

## **JIMAR – PFRP ANNUAL REPORT FOR FY 2007**

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Project Proposal Title: Examining latitudinal variation in food webs leading to top predators in the Pacific Ocean

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)**

A previous trophodynamics study funded by PFRP (PFRP Project #659559) has demonstrated significant heterogeneity in trophic pathways across the tropical Pacific, associated with either the prevailing mesoscale oceanography or the seabed topography. These results have the potential to not only identify shifts in ecosystem structure (climate change), but also may help to define stock structure of widely distributed tropical tunas. A similar, but more localized study off eastern Australia (Young et al. 2004) is also beginning to reveal differences not only within the region but also in comparison with the study in the tropical Pacific (Olson et al. 2005). Given the proximity of the two studies geographically and the potential migration of tunas between the regions, project researchers will conduct a study that compares the trophodynamics of the pelagic ecosystems of these regions using largely existing data sets. The analysis would combine statistical comparisons with qualitative models to determine similarities or otherwise of the two regions. Such comparisons may offer insight into the ecosystem impacts of potential climate change expressed as ocean warming. This project will compare stomach contents of top predators from tropical and temperate waters of the western, central, and eastern Pacific Ocean to examine latitudinal differences in the trophic pathways of these regions. The results will be used to develop and compare qualitative models (Dambacher et al. 2002) of the trophic flows within each region.

2. Progress during FY 2007 (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):

An Access database has been established to incorporate dietary data previously held by Australia, Noumea and the United States. This data base has all details necessary to select predator prey diet matrices of varying spatial and temporal resolution. At present we have all data from Noumea and Australia entered resulting in a data set of approximately 7000 stomachs from ~25 predators. The United States data set is nearly completed and will be incorporated into the data base soon. A meeting was held in Hobart in September 2006 where the four investigators agreed to use the existing CSIRO database as the holding port for all the data to be used in the analyses. This required a number of alterations to the existing database and to the format of the SPC data which has now been achieved.

As part of the process of integrating the data sets, Jeffrey Dambacher attended a meeting of Ecosystem modelers in Noumea in March 2007 where he demonstrated the qualitative approach. Preliminary analyses of the data sets have been used to explore the basic structure of the food webs from different regions (Figure 1). These network structures will provide the basis for the development of qualitative models that will be used to explore perturbation scenarios in each of the regions considered in the project.

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

We are now ready to enter the eastern Pacific food web data. These data are in the process of being checked for accuracy. Once these data are entered we will be in a position to make the latitudinal comparisons. We are planning a meeting in La Jolla later this year to finalize data entry. We have submitted an abstract to the CLIOTOP Symposium at which we will present results and a manuscript. Jeffrey Dambacher will be reporting on the work to date at the November 2007 PFRP Principle Investigators Workshop.

4. List of papers published in refereed journals during FY 2007.

none

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

Young, J., R. Olson, V. Allain, J. Dambacher and A. Hobday. Examining latitudinal variation in food webs leading to top predators in the Pacific Ocean: an introduction. PFRP Principle Investigators Workshop, Hawaii. November 2006

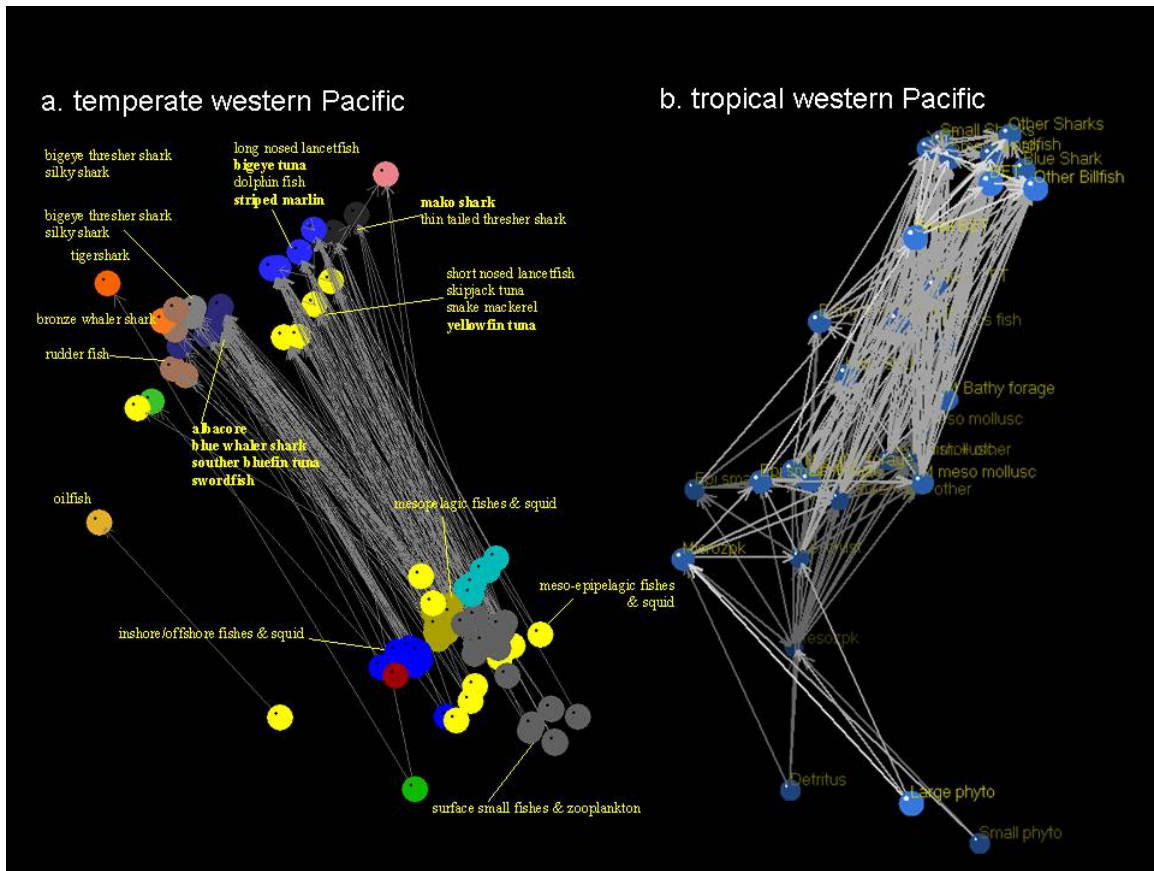
Dambacher, J.M. March 9, 2007. Qualitative modelling of complex biological and social systems. SPC Seminar, Noumea.

6. Graduates (Names of students graduating with MS or PhD degrees during FY 2007. Provide titles of their thesis or dissertation):

7. Awards (List awards given to JIMAR employees or to the project itself during the period):
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		
	FY05	FY06	FY07	FY05	FY06	FY07	FY05	FY06	FY07
Peer-reviewed									
Non-peer reviewed									

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):
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):
  - (ii) Number of employees/students that received 100% of their funding from an OAR laboratory and/or are located within that laboratory.
  - (iii) Number of employees/students that were hired by NOAA during the past year:
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: Structure of pelagic foodwebs for a) temperate western Pacific, and b) tropical western Pacific Ocean. Plot of species with relative distances in a 3-D non-metric multidimensional scaling space based on regular role equivalence. The equivalence of species is a function of the similarity of their predator and prey linkages throughout the entire trophic network. In a) closely clustered species with nodes of the same color are members of an equivalent group, while in b) the groups are represented by a single node.

12. For multi-year projects, provide budget for the next year on a separate page. Contact Dodie Lau to confirm whether or not your project is receiving continuation funds (e.g., year 2, year 3), and for budget preparation assistance, [lau@hawaii.edu](mailto:lau@hawaii.edu)