employed a transoceanic migration, heading to the African coast.

Despite the few turtles tracked (only four turtles nested in Espírito Santo during 2005/06 season), the time spent in Uruguayan-Argentinean waters (15 to 55 days), suggests that this region is an important feeding ground for turtles that nest in southeastern Brazil.

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