

## JIMAR – PFRP ANNUAL REPORT FOR FY 2005

**P.I./Sponsor Name:** Russell E Brainard, Jeffrey J Polovina, Michael P Seki, Bo Qui and Pierre Flament

**Project Proposal Title:** *The role of oceanography in aggregation and vulnerability of Bigeye tuna in the Hawaii longline fishery from satellite, moored and shipboard time series.*

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

Stock assessment of Bigeye tuna is generally based on long-line catch-per-unit-effort (CPUE) as an index of abundance of stock assessment. Unfortunately, fishery-dependant CPUE does not necessarily reflect abundance of stock, but rather the catchability which is in turn dependant on variable oceanographic conditions. Preferential habitat appears to be the 8-15 C waters near the base of the thermocline so variability of thermo-cline depth could affect concentration. According to work by Boggs, Brill and others Bigeye tend to remain in the upper 10-90m at night and repetitively migrate vertically between 350-500m and 50-150m during the day. However, a recent paper in the southern Pacific by Schaefer and Fuller (2002) suggests on rare occasions they can exceed 1000m in depth (and thus can not be physiologically oxygen limited to 350m in their dive profiles). This behavior suggests that at times when the thermal structure is depressed, tuna may be less aggregated and vice-versa. Likewise horizontal and vertical shears have a profound effect on catchabilities and we would like to consider whether wave activity could also be a factor effecting catchability.

### 2. Progress during FY 2005

**Bigeye mooring data return** For the year 3 mooring seven out of eleven SeaBird SBE39 temperature recorders returned with data. The recorders where at the following

depths: surface, 25 m, 125 m, 200 m, 250 m, 300 m, 400 m, and 700 m. The Seabirds recorded temperature data every 300 sec.

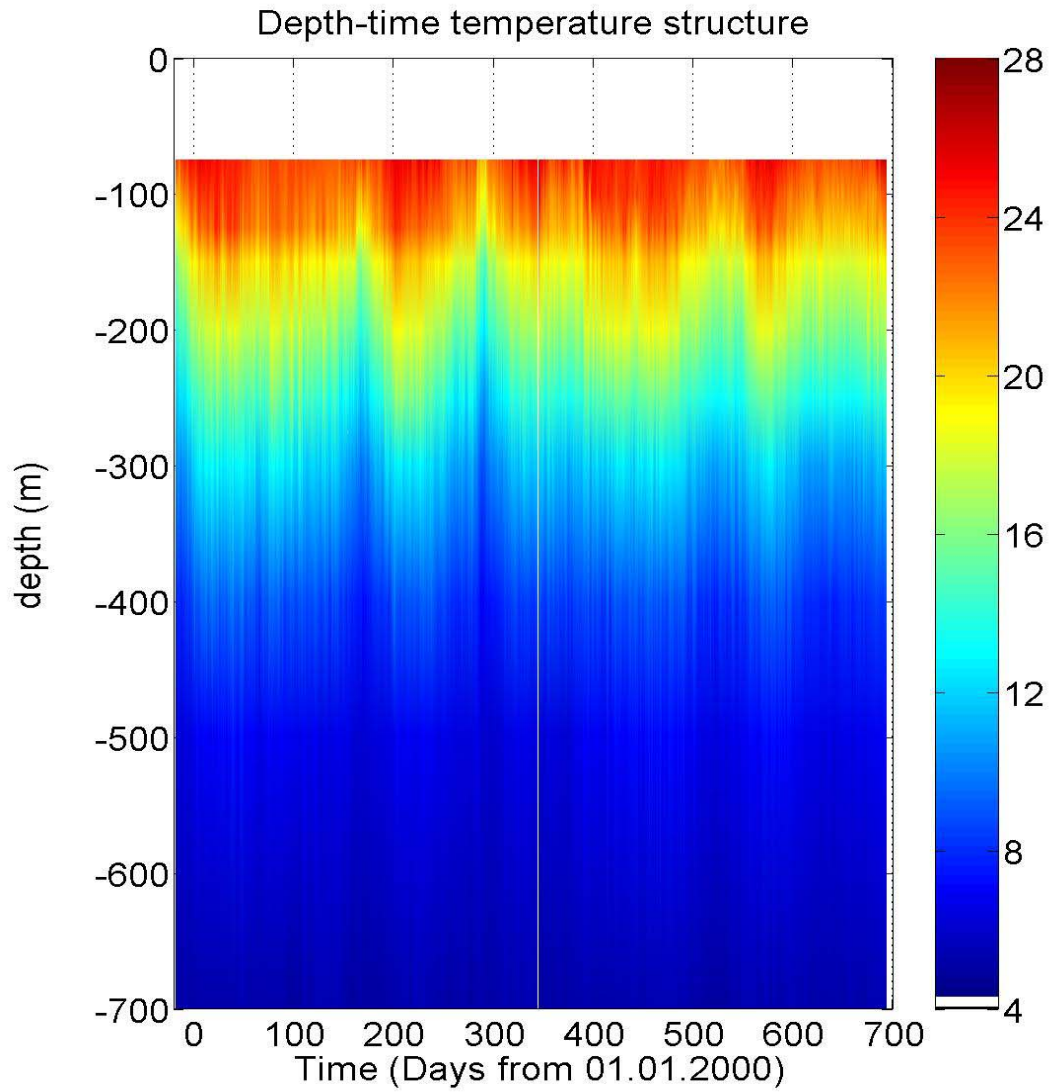


Figure 1. Depth time temperature slice (year 1& 2 with time in days from 01 01 2000).

The upward and downward looking ADPs (acoustic Doppler profilers) had start times which were shifted by 30 minutes to avoid interference between the two instruments. Data collection parameters were set to record for 20 min, with 70 pings, with twenty 8 meter bins, with a 4m blanking interval at the top and bottom. Full data coverage for the year was recorded.

The third instrument deployed was an Aanderaa RCM9 current meter at 350m. The deployment parameters were 8 channels, wide temperature and conductivity ranges. The instrument was also equipped with a dissolved oxygen sensor.

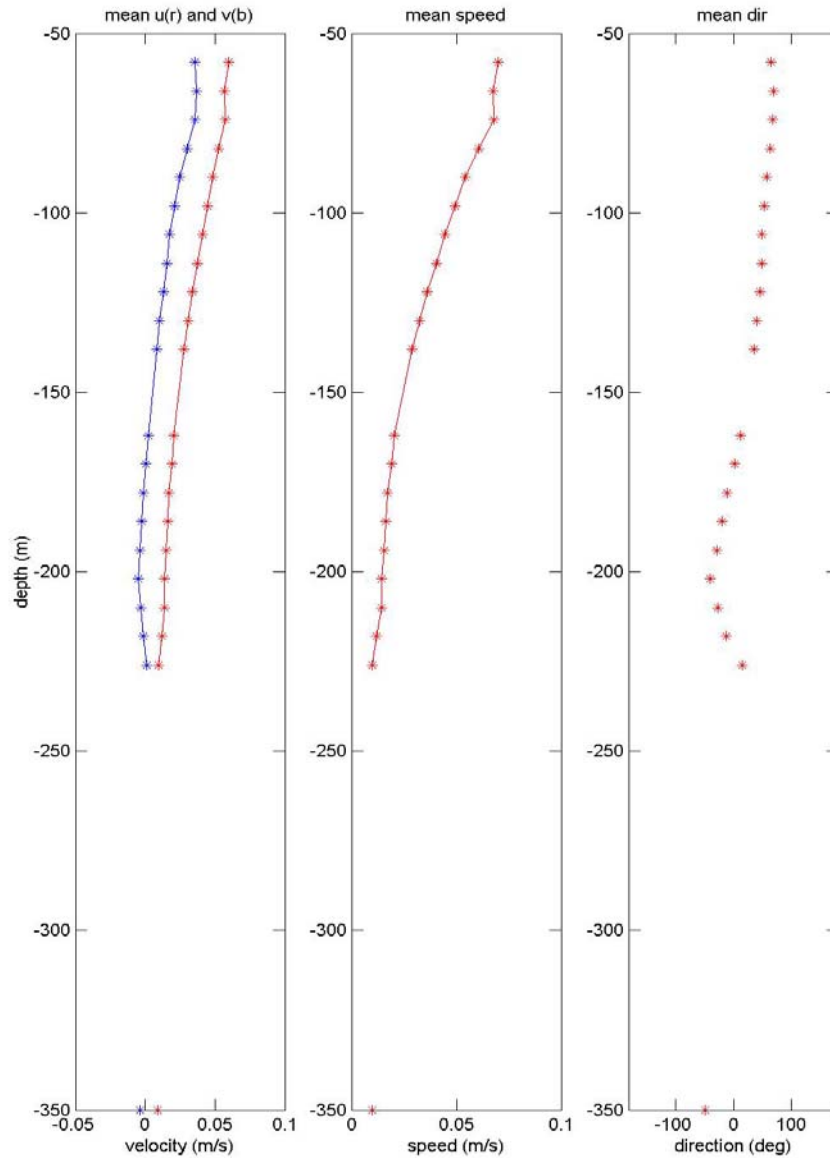


Figure 2 Shows the deployment mean of ADP and RCM9 year2 vertical velocity structure.

A generalized additive model was used to predict the effects of oceanography in the Palmyra Atoll region on bigeye CPUE from Hawaii Longline logbook entries. It was found that bigeye CPUE was higher in El Niño years around Palmyra Atoll and predictions of higher CPUE were made for the 2005 winter months.

3. Plans for the next fiscal year (one paragraph):  
During the next fiscal year, analysis of the 3 years of BIGEYE mooring data will be completed and an manuscript summarizing the data and the most important findings will be submitted.
4. List of papers published in refereed journals during FY 2005.  
El Niño Effects at Palmyra Atoll: Oceanographic Changes and bigeye tuna *Thunnus obesus* catch rate variability by Evan A. Howell and Donald R. Kobayashi (submitted to Fisheries Oceanography)
5. Other papers, technical reports, meeting presentations, etc.  
Hyder, P., K. Bigelow, (2004). Migration and abundances of BIGEYE tuna (Thunnus Obesus) inferred from catch rates and their relation to variations in the ocean environment. Talk presented at the ASLO/TOS 2004 Ocean Research Conference, Honolulu, Hi.
6. 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				1		1	2		
Non-peer reviewed		1		1					

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):  
none
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): 1 oceanographer, MS Oceanography
- (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: Figure 1. Depth time temperature slice (year 1& 2 with time in days from 01 01 2000).
- Caption 2: The third instrument type deployed was an Aanderra RCM9 at 350m