

## JIMAR – PFRP ANNUAL REPORT FOR FY 2005

**P.I./Sponsor Name:** Yonat Swimmer, Mike Musyl, Lianne M<sup>c</sup>Naughton, Rich Brill

**Project Proposal Title:**

“Survivorship, migrations, and diving patterns of sea turtles released from commercial longline fishing gear, determined with pop-up satellite archival transmitters“

**Funding Agency:** NOAA

**NOAA Goal** (Check those that apply):

- To protect, restore, and manage the use of coastal and ocean resources through ecosystem-base management
- To understand climate variability and change to enhance society’s ability to plan and respond
- To serve society’s needs for weather and water information
- To support the nation’s commerce with information for safe, efficient, and environmentally sound transportation

**1. Purpose of the Project (one paragraph)**

The objectives of this project are two-fold: 1) to provide estimates of delayed mortality and morbidity in sea turtles following interactions with longline fishing gear, and 2) to compare the movements and behaviors of sea turtles caught and released from longline gear to free-swimming controls. To do this, we’ve deployed pop-up satellite archival tags (PSATs) on longline-caught and free-swimming hard-shelled turtles in the Eastern Tropical Pacific, the North Pacific, and the South Atlantic Oceans.

**2. Progress during FY 2005 (One-two paragraphs, including a comparison of the actual accomplishments to the objectives established for the period, and the reasons for slippage if established objectives were not met):**

PSATs deployed in the North Pacific Ocean

California-based observers have deployed 13 PSATs on incidentally-caught loggerhead turtles in the North Pacific Ocean swordfish fishery since 2002. Of these, turtles that were “deeply” hooked” (hooked in mouth) were successfully tracked for an average of 136 days (n=8), while turtles that were “lightly” hooked (in flipper), were tracked an average of 55 days (n=1). Four of the 13 tags failed to report, and the majority of tags failed to transmit any appreciable depth and temperature data. It appeared that a single mortality case was observed 6 months post-release from fishing gear. Turtles’ start and end points are graphed in Figure 1.

## PSATs deployed in the South Atlantic Ocean

Since January 2004, 5 loggerhead turtles have been tracked with PSATs after their interaction with longline fishing gear. Of these, data have been received for one tag, which chronicled the turtle's movements for 76 days after which the tag was apparently shed. Three PSATs are currently reporting data and these data will become available to us in the coming weeks. We had anticipated the CPUE of turtles to be higher thereby enabling the deployment of additional PSATs. Turtles' start and end points are graphed in Figure 2.

Turtles' most probable tracks are currently being determined via the Kalman-filter modeling approach. We continue to work with Anders Nielsen to refine these estimates based on incorporation of sea surface temperature data. However, this has been problematical due to the paucity of temperature data downloaded from some of the PSATs. Overall, we are disappointed with the quantity of data received from PSATs. To help decipher these low data reporting rates, we are closely working with Michael Musyl on another PFRP project to determine the relative performance characteristics of PSATs. PSAT reporting rates and possible explanatory factors have been added to a meta database which will incorporate PSAT information from a number of different researchers (*i.e.* Musyl, Brill, Swimmer, Lutcavage, Wilson, *et al.*) on many different species to explore for patterns and commonalities (*e.g.* comparing serial numbers of non-reporting tags, *etc.*). Lastly, with our "team" of PSAT collaborators (Oceanographic Correlations: Mike Laurs, Dave Foley, Keith Bigelow; Data Analysis and PSAT function: Molly Lutcavage, Yonat Swimmer; Physiological Modeling: Hans Malte, Christina Larsen; Biochemical Correlates of Delayed Mortality: Chris Moyes; Kalman Filter Development: John Sibert, Anders Nielsen; Habitat

Based Models and Stock Assessments: Pierre Kleiber, Keith Bigelow; Visual Capability of Pelagic Fishes: Eric Warrant, Kerstin Fritsches) we intend to explore many different avenues of investigation that may help explain vertical and horizontal movement patterns of turtles that may uncover vertical and thermal niche partitioning in the pelagic ecosystem.

### **3. Plans for the next fiscal year (one paragraph):**

We plan to purchase platform terminal transmitters (PTTs) in order to get better estimates of turtles' post-release movements short term survivorship. These tags will be deployed on longline-caught and released turtles in the Hawaii-based swordfish and tuna fisheries, Brazil's swordfish fishery, as well as other fisheries in South and Central America where we are also concurrently conducting sea turtle by-catch fishing experiments.-Mike Laurs and colleagues at NOAA/PFEL have designed and constructed a "Live Access Server" whereby tracks estimated by the Kalman filter can be overlaid with a suite of oceanographic parameters to look for patterns and correlation in the various species.

Project personnel will continue to analyze data outlined above and other activities will consist of preparing draft manuscripts and disseminating preliminary findings to various venues such as those provided by scientific conferences and through the popular press.

### **4. List of papers published in refereed journals during FY 2005.**

Swimmer Y, Arauz, R, Higgins B, M<sup>c</sup>Naughton L, McCracken M, Ballesterero J, and R. Brill In Press. Food Color and Marine Turtle Feeding Behavior: Can Blue Bait Reduce Turtle Bycatch in Commercial Fisheries? *Marine Ecology Progress Series*.

Swimmer, Y, M<sup>c</sup>Naughton, L., Moyes C., and R. Brill. In Press. Metabolic biochemistry of cardiac muscle in three tuna species (bigeye, *Thunnus obesus*; yellowfin, *T. albacres*; and skipjack, *Katsuwonus pelamis*) with divergent ambient temperature and oxygen tolerances. *Fish Physiology and Biochemistry*.

Hyde, Lynn, Humphreys Jr., Musyl, West and Vetter. 2005. Shipboard identification of fish eggs and larvae by multiples PCR and description of fertilized eggs of blue marlin, shortbill spearfish and wahoo. 286:269-277 *Marine Ecology Progress Series*

Nielsen, Bigelow, Musyl, Sibert. 2005. Improving Light-based geolocation by including sea surface temperature. *Fisheries Oceanography*.

George H. Burgess, Lawrence R. Beerkircher, Gregor M. Cailliet, John K. Carlson, Enric Cortés, Kenneth J. Goldman, R. Dean Grubbs, John A. Musick, Michael K. Musyl, Colin A. Simpfendorfer. 2005. The decline of shark populations in the Northwest Atlantic Ocean and Gulf of Mexico: Fact or Fiction? (*submitted to Fisheries Research*)

Keith Bigelow<sup>1\*</sup>, Michael K. Musyl<sup>2</sup>, Francois Poisson<sup>3</sup> and Pierre Kleiber<sup>1</sup>. 2005. Pelagic Longline Gear Depth and Shoaling: How Deep is Deep? (*submitted to Fisheries Research*).

Richard W. Brill<sup>1</sup>, Keith A. Bigelow, Michael K. Musyl, Kerstin A. Fritches, Eric J. Warrant BIGEYE TUNA (*THUNNUS OBESUS*) BEHAVIOR AND PHYSIOLOGY AND THEIR RELEVANCE TO STOCK ASSESSMENTS AND FISHERY BIOLOGY SCRS/2004/062 Col. Vol. Sci. Pap. ICCAT, 57(2): (2005)

**5. Other papers, technical reports, meeting presentations, etc.**

- Swimmer, Y. Submitted. Relationship Between Atmospheric Basking and Disease in Captive Green Turtles (*Chelonia mydas*). *Chelonian Conservation and Biology*. Michael K. Musyl<sup>1</sup>, Lianne M. McNaughton<sup>1</sup>, J. Yonat Swimmer<sup>2</sup> and Richard W. Brill<sup>3</sup> 2004. Convergent Evolution of vertical movement behaviour in swordfish, bigeye tuna, and bigeye thresher sharks. *PFRP Newsletter, October-December 2004, 1-4*.
- Southwood, A.L., Higgins, B., Brill, R.W., Vogt, R., and J.Y. Swimmer. Submitted. Aquatic chemoreception in loggerhead sea turtles: behavioral responses to food and a novel chemical. *Marine Ecology Progress Series*.
- Swimmer, Y. Sea Turtle Bycatch Reduction: an update on sensory experiments and field trials. North Pacific Loggerhead Workshop Western Pacific Fisheries Management Council, March 2005.
- Swimmer, Y., Brill, R., Sales, G., Arauz, R., McCracken, M., Marcovaldi, N., Musyl, M., Ballesterio, J., McNaughton, L. and C. Boggs. In Press. Mitigation measures to reduce sea turtle interactions with longline fishing gear: from the lab to the ocean. [Abstr] Oral presentation at the 25th Annual Symposium on Sea Turtle Conservation and Biology 16-22 January 2005, Savannah, Georgia, USA.
- Swimmer, Y., Musyl, M., McNaughton, L., Arauz, R., Ballesterio, J., Nielson, A. and R. Brill. In Press. Sea Turtles and Longline Fishing in the Pacific Ocean. [Abstr] Oral presentation: World Fisheries Congress, May 2-6, 2004, Vancouver, BC, Canada.
- Swimmer, Y., Arauz, R., Musyl, M., Ballesterio, J., McNaughton, L. and R. Brill. In Press. Survivorship and behavior of olive ridley turtles off the coast of Costa Rica following interactions with longline fishing gear. [Abstr] Poster presented at the 24th Annual Symposium on Sea Turtle Conservation and Biology 22 - 29 February 2004, San Jose, Costa Rica.
- Southwood, A., Higgins, B., Brill, R. and Y. Swimmer. Chemoreception in sea turtles: Implications for longline fisheries interactions. Presented at the Scientific and Statistical Committee, Western Pacific Fisheries Management Council, February, 2004 and University of Hawaii, Dept. of Zoology, Seminar Series, March 2004.

**6. Graduates (Names of students graduating with MS or PhD degrees during FY 2005. Provide titles of their thesis or dissertation):**

N/A

**7. Awards (List awards given to JIMAR employees or to the project itself during the period):** N/A

**8. Publication Count (Total count of publications for the reporting period and previous periods categorized by NOAA lead author and Institute (or subgrantee) lead author and whether it was peer-reviewed or non peer-reviewed (not including presentations):**

	JL Lead Author			NOAA Lead Author			Other Lead Author		
	FY03	FY04	FY05	FY03	FY04	FY05	FY03	FY04	FY05
Peer-reviewed	2	0	1	1	0	2	0	0	0
Non-peer reviewed	3	5	5	3	3	2	0	0	0

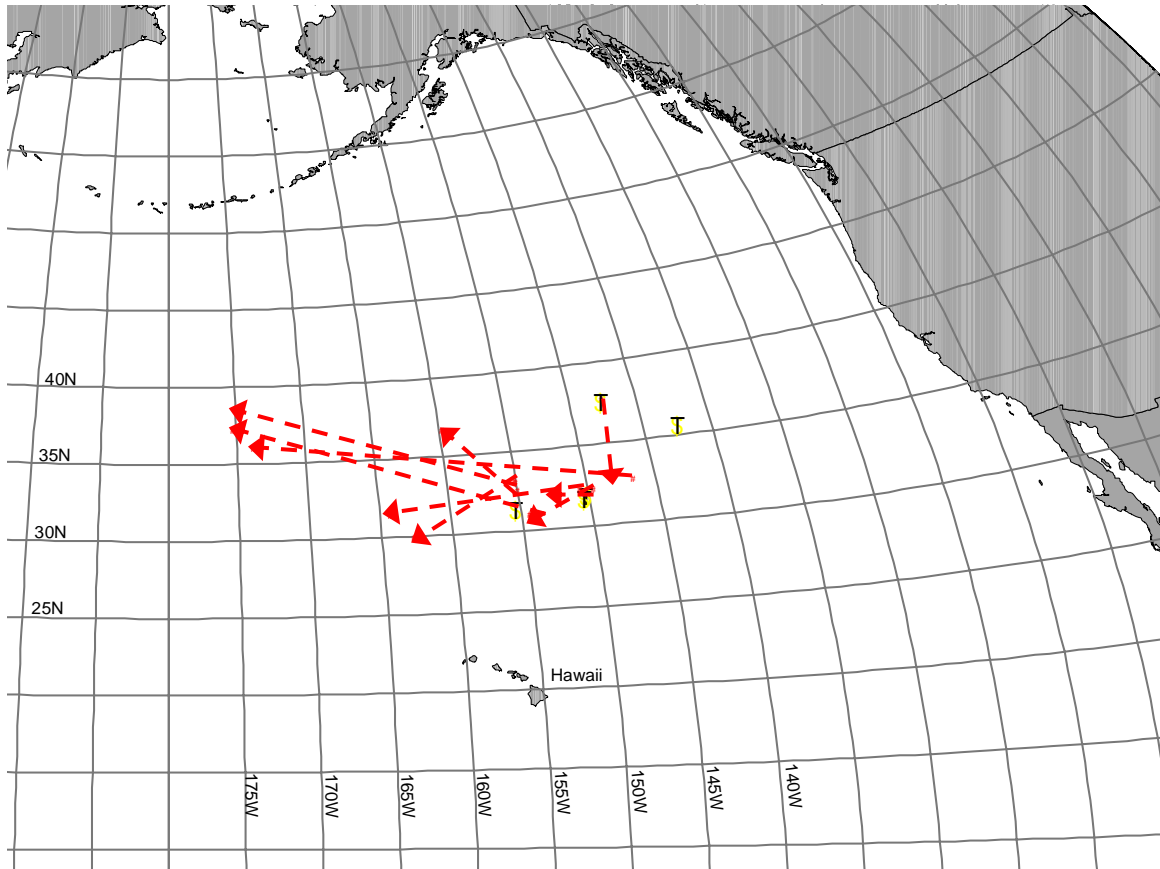
**9. Students and Post-docs (Number of students and post-docs that were associated with NOAA funded research. Please indicate if they received any NOAA funding. For institutes that award subcontracts, please include information from your subgrantees):**

Lianne McNaughton  
Amanda Southwood, PhD

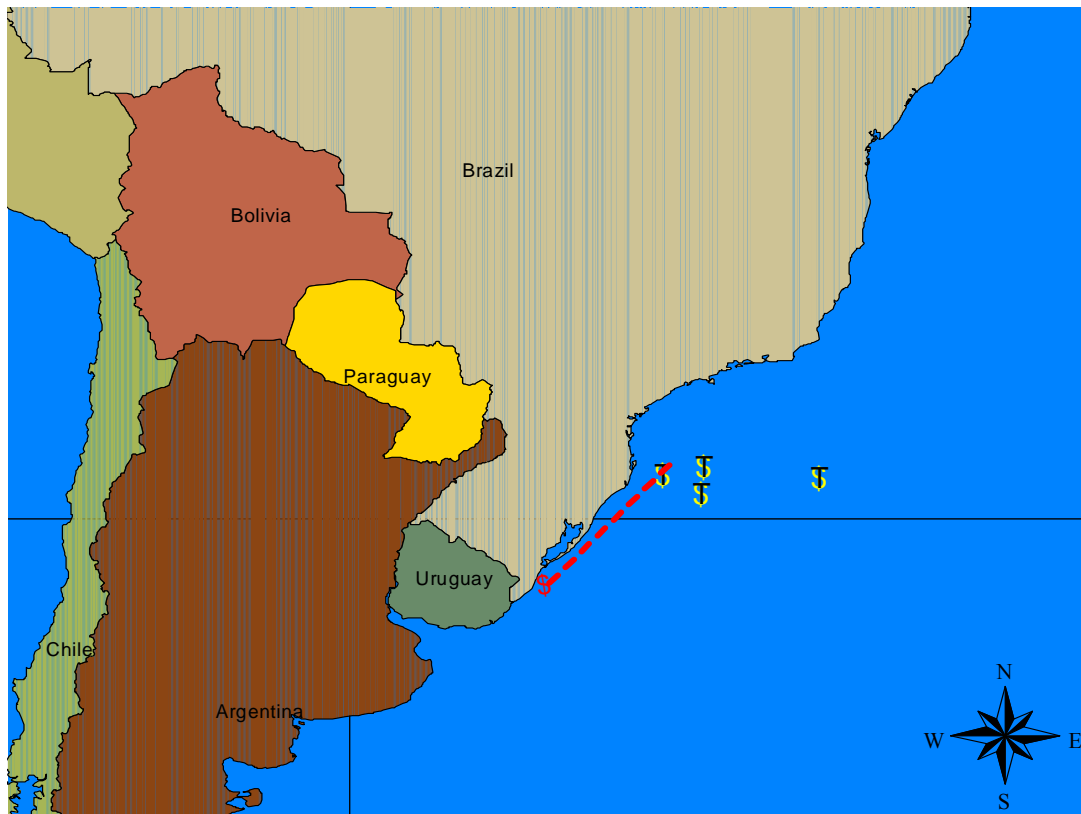
**10. Personnel:**

- (i) Number of employees by job title and terminal degree that received more than 50% support from NOAA, including visiting scientists (this information is not required from subgrantees):  
0
- (ii) Number of employees/students that received 100% of their funding from an OAR laboratory and/or are located within that laboratory.  
0
- (iii) Number of employees/students that were hired by NOAA during the past year:  
0

**11. Images and Captions (JIMAR will be including images in the annual report. Please send two of your best high-resolution, color images (photo, graphic, schematic) as a JPEG or TIFF with a caption for each image. Hardcopies of images can be dropped off at the JIMAR office if no electronic versions are available.**



- Caption 1: Deployment locations (yellow triangles) and start and end points of turtle tracks (red dashed line) from 13 loggerhead turtles tagged after their capture and release from longline fishing gear in a swordfish-style fishery in the North Pacific Ocean. Average number of days tracked for 8 deeply-hooked turtles was 136.



- Caption 2: Deployment locations (yellow triangles) and start and end points of a track (red dashed line) from 5 loggerhead turtles tagged after their capture and release from longline fishing gear in a swordfish-style fishery off Brazil.