JIMAR – PFRP ANNUAL REPORT FOR FY 2005

P.I./Sponsor Name: Selina Heppell (Oregon State University), Molly Lutcavage (University of New Hampshire), and John Sibert (University of Hawaii, JIMAR)

Project Proposal Title: **Comparing sea turtle distributions and fisheries interactions in the Atlantic and Pacific**

Funding Agency: NOAA

NOAA Goal (Check those that apply):

- X 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)

We propose to run quantitative and qualitative analyses of existing data on the ecology, distribution and fishery interactions of leatherback and loggerhead sea turtles in both 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, where fisheries interactions are common, appear to be stable or increasing, while populations of the same species in the Pacific are declining. Because of great concerns for their 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.

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):

We received our funding in January 2005. Our objectives for FY2005 fall into 3 phases:

Data acquisition

1. Compile published and unpublished data on the life history, at-sea distribution, pelagic and coastal fisheries interactions, and history of direct exploitation for

loggerhead and leatherback sea turtle populations in the North Pacific and North Atlantic oceans.

To date, we have created a database for collection and sorting of biological information, fishery data, and oceanographic data relevant to sea turtles in the Pacific and Atlantic basins. We are constructing a GIS-based assessment tool for a spatial evaluation of temporal changes in nesting beach numbers, fishery interactions (based on density of effort in sea turtle habitat), and conservation actions such as egg protection. Our database and map will be populated with published data from a variety of sources, and serve as a framework for hypothesis testing. In addition, spatial and oceanographic analyses of Atlantic leatherback sea turtle movements are underway by Lutcavage and collagues, and these results will be used to test hypotheses related to movements and spatial and temporal depiction of habitat.

Hypothesis formulation

2. Identify and evaluate alternative hypotheses for population change for each species in each ocean basin, by postulating the changes in abundance, distribution, genetic composition or size distributions that would be anticipated from these hypotheses.

The PIs have been in contact with a number of sea turtle researchers, oceanographers and federal sea turtle working groups to discuss possible causes for population recovery (Atlantic) and declines (Pacific). We will finalize a list of invitees for our September workshop in Honolulu by May 1.

Model building and hypothesis testing

3. Compare expected distributions of loggerhead and leatherback turtles in each ocean basin based on habitat preferences and oceanographic regimes.

Graduate student Abigail McCarthy has completed an initial analysis of loggerhead turtle habitat preferences using General Additive Models of sea turtle bycatch records from the Atlantic. The predicted distribution of turtles from this model will be tested for Atlantic and Pacific using additional bycatch records and data from satellite telemetry. The results will also be compared with previous studies that utilize different methods. Ms. McCarthy will complete her thesis in December 2005.

- 4. Develop a modeling framework for assessment of population-level impacts of pelagic fisheries on sea turtle populations that are subject to multiple stressors.
- PI Selina Heppell and contractor Rebecca Lewison have developed and evaluated a series of age-structured models to predict time lags and magnitude of trends in sea turtle populations that are expected following a natural or man-made perturbation. We are also examining more traditional production models for leatherbacks, as nesting beaches in the Atlantic provide a range of population sizes and recovery rates that can help determine appropriate stock-recruitment parameters. We are also investigating the potential for evaluation of stock status through size distributions; this may be

possible with loggerheads, but is unlikely to work for leatherbacks due to extreme variability in size at age observed by Snover and Avens at the SEFSC.

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

Following a 3-day workshop with sea turtle biologists, fishery modelers, and oceanographers (planned for September 2005), we will evaluate alternative hypotheses for population declines through analyses of potential habitat quality shifts, fishery impacts and impacts at nesting beaches. This will require additional modeling. We will hold a follow-up workshop in Year 2 to share our results and to complete a report on the project. This follow-up workshop may be held in Honolulu to accommodate project collaborators and interested participants residing in New Caledonia, Hawaii and the southeast Asian and Pacific regions. We will present our Year 1 results at the PFRP investigator's meeting in November 2005 and at the International Sea Turtle Symposium in April 2006. Ms. McCarthy will submit two manuscripts from her thesis by June 2006; Lewison and Heppell will complete and submit their manuscript on age-structured models and time lags in September 2005. We anticipate at least one other major publication from this effort. Kirby, Lutcavage and Heppell will examine movements and conduct analyses of oceanographic dispersal patterns of juveniles and adults. This may include additional collaborators with expertise in habitat choice and optimal foraging applications.

4. List of papers published in refereed journals during FY 2005. none

- 5. Other papers, technical reports, meeting presentations, etc.
- Heppell, SS and M. Lutcavage. Comparing sea turtle trends in the Pacific and Atlantic: an integrative approach to determine the relative role of fishing mortality. PFRP Investigator's meeting, Honolulu, November 2004.
- Graduates (Names of students graduating with MS or PhD degrees during FY 2005. Provide titles of their thesis or dissertation): none
- 7. Awards (List awards given to JIMAR employees or to the project itself during the period): none
- 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									
Non-peer									
reviewed									

None (funding received January 2005).

 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):
Abigail McCarthy, MSc, Oregon State University, Dept. Fisheries and Wildlife Julie Barr, MSc, Oregon State University, Marine Resource Management Program

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): none
- (ii) Number of employees/students that received 100% of their funding from an OAR laboratory and/or are located within that laboratory. none
- (iii) Number of employees/students that were hired by NOAA during the past year: none
- 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 of 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:
 - Caption 2: