

JIMAR ANNUAL REPORT FOR FY 2010

P.I./SPONSOR NAME: Jeffrey C. Drazen

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

PROJECT PROPOSAL TITLE: Examining Pelagic Food Webs using Multiple Chemical Tracers

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.
- Mission Support

PURPOSE OF THE PROJECT (One paragraph):

Middle trophic level organisms (namely macroplankton and micronekton) are the decisive link between primary producers and top predators as well as food items of many commercially important pelagic predators. However, the trophic dynamics of many macroplankton and micronekton are poorly known. Consequently, fishery models and ecosystem-based management decisions would benefit greatly from detailed information on the trophic dynamics of these organisms in the pelagic environment. We are utilizing multiple chemical analyses (bulk stable isotopes, compound specific isotopes, lipid biomarkers, and mercury concentrations) in conjunction with supplementary stomach content analyses to characterize the pelagic food web, incorporating organisms from primary producers to top predators in waters surrounding the Hawaiian Islands. Our specific objectives are

- 1) evaluate variation in diet amongst
 - a. commercially important top predators
 - b. major taxonomic and ecological groups of middle trophic level pelagic animals
- 2) determine major trophic connections between epipelagic, mesopelagic, and bathypelagic habitats and communities.

Results from this project will increase our understanding of trophic connectivity between the forage base and top predators and further elucidate the structure and variability of

pelagic food webs, which is necessary information for ecosystem-based managers and ecosystem modelers.

PROGRESS DURING FY 2010 (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):

In the first 10 months of the project our efforts have focused on sample collections and processing of these samples in the laboratory which were our stated goals for this period of the project. Samples have been collected during dedicated small boat operations (UH RV Klaus Wrytki) and aboard ships of opportunity (i.e. CMORE cruise) on 5 short cruises ranging from one to 7 days. Some difficulties were encountered initially with logistics on the UH boat and with the net system employed. We may need to invest some project funds into the procurement of our own net with a slightly larger mouth opening to improve catches but this will require our use of a larger vessel. Despite difficulties 250 samples have been collected of 75 taxa (species or higher taxonomic category) thus far. Some of these were collected in association with the UH @Sea program, which uses a sailing vessel to teach and train undergraduates in the fields of oceanography and marine biology. This opportunity was wonderful outreach and our sampling project was the most popular on the cruise to the Northwest Hawaiian Islands. In addition to mid-trophic level animals, 217 top predator samples comprising 22 species have been collected through the Hawaii Longline Observer program and opportunistically from local fisherman.

Lab work has focused on stomach content analysis of opah, lancetfish, and snake mackerals (~125 stomachs). The findings have been unexpected. Notably lancetfish and the deep water opah both consume a large amount of plastic and other garbage. Also while lancetfish consume a lot of mesopelagic fishes and crustaceans as previously documented in other regions they also eat a large number and mass of hyperiid amphipods and alciopid polychaetes. This is a surprise given their enormous gape and large dagger-like teeth. The few snake mackerel stomachs analyzed only contained bait and many more samples are required to determine the species diet.

Some samples of larger mesopelagic predators including lancetfish, snake mackerals and escolar have been analyzed for bulk isotopes. These results suggest that all three species are at a similar trophic level and a slightly lower trophic level compared to yellowfin tuna for example.

PLANS FOR THE NEXT FISCAL YEAR (One paragraph):

In the next fiscal year we will continue with sample collection, possibly procure a dedicated net for micronekton, and perform laboratory analysis of collected tissues. There is an opportunity to participate in an NSF sponsored research cruise off Hawaii which should allow for depth discrete mid-trophic level and zooplankton sampling using a multiple net system. Also, Choy and Drazen will travel to Australia to perform lipid biomarker work on select samples to evaluate trophic connections.

LIST OF PAPERS PUBLISHED IN REFERRED JOURNALS DURING FY 2010, 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.:

Scientific Presentations

- 6/10 Pelagic Food Web Connectivity in the Central North Pacific Ocean with a Focus on Deep Ocean Mid-trophic Level Groups. C. A. Choy, B. N. Popp and J. C. Drazen. 12th Deep-Sea Biology Symposium, Reykjavik, Iceland
- 11/09 Examining Pelagic Food Webs using Multiple Chemical Tracers. J. C. Drazen, C. A. Choy and B. N. Popp. Pelagic Fisheries Research Program PI Workshop, Honolulu, HI
- 2/10 Using multiple chemical tracers in Hawaiian pelagic food webs. C. A. Choy, B. N. Popp, and J. C. Drazen. Ocean Sciences Meeting, Portland, OR

GRADUATES (Names of students graduating with MS or PhD degrees during FY 2010; 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			

PERSONNEL (on Subcontracts):

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

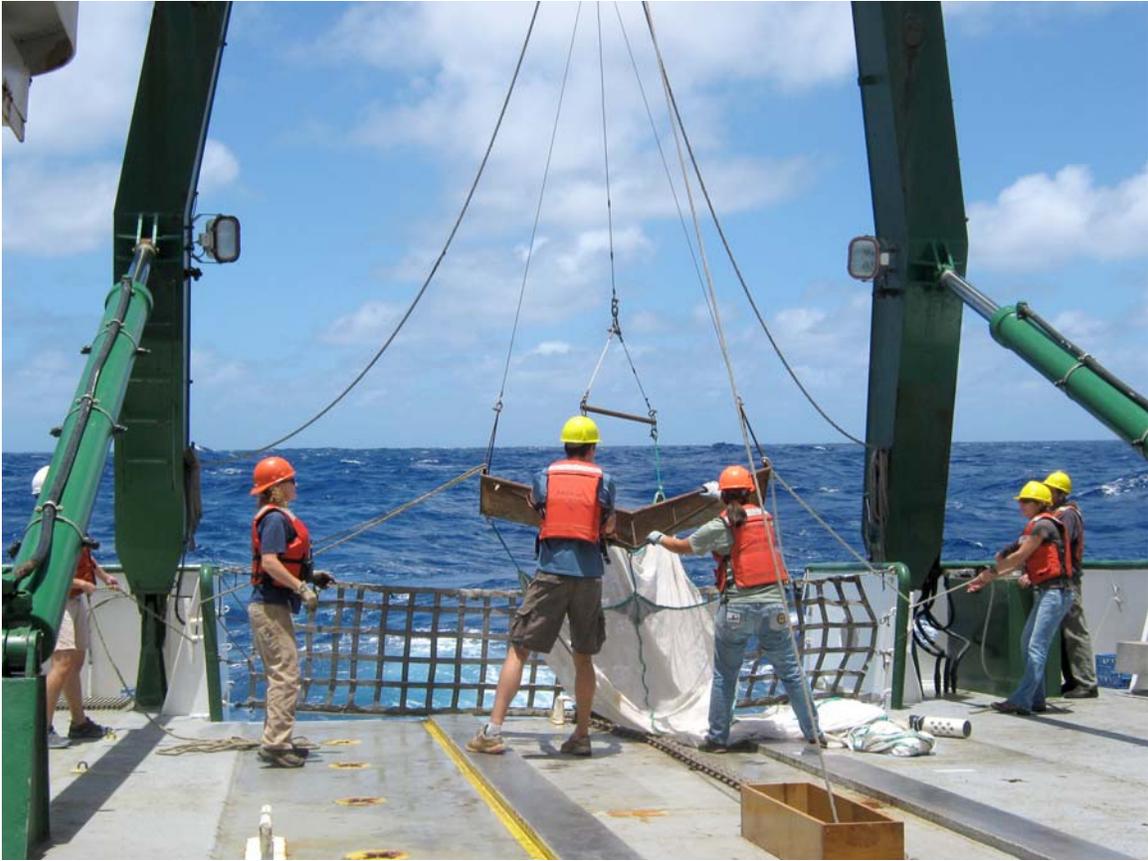
C. Anela Choy, PhD student, University of Hawaii, Department of Oceanography

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: Opah at the Honolulu fish Auction. Stomachs of specimens such as these are being used for a diet analysis of this commercially important species.



- Caption 2: Deployment of an Isaacs-Kidd midwater trawl off the back deck of the RV Kilo Moana to collect micronekton for food-web study.

ACRONYMS: Please provide the complete descriptions for any acronyms used in any areas of the report. For example: UH (University of Hawaii)

UH – University of Hawaii

RV – Research Vessel