## JIMAR ANNUAL REPORT FOR FY 2010

P.I./SPONSOR NAME: Kevin Weng, Tim Essington, Mark Maunder

NOAA OFFICE (Of the primary technical contract): NMFS/PIFSC

PROJECT PROPOSAL TITLE: Intraguild predation, cannibalism, and the productivity of tuna populations

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): This project seeks to (1) construct a comprehensive database of the feeding habits of pelagic apex predators (2) use those data to identify the life history stages, locations and time periods when predation on commercially-valuable tuna is most pronounced (3) develop simple population models to gauge the impacts of predation on fisheries reference points.

PROGRESS DURING FY 201009 (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): We have completed the database and analysis of feeding habits data and are finalizing manuscripts for publication. An important component of the database is the inclusion of historical data from the 1950's and 1970's, not as data summaries but as raw data. This has dramatically increased our power to describe important predators on tunas, the sizes of tunas being consumed, and to evaluate the implications of changing predator fields on the productivity of tunas.

We have two main products to date. The first is a draft manuscript that describes the main predators on skipjack, yellowfin and bigeye (rare) tunas, and used simple measures of reproductive value to identify groups of predators likely to have the greatest effect on population dynamics. This analysis has revealed that bigeye tuna are rarely consumed by large fish (marlins, sharks, larger tunas) but that yellowfin and especially skipjack tuna comprise a significant component of the feeding habits of large bodied pelagic predators. Moreover, consumption is directed at body sizes

that are near or exceed the size at recruitment, indicating that these predators may directly impact the productivity of these species. For yellowfin tuna, the most important predators are the *Carcharhinus* sharks and for skipjack tuna the most important predators are sharks and marlins. Another notable observation is the frequency of occurrence of both species in predator diets is highest in samples collected via purse seine sets on floating objects (likely a consequence of the aggregating effect of these objects on juvenile fishes). This suggests that fishing practices may be inadvertently changing predator-prey interactions by altering the spatio-temporal overlap of juvenile tunas with their predators

The second main project used these data to assess changes in the prey fields of tunas and other predators, using the fish as "biological samplers" that can provide an indicator of changes in prey communities. This work has provided the first documented evidence for increasing cephalopod abundance over the four decades of data. Moreover, we find even recent increases in cephalopod abundance that is attributable mostly to *Dosidicus gigas* (Humboldt squid). This finding is noteworthy because while poleward range expansion of this species is well known, our data are collected in the core of their range and therefore provides the first indication of possible population growth independent of range expansion.

PLANS FOR THE NEXT FISCAL YEAR (One paragraph): Draft manuscripts of both manuscripts are complete, we intend to submit both to jourals within the year

LIST OF PAPERS PUBLISHED IN REFERRED JOURNALS DURING FY 2009, 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

- OTHER PAPERS, TECHNICAL REPORTS, ETC.: none
- GRADUATES (Names of students graduating with MS or PhD degrees during FY 2009; Titles of their Thesis or Dissertation): Mary Hunsicker, Ph.D. November 2010, University of Washington. "The role of squid within food webs, fisheries, and the environment"
- AWARDS (List awards given to JIMAR employees or to the project itself during the period):
- 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	0	0	0
Non-Peer Reviewed	0	0	0

PERSONNEL:

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

This project supported one Ph.D. student at the University of Washington

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):

No photos or images available at this time. We are preparing a piece for the PFRP newsletter currently and that may have some graphical content.