

## JIMAR ANNUAL REPORT FOR FY 2008

P.I./SPONSOR NAME: Jay R. Rooker, David Itano, John Sibert

NOAA OFFICE (Of the primary technical contact): PIFSC

PROJECT PROPOSAL TITLE: Nursery Origin of Yellowfin Tuna (*Thunnus albacares*) in the Hawaiian Islands

FUNDING AGENCY: NOAA, NMFS

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):

The purpose of this study is to provide information on the source(s) of yellowfin recruits (age-1 and age-2) to Hawaii-based surface fisheries using natural tracers (stable isotopes and trace elements) in otoliths. Our first step is to develop a baseline that describes the chemical signatures in the otoliths of age-0 yellowfin from putative spawning and/or nursery areas in Hawaii and the broader western and central Pacific Ocean (WCPO). This initial baseline will be used to test whether ambient chemical conditions in regional nurseries are sufficient to impart unique signatures in the otoliths of age-0 yellowfin. After establishing a baseline, we will target age-1 and age-2 (sub-adult to young adult) yellowfin from the Hawaiian Island fisheries to determine their source (natal origin). Ultimately, we hope to determine the relative contribution that locally spawned residents (versus transients) make to the Hawaii-based fisheries.

PROGRESS DURING FY 2008 (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):

Note: Funding for project available at Texas A&M University on Jan 18, 2008 (start date). Progress Report reflects activities during the first 6 months of project.

Our first step of the project is to develop a baseline describing the chemical signatures in otoliths of age-0 yellowfin from putative spawning and/or nursery areas in Hawaii and the broader WCPO. Samples have been obtained from potential nursery areas during

year 1 (2008) of the study, these include; Hawaiian Islands (inshore FADs off Oahu and Kauai), Cross Seamounts, equatorial central Pacific (Line Islands), several locations along the equatorial western Pacific (Moro Gulf Philippines, Marshall Islands, Solomon Islands), and one location in the eastern Pacific (Baja Mexico). Preliminary data from age-0 yellowfin tuna indicate stable isotopic composition in otoliths of individuals from the Hawaiian Islands, Cross Seamounts, and the western equatorial (Moro Gulf Philippines) were significantly different (MANOVA,  $P < 0.05$ ). In general, otoliths of yellowfin from the western equatorial region were depleted relative to areas in and around Hawaii, with intermediate values observed for individuals collected from the offshore seamount in the Hawaii EEZ. Cross validated classification success from quadratic discriminant function analysis was 86%, indicating the approach has promise for identifying yellowfin tuna from different nurseries. After building our baseline data set to include additional nursery areas, otolith core material from age-1 and age-2 yellowfin tuna from the Hawaii-based fisheries will be compared to baseline data using mix-stock procedures. This will allow us for the first time to investigate the relative contribution of locally spawned versus transient yellowfin tuna to Hawaii-based fisheries.

#### PLANS FOR THE NEXT FISCAL YEAR (One paragraph):

Efforts over the next year will be devoted toward developing our baseline data set for yellowfin tuna from all nursery areas using both stable isotopes and trace elements over a 2-year period (2007/2008 and 2008/2009). In addition, we will initiate work on a similar baseline for bigeye tuna nursery areas. To date, all samples of yellowfin tuna and bigeye tuna have been obtained for the first year baseline data, and the remaining otolith analyses (stable isotope and trace element) are currently being performed. In addition to analyzing year 1 samples, year 2 will involve additional collections of age-0 yellowfin tuna and age-0 bigeye tuna from similar nursery areas and subsequent otolith analyses. A significant effort will also involve collections of age-1 and age-2 yellowfin tuna and bigeye tuna from the Hawaii-based fisheries in the next year and isolate core material from these otoliths. The origin of unknown tuna (age-1 and age-2 yellowfin tuna and bigeye tuna) will be determined with mix-stock analyses that include our age-0 signatures of each species as baseline data.

LIST OF PAPERS PUBLISHED IN REFERRED JOURNALS DURING FY 2008, 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.

#### OTHER PAPERS, TECHNICAL REPORTS, ETC.:

1) Itano, D.G., Wells R.J.D., Rooker J.R. 2008. Origin of yellowfin tuna (*Thunnus albacares*) in the Hawaiian Islands: preliminary assessment of natal signatures in otoliths. Submitted as a working paper to the Western and Central Pacific Fisheries Commission, Scientific Committee, Fourth Regular Session. 11-22 August 2008 Port Moresby, Papua New Guinea. Biology SWG.

Presentation:

2) Wells, R.J.D., Rooker J.R., Itano D.G. 2008. Origin of yellowfin tuna in the Hawaiian Islands. 59<sup>th</sup> Annual Tuna Conference, Lake Arrowhead, CA.

GRADUATES (Names of students graduating with MS or PhD degrees during FY 2008; Titles of their Thesis or Dissertation):

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			
Non-Peer Reviewed	1		

PERSONNEL:

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

Graduate student: 1

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):

Caption 1: Canonical scores plot from QDFA of age-0 yellowfin tuna collected from Hawaiian Islands, Cross Seamounts, and western equatorial nursery areas. Plots are based on  $\delta^{13}\text{C}$  and  $\delta^{18}\text{O}$  stable isotopes in otolith cores and ellipses represent 95% confidence intervals.

