JIMAR ANNUAL REPORT FOR FY 2008

P.I./SPONSOR NAME: Molly Lutcavage, Ph.D., Selina Heppell, John Sibert

NOAA OFFICE (Of the primary technical contact): SWFSC

PROJECT PROPOSAL TITLE: **Comparing sea turtle distributions and fisheries interactions in the Atlantic and Pacific**

FUNDING AGENCY: NOAA

NOAA GOAL (Check those that apply):

- ☒ To protect, restore, and manage the use of coastal and ocean resources through ecosystem-based 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

PURPOSE OF THE PROJECT (One paragraph):

We are conducting quantitative and qualitative analyses of existing data on the ecology, distribution and fishery interactions of leatherback and loggerhead sea turtles in the North Pacific and North Atlantic oceans. Our primary goal is to use a comparative approach to determine why populations of sea turtles in the Atlantic appear to be stable or increasing, while populations of the same species in the Pacific are declining, even though fisheries interactions occur in each ocean basin. Because of great concerns for turtle survival, and their protected status under the Endangered Species Act, sea turtle take in pelagic fisheries has resulted in complete closures (e.g., Hawaii, Grand Banks) or major restrictions on effort and area for the US fleet (e.g., NE Distant Sector, Atlantic). Scientific understanding of the extent and nature of world-wide take patterns in pelagic and inshore fisheries, and impacts on stock rebuilding, is incomplete, at best. Our PASTA research project is now comprised of an interdisciplinary group of sea turtle biologists, fisheries scientists, demographers, and oceanographers from federal and international agencies and academia.

Steering Committee: Molly Lutcavage, Selina S. Heppell, Tomo Eguchi, David Kirby, Rebecca Lewison, Abigail McCarthy, Melissa Snover, Yonat Swimmer

PROGRESS DURING FY 2008 (One-two paragraphs, including a comparison of the actual accomplishments to the objectives established for the period, and the reasons for the slippage if established objectives were not met):

The objective of this portion of the PASTA initiative was to examine dispersal of sea turtle hatchlings via drift simulation in order to understand possible reasons for differences in recruitment. A model was developed by David Kirby, with input from our lab, as well as that provided in our PASTA workshops, in order to investigate inter-annual and decadal scale variability in the areal extent of Pacific pelagic habitat for hatchlings. The motivation for the work was to investigate the hypothesis that changing ocean conditions during early life history may have impacted upon recruitment within turtle populations. An additional goal is to understand difference dispersal outcomes in the Pacific vs. Atlantic basins that might provide insight on differences in population cycles.

The hatchling drift model assumes that movement results both from advection of leatherback hatchlings by surface currents and diffusion due to randomly directed swimming activity. This structural assumption in the model is a necessary simplification that neglects finer scale directed movements by the whole simulated population, but it is likely to be robust at the time step (1 day) and grid spacing (1/2 degree) used. Recent work exploring foraging behaviour after extracting current vectors from adult turtle tracks (Phillippe Gaspar, pers. com.) clearly illustrates how the effects of surface currents can mask the effects of foraging, and this effect is likely to be significantly greater for hatchlings than for adults. Numerical particle tracking experiments were carried out, with populations of hatchlings released immediately offshore from known nesting beaches during the months of peak hatchling emergence. The maximum extent of occupied habitat was recorded at the end of one year of simulation and the model was run for the years 1948-2004. The results showed considerable variation in the spatial extent of hatchling habitat, with Japanese loggerheads having clearly the most disbursed population and West Papuan the most variable. There is apparent synchronicity between the spatial extent of hatchling habitat on both sides of the Pacific, reflecting the basin-scale effects of the El Nino Southern Oscillation on surface currents.

PLANS FOR THE NEXT FISCAL YEAR (One paragraph): This is the final year of the PFRP project. However, we hope to further develop these concepts during 2008 and prepare results for publication in a peer reviewed journal. At that stage, the ecological properties of predicted areas of hatchling habitat (i.e. temperature, primary production, bathymetry) will be examined and the estimates of areal extent of hatchling habitat will be revised to take into account potential mortality due to unfavorable conditions.
We are examining prospects for collaboration on Atlantic model runs with Dr. Raghu Murtugudde through development of a new proposal.

LIST OF PAPERS PUBLISHED IN REFERRED JOURNALS DURING FY 2008, in the following format: (Author or authors with last name and initials, publication year: Article title. *Journal name,* volume, page range.) For example: Charney, J.G., and A. Eliassen, 1964: On the growth of the hurricane depression. *J. Atmos. Sci.*, 21, 68-75.

None so far

OTHER PAPERS, TECHNICAL REPORTS, ETC.: 1.Decadal changes in sea turtle hatchling distributions infrerred from drift simulations modelling. Climate Change Impacts on Top Predators Plenary, La Paz, Mexico, 3-7 Dec 2007
2. The Pacific-Atlantic Sea Turtle Assessment (PASTA) project: using comparative methods to identify effects of climate change on populations. Climate Change Impacts on Top Predators Plenary, La Paz, Mexico, 3-7 Dec 2007

GRADUATES (Names of students graduating with MS or PhD degrees during FY 2008; Titles of their Thesis or Dissertation): n/a

AWARDS (List awards given to JIMAR employees or to the project itself during the period): n/a

PUBLICATION COUNT (Total count of publications for the reporting period and categorized by NOAA lead author and Institute (or subgrantee) lead author and whether it was peer-reviewed or non peer-reviewed (not including presentations):

	JI Lead Author	NOAA Lead Author	Other Lead Author
Peer Reviewed			
Non-Peer Reviewed			

PERSONNEL:

For projects that awarded subcontracts in the fiscal year, please provide the number of supported postdocs and students from each subgrantee.

Andy Myers, Ph.D. (postdoc) partial support, 8%
David . Kirby, Ph.D. (subcontract)

IMAGES AND CAPTIONS (We will also be including images for the annual report. Please send two of your best high-resolution, color images (photo, graphic, schematic) as a **JPEG or TIFF (300 dpi)** with a caption for each image. If you do not have an electronic version of the image, a hardcopy version may be dropped off at the JIMAR office located in the Marine Sciences Building, Room 312):

- Caption 1:

- Caption 2: