

JIMAR ANNUAL REPORT FOR FY 2009

P.I./SPONSOR NAME: Jock Young, Robert Olson, Valerie Allain, and Jeffrey Dambacher

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

PROJECT PROPOSAL TITLE: Examining latitudinal variation in food webs leading to top predators in the Pacific Ocean (#657362)

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:

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 is also beginning to reveal differences not only within the region but also in comparison with the study in the tropical Pacific. Given the proximity of the two studies geographically and the potential migration of tunas between the regions, project researchers are conducting a study that compares the trophodynamics of the pelagic ecosystems of these regions using largely existing data sets. The analysis combines 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 aims to 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 are used to develop and compare qualitative models of the trophic flows within each region.

PROGRESS DURING FY 2009 :

A manuscript was prepared during the previous fiscal year in which qualitative modeling was employed to examine diet data from a variety of upper-level predators in three large

regions of the equatorial and South Pacific Ocean. The manuscript was submitted to the CLIOTOP special issue of *Progress in Oceanography*, and during FY 2009 was favorably reviewed, revised by the authors, and accepted for publication. The results have previously been reported at a PFRP PI meeting and at the CLIOTOP Symposium in La Paz, Mexico. An Access data base that incorporates dietary data resulting from separate trophic ecology projects in Australia, New Caledonia, and the United States is well established and is now the basis of an expanded data base that includes samples from the Atlantic and Indian Ocean.

PIs Jock Young, Robert Olson, and Valerie Allain met following the November 2008 PFRP PI meeting to plan and initiate a traditional diet data analysis of tunas and dolphinfish from the three large regions mentioned above. Specifically, the work entails broad scale latitudinal comparisons of the diets of yellowfin tuna, bigeye tuna, and dolphinfish. The primary habitat of these three species includes different depth strata in pelagic waters over a wide latitudinal range in the Pacific Ocean. This meeting and the ensuing analyses formed the basis of an expanded study that now includes researchers working in the Indian and Atlantic Oceans (see next section).

PLANS FOR THE NEXT FISCAL YEAR:

Plans are underway to convene a workshop in Sète, France during September 2009 on the expanded international study mentioned above. The workshop is an activity of CLIOTOP working group 3, and is co-sponsored by GLOBEC-CLIOTOP, CSIRO, IATTC, IRD, SPC, the University of New Hampshire, and PFRP (through the present project). The workshop is to focus on a global comparison of diet data using multivariate regression tree analysis and other methods in efforts to analyze latitudinal variation in pelagic food webs.

LIST OF PAPERS PUBLISHED IN REFERRED JOURNALS DURING FY 2009

Dambacher, J.M., J.W. Young, R.J. Olson, V. Allain, F. Galván-Magaña, M.J. Lansdell, N. Bocanegra-Castillo, V. Alatorre-Ramírez, S.P. Cooper, and L.M. Duffy. 2009. Analyzing pelagic food webs leading to top predators in the Pacific Ocean: a graph-theoretic approach. *Progress in Oceanography*. In press.

OTHER PAPERS, TECHNICAL REPORTS, ETC.:

Olson, R.J. and J.W. Young, 2007. The Role of Squid in Open Ocean Ecosystems. Report of a GLOBEC-CLIOTOP/PFRP workshop, 16-17 November 2006, Honolulu, Hawaii, USA. GLOBEC Report 24, vi, 94.

Maury, O., Lehodey, P., Garcia, A., Marsac, F., Olson, R., Young, J., Murtugudde, R., Miller, K., 2008. The first CLIOTOP symposium: an overview. GLOBEC International Newsletter 14(1), 59-63.

GRADUATES (Names of students graduating with MS or PhD degrees during FY 2009; Titles of their Thesis or Dissertation):
None

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

None

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			1
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.

None

IMAGES AND CAPTIONS:

- Figure 1: Aggregated food webs of three regions of the Pacific Ocean. Graph nodes represent groups of species with similar predator-prey relationships and are arranged in tiers with top predators in tier 1. Shown for each tier are mean and standard deviation of trophic levels of the taxa in each group.
- Figure 2: Sample locations, number of samples (“catch”), and gear/purse-seine set type corresponding to diet data of yellowfin tuna, bigeye tuna, and dolphinfish collected in three large regions of the equatorial and South Pacific Ocean. The data will be used in an expanded study comparing the diets over latitudinal bands in three oceans during FY 2010. LL=longline; PS_AnchFAD=purse seine, anchored FAD sets; PS_dolphin= purse seine, dolphin sets; PS_FloatObj= purse seine, floating-object sets; and PS_Unass= purse seine, unassociated sets.

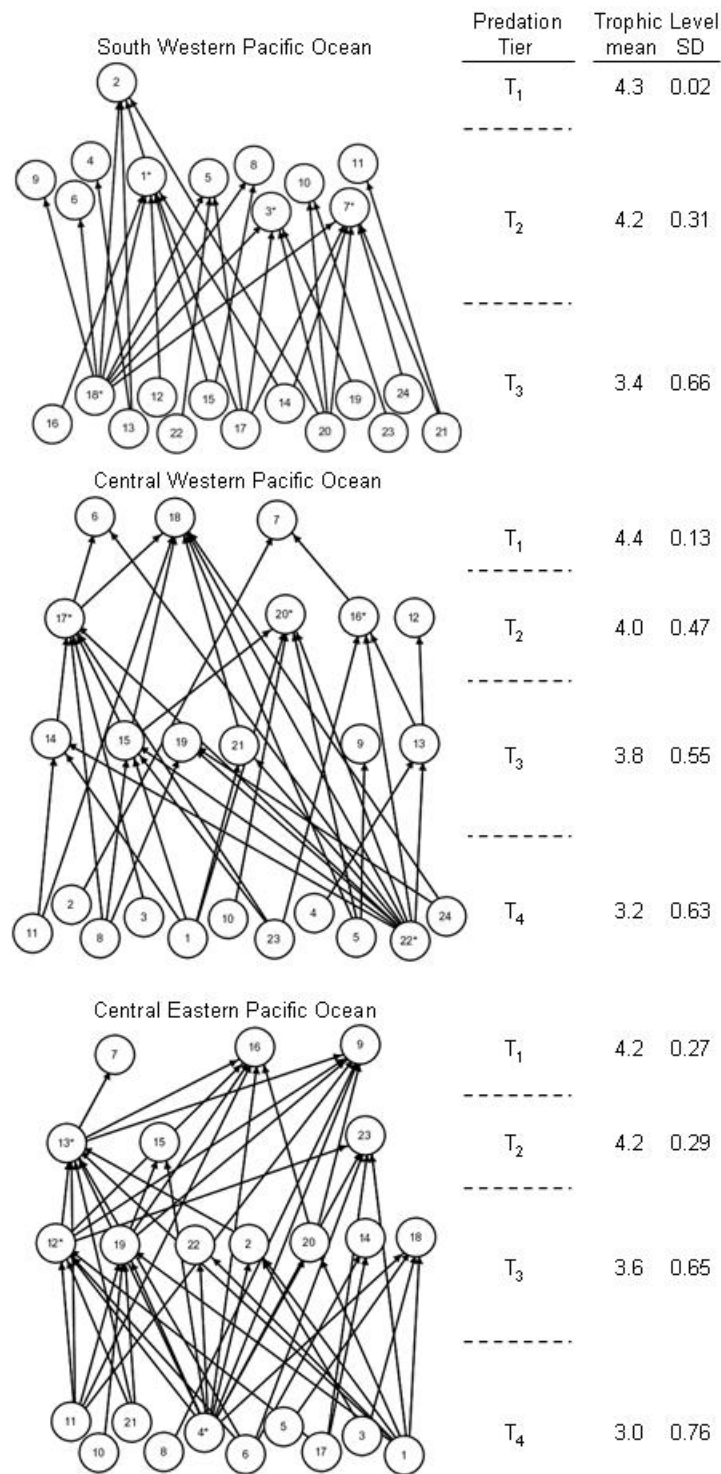


Figure 1.

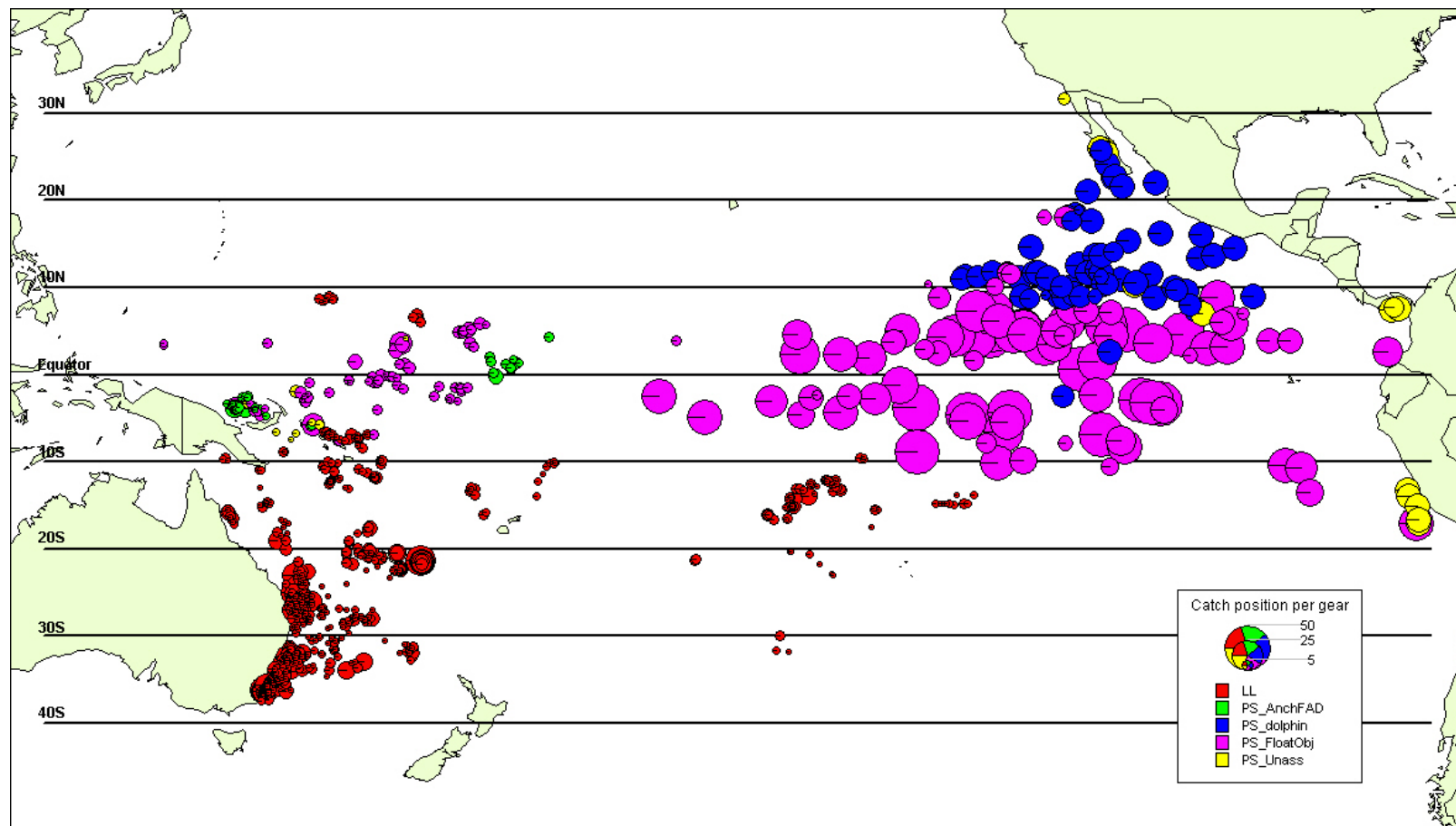


Figure 2.