

LARGE PELAGICS RESEARCH CENTER
SEMI-ANNUAL PROGRESS REPORT – DEADLINE 7/31/2007



Report: #1

Reporting Period: 11/01/2006 – 04/30/2007

Project Title: Spatial Ecology of Marine Turtles in the Eastern Atlantic

Principal Investigator(s): Michael Coyne, Brendan Godley, Mike Fedak

1. Purpose of the Project: (one paragraph)

Through an integration of satellite tracking, remote sensing, modeling and novel informatics we will investigate a series of questions:

- What are the migratory and four-dimensional (X,Y,Z,T) foraging strategies undertaken by the study species?
- How are these strategies influenced by oceanographic conditions?
- What are the oceanographic conditions that serve as habitat for the study species?
- How can this knowledge be used to mitigate interaction with commercial fisheries?

In tandem, we aspire to contribute significantly to capacity within the LPRC and the wider animal tracking field through our use, development and promotion of the Satellite Tracking and Analysis Tool:

- All data will be stored in an effective clearing-house where it will be available for future intra and cross-taxa analysis.
- All appropriate data management and analytical techniques developed during the course of this project will be incorporated into STAT for use by other investigators, which currently include over 100 projects and 2000 tags.
- Selected tracks available through the online tracking interface of STAT will help promote the work of this project at the LPRC.

2. Progress during the last six months:

During the last six months we planned to deploy satellite tags on 10 leatherback sea turtles at Mayumba National Park in Gabon. Due to technical difficulties 7 of the tags failed within the first few days of deployment. We have data from 8 turtles tagged previously during 2005 and 2006. The LPRC grant has also allowed us to leverage partnerships with other organizations working in the region, providing access to data from an additional 3 leatherbacks. We now have data from a total of 14 Gabonese leatherback turtles.

As referenced in our previous progress report, 12 loggerhead turtles were satellite tagged on the island of Boa Vista, Cape Verde, during August 2006. Four of these tags continue to transmit after nearly a year, providing unprecedented information about the distribution of the Cape Verdean loggerhead population.

We have archived and are processing oceanographic data necessary for integration with animal movement data. All location data collected to date have been sampled for a broad suite of coincident oceanographic data (e.g. bathymetry and sea surface temperature, chlorophyll, height, currents).

3. Preliminary Data:

Twelve loggerhead turtles were tagged in the Cape Verde Islands during August 2006. Four with SMRU SRDL tags and 8 with Sirtrack Kiwisat 101 tags. Previous studies have suggested that the loggerhead population at Boa Vista displayed phenotypically linked foraging behavior, with larger adults feeding neritically on the coastal shelf and smaller adults feeding pelagically. To this end we aimed to tag a wide distribution of adult-sized animals to further test this finding and possibly identify the critical size separating the two foraging modes. We were able to tag animals ranging in size from 74.5 to 103 cm CCL. Preliminary results from this year mostly support previous finding with one exception. A relatively small turtle (68124 Fogo, 82.5 cm CCL) appears to be feeding neritically. All other individuals 90 cm CCL and smaller appear to be feeding pelagically.

We used satellite telemetry to describe patterns of habitat utilization during the internesting period for leatherback turtles nesting at Mayumba National Park in Gabon. The National Park includes critical nesting grounds and a Marine Protected Area (MPA) to 15 km offshore. Turtles dispersed widely from the nesting beach spending $62 \pm 26\%$ of tracking time outside of the protected confines of the National Park. This propensity to disperse is likely to increase the chance of deleterious interactions with fisheries in the region. Patterns of habitat utilization indicate the need for wider spatial scale planning on the West African continental shelf to enhance protection of leatherback turtles while seasonally occupying these habitats in great numbers for breeding and nesting.

Spatial analyses with oceanographic data are in progress.

Table. Release date and summary data for all turtles tagged during the project to date.

Note: Information provided will be included in the Center's reports to NMFS-NOAA and made public through the center's website. Clearly indicate any confidential information that you do not wish to make public at this time.

Tag ID / Name	Locations	Deploy Date	Last Location	Days At-Large
Cape Verde				
34208 Sal	707	8/19/06	8/1/07	347
57385 Bailey Ariel Sunshine	1436	8/21/06	7/14/07	327
64701 Santiago	250	8/22/06	9/18/06	27
64702 Maggie Marine	1112	8/25/06	4/27/07	245
68121 Fortunata	2025	8/17/06	8/1/07	349
68122 Santo Antao	493	8/19/06	12/19/06	122
68123 Boavista	493	8/27/06	11/3/06	68
68124 Fogo	807	9/5/06	8/1/07	330
68125 Sao Vicente	1547	9/3/06	8/1/07	332
68554 Brava	277	8/18/06	1/12/07	147
68556 Branco	1012	8/26/06	4/1/07	218
68558 Sao Nicolau	649	8/30/06	6/11/07	285
Gabon				
68562 Hillandale	244	2/3/07	3/9/07	34
68563 Solange	139	2/9/07	3/8/07	27
68555 Gabon SRDL 10456	4	1/31/07	1/31/07	0
68559 Gabon SRDL 10548	240	2/1/07	7/31/07	180
68560 Gabon SRDL 10549	44	2/1/07	2/3/07	2
72997 Gabon Kiwisat 1	11	1/30/07	1/30/07	0
72998 Gabon Kiwisat 2	27	1/30/07	2/1/07	2
72999 Gabon Kiwisat 3	17	2/1/07	2/1/07	0
73000 Gabon Kiwisat 4	22	2/2/07	2/3/07	1
73001 Gabon Kiwisat 5	27	2/2/07	2/2/07	0

4. Difficulties:

Our attachment method failed on 7 of the 10 leatherback turtles tagged in Gabon resulting in little or no data obtained from those tags. We are working with LPRC staff to refine the tag attachment technique for future deployments.

Delays in year 2 funding have made it impossible to obtain satellite tags in time for the 2007 nesting season on Boa Vista, Cape Verde. We are currently evaluating our options, including waiting until the 2008 nesting season, or deploying tags on another population with suitable seasonality.

5. Plans for the next six months to year:

During the next year we plan to:

- Continue our ecological analysis of data coming in from Cape Verde loggerheads and Gabon leatherbacks.
- Deploy 15 satellite tags on leatherback sea turtles in Gabon.
- Complete aggregation and evaluation of oceanographic datasets.
- Model relationship between sea turtle movements and oceanographic conditions.
- Present preliminary results on aspects of this work at the 2nd International Symposium on Tagging and Tracking of Marine Fish with Electronic Devices to be held during October 2007 in San Sebastian, Spain, and the 28th Annual Sea

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Turtle Symposium to be held during January 2008 in Loreto, Baja California Sur, Mexico.

6. Dissemination

Publications:

Witt MJ, Broderick AC, Coyne MS, Formia A, Ngouesso S, Parnell RJ, Sounget G-P, Godley BJ (in press) Satellite tracking highlights difficulties in the design of effective protected areas for leatherback turtles during the interesting period. Oryx. (For pre-print contact m.j.witt@ex.ac.uk)

Workshops:

An Atlantic Loggerhead meeting is being planned for 2007 in conjunction with project collaborators to be held on Boa Vista, Cape Verde Islands. This work will be a major focus of the workshop.

Conferences:

Present preliminary results on aspects of this work at the 2nd International Symposium on Tagging and Tracking of Marine Fish with Electronic Devices to be held during October 2007 in San Sebastian, Spain, and the 28th Annual Sea Turtle Symposium to be held during January 2008 in Loreto, Baja California Sur, Mexico.

Manuals, Protocols:

Outreach Activities: The tracks of turtles in the Cape Verde and Gabon projects have been available on the [seaturtle.org](http://www.seaturtle.org) website since their release. The site has been used for both public education and outreach purposes and to inform other investigators of opportunities for potential collaboration. All maps on the site are updated daily in near-realtime.

http://www.seaturtle.org/tracking/index.shtml?project_id=162

http://www.seaturtle.org/tracking/index.shtml?project_id=104

Patent, Copyright, Invention Disclosure Activity:

7. Collaborators and Personnel: (list collaborators and personnel working on this project, include terminal degree and institution not listed on the proposal).

Dr. Michael Coyne, Duke University

Dr. Brendan Godley, University of Exeter at Cornwall

Lucy Hawkes, PhD student, University of Exeter at Cornwall

Matthew Witt, PhD student, University of Exeter at Cornwall

Dr. Patrick Halpin, Duke University

Dr. Mike Fedak, University of St. Andrews

Pedro Lopez Suarez, Natura 2000 Cabo Verde

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Dr. Luis Felipe Jurado, University of the Canary Islands
Dr. Angela Formia, WWF Gabon
Bas Verhage, WWF Gabon

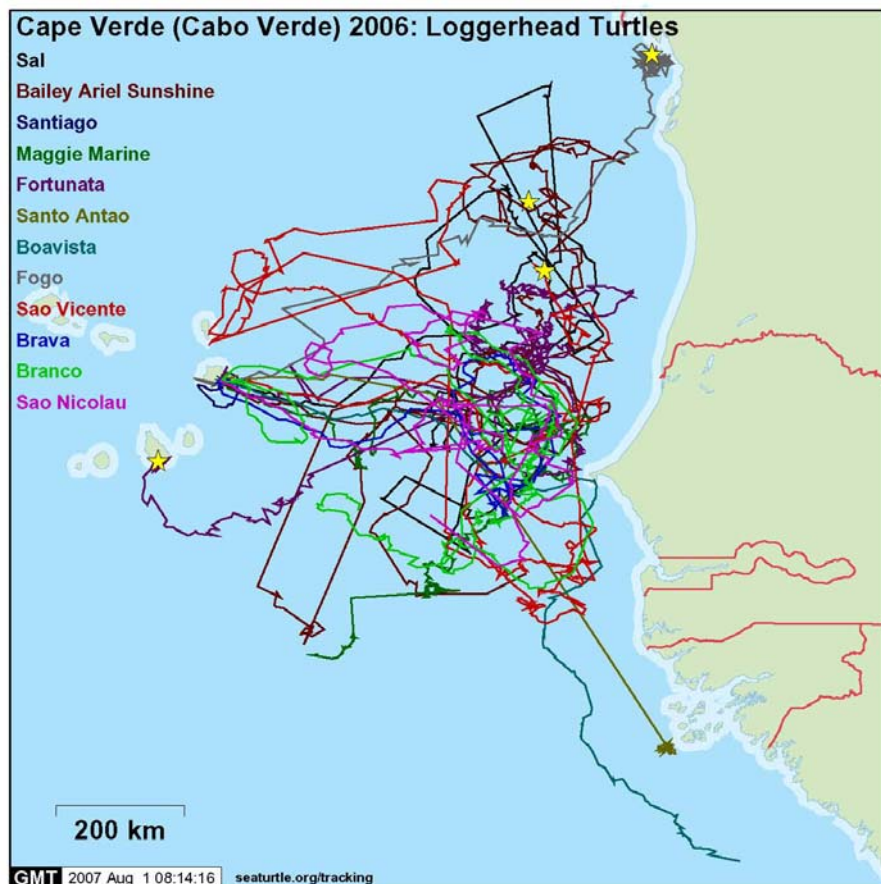
8. Students: (list students receiving funding, degree type, anticipated graduation date, thesis or dissertation title)

Lucy Hawkes, PhD June 2007 – Migratory and nesting ecology of the loggerhead sea turtle in Cape Verde and the USA

Matthew Witt, PhD September 2007 – Integrating sea turtle satellite tracking data with oceanographic datasets

8. Images and Captions: Please send two or three high resolution images (preferably in color) of people at work, graphic data, schematics, etc. as JPEG images. Include appropriate photo/analysis credit. Images will be used in the Center’s reports to NOAA and on the Center’s website to highlight your research.

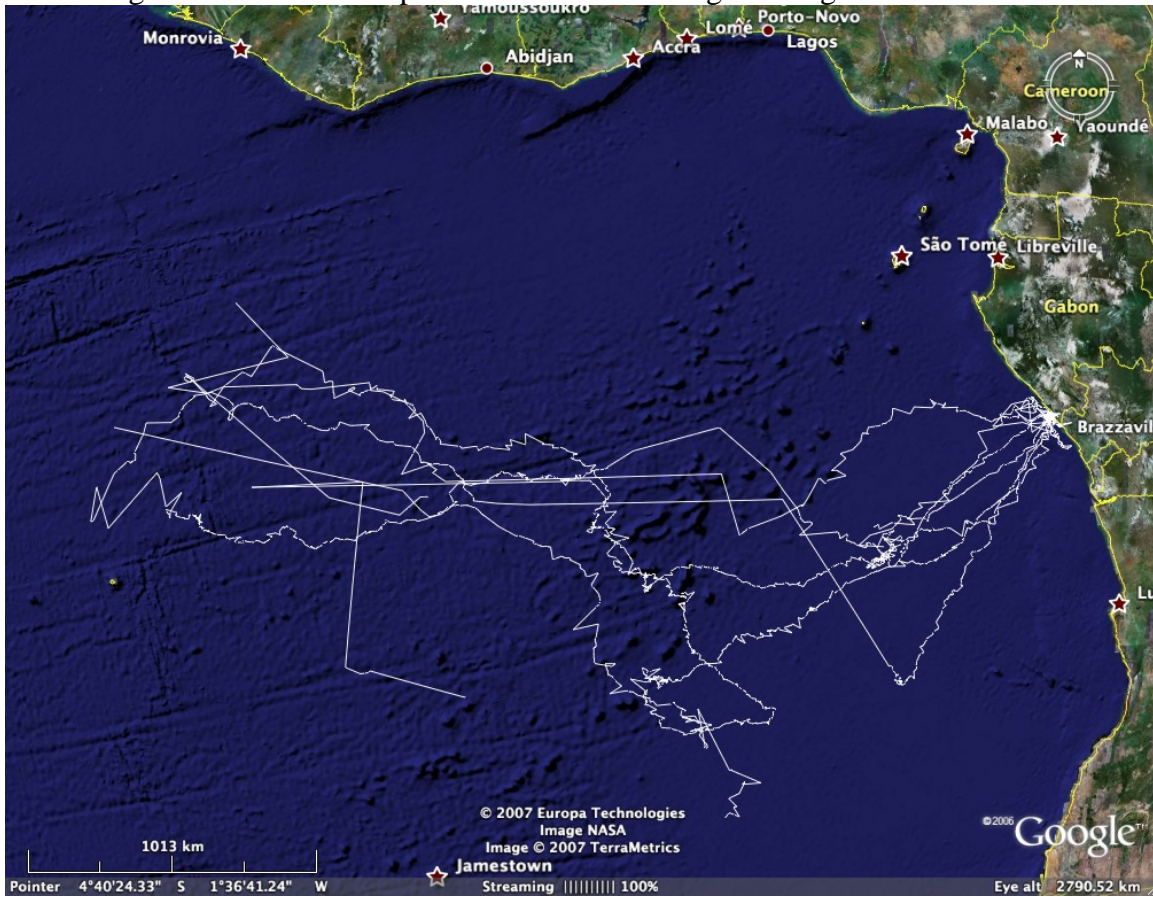
Figure 1: Attachement1.pdf Credit: seaturtle.org/tracking



Tracks of 12 satellite tagged loggerhead sea turtles from the Cape Verde Island, West Africa, as of 1 August 2007.

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Figure 2: Attachment2.pdf Credit: seaturtle.org/tracking



Tracks of 7 satellite tagged leatherback sea turtles from Mayumba National Park, Gabon, in the South Atlantic, as of 1 August 2007.

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