

JIMAR ANNUAL REPORT FOR FY 2012

P.I. NAME: Kevin Weng

NOAA OFFICE (*Of the primary technical contact*): NMFS Pacific Islands Fisheries Science Center

NOAA SPONSOR NAME: NMFS Pacific Islands Fisheries Science Center

PROJECT PROPOSAL TITLE: Impacts of Fishing on Vulnerable Non-target Species at Seamounts

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*):

Seamounts have extraordinary levels of endemism and exert a powerful aggregating effect on species, attracting fishes, cetaceans, seabirds and turtles. Only a few of the world's 100,000 seamounts have been explored, leaving us with a minimal understanding of the biology of seamount organisms. Despite this, seamounts experience intensive fisheries, and interviews of commercial fishermen in Hawaii reveal frequent catches of benthic-pelagic sharks. As a result the Western Pacific Fishery Management Council and NOAA are responsible for the management of species that are potentially endemic, highly vulnerable to fishing, and so poorly understood that they cannot be assessed and for which no definitions of essential fish habitat (EFH) exist. While seamounts have been hypothesized as stepping-stones, we do not know if seamount sharks are isolated populations or if they move between seamounts and landmasses. Deep set longline fishing will be conducted at Cross Seamount to characterize the elasmobranch community. Detailed studies will be conducted for the three highest trophic level benthic-pelagic elasmobranchs, the Cooke shark (*Echinorhinus cookei*) the sixgill shark (*Hexanchus griseus*) and the sleeper shark (*Somniosus pacificus*). A combination of acoustic, satellite and accelerometry technologies will be used to characterize their behavior, habitat use and connectivity with other

seamounts and islands. The resulting data will allow definitions of EFH and determination of appropriate management units. The proposal includes a low risk–high reward component, using established methods on new species; as well as a high risk–high reward component, that aims to develop a novel method to study these deep water animals.

PROGRESS DURING FY 2012 (*One-two paragraphs*):

Include a comparison of the actual accomplishments to the objectives established for the period, along with reasons for the slippage if established objectives were not met

Characterization of benthic-pelagic elasmobranchs: Demersal longline sets have been conducted in depths ranging from 200m to 1000m and three species of demersal elasmobranch recorded.

Determination of fine-scale habitat use: We made extra efforts to recover satellite tags that popped up at sea, using a radio direction finder from the boat (or in the case of tags that hit land, conducting searches on foot along the shoreline). We recovered five out of six tags that reported. The sixth reported from a distant location, precluding a search. These tag recoveries allowed us to download extremely detailed records of depth, temperature and light, characterizing the finescale behavior of the animals.

Determination of connectivity and long-range movements: We have placed VR2 in deep water around Oahu and Penguin Banks, with further devices maintained by other researchers in other regions of the Main and Northwest Hawaiian Islands. We have tagged 11 sharks with acoustic transmitters that can be detected by these receivers. We have deployed seven satellite tags on two deepwater demersal elasmobranchs to characterize movement patterns.

Studying foraging behavior to reduce by-catch: The Daily Diary accelerometer was to have been housed for use in deep water by the developers at Swansea University, UK. They have been unable to develop a deep water version of the daily diary tag. We therefore undertook a search for alternate devices, and found one company that produces an accelerometer that can release itself from the animal for recovery. We have purchased these devices and will be testing and deploying them in the near future.

We also conducted a foraging study of deep water elasmobranchs using bulk and compound specific stable isotope techniques to gain an understanding of the trophic level and food web interactions.

Note that due to difficulties in conducting shark fishing operations from commercial fishing vessels that are allowing us to join their trips, we have yet to tag at Cross Seamount.

However, we have gathered large amounts of data from the Main Hawaiian Islands. We are working to develop the capacity to capture deep water sharks at Cross Seamount.

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

Tagging of sharks using acoustic, satellite and accelerometry tags. Testing of new accelerometer devices on deep water sharks near Oahu (such that recovery searches can be conducted). Retrieval and download of the VR2 acoustic monitoring arrays.

**LIST OF PAPERS PUBLISHED IN REFERRED JOURNALS DURING FY 2012
OTHER PAPERS, TECHNICAL REPORTS, ETC.**

PUBLICATION COUNT

*complete excel attachment (*JIMAR publications request*)

Comfort, C; Weng, K. Submitted to Deep Sea Research II. Environmental drivers of vertical behavior of *Hexanchus griseus* in Hawaii

GRADUATES:

Names of students graduating with MS or PhD degrees during FY 2012; Titles of their Thesis or Dissertation

Comfort, Christina. MSc, Oceanography. Spatial And Trophic Ecology Of The Bluntnose Sixgill Shark: Environmental Drivers Of Behavior And Comparative Trophic Position In Two Distinct Habitats

AWARDS:

Name of JIMAR employees or project receiving award during the period, and Name of award

none

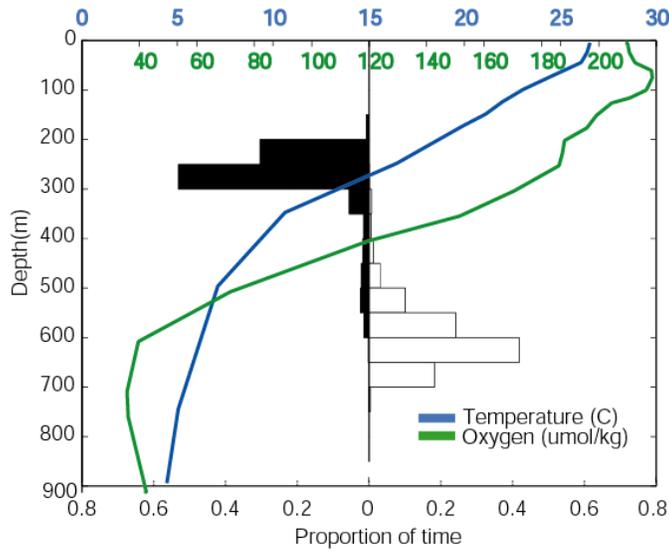
PERSONNEL (on Subcontracts):

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

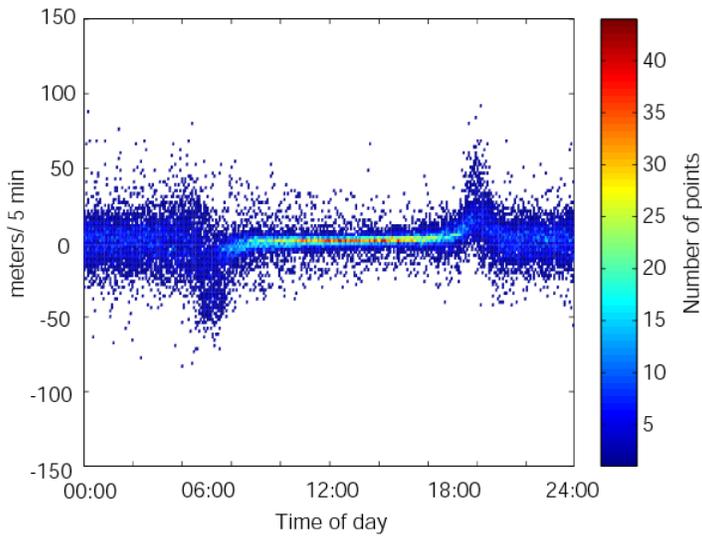
One graduate student supported

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:** Depth habitat of Shark 1, a mature male *Hexanchus griseus* which left Hawaii during its time at liberty. Black bars show night, white bars day. Thermocline and oxycline data are shown in blue and green lines respectively.



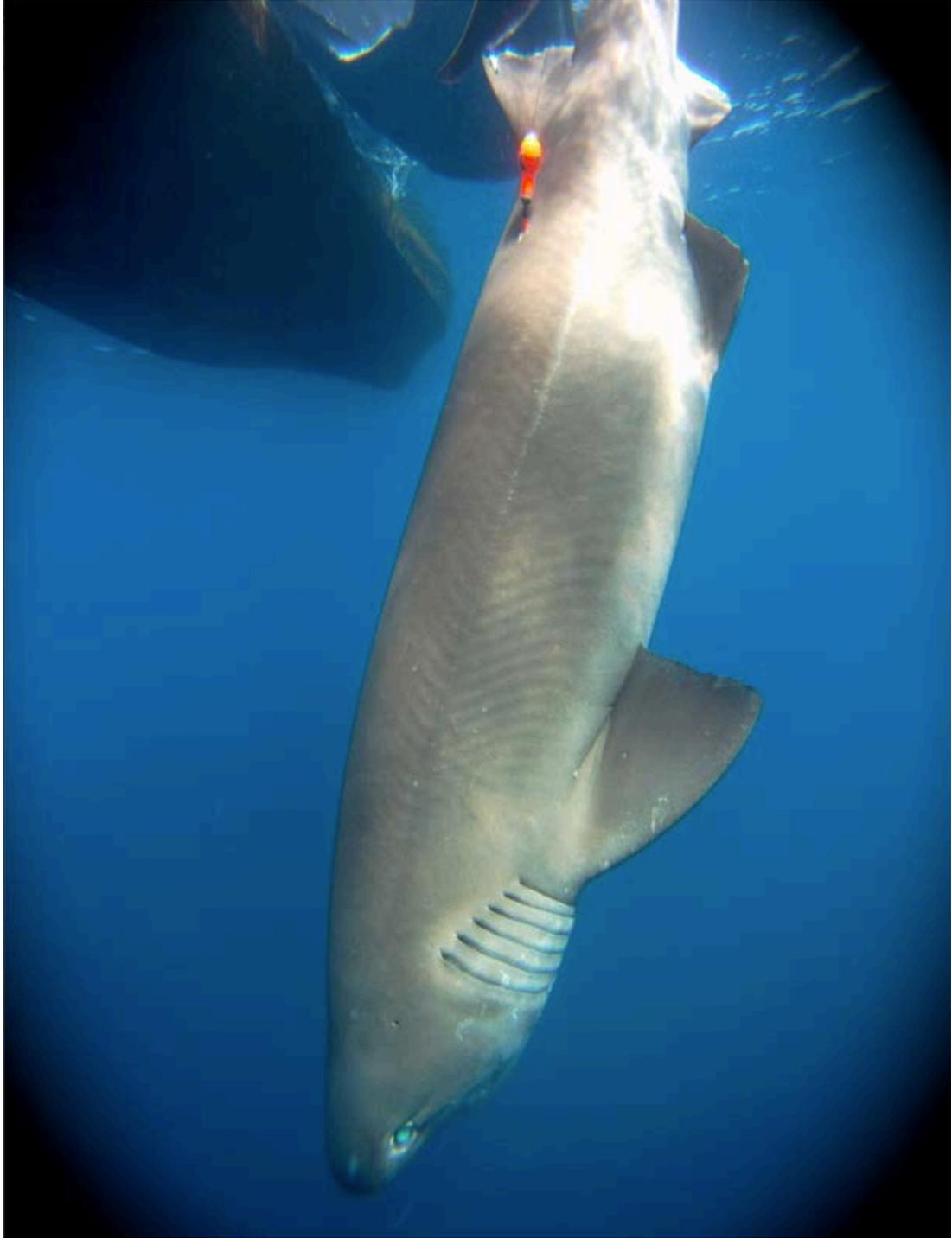
- Caption 2:** Vertical rate of movement versus time of day for Shark 3. This shark displayed a clear ascent and descent, and a greater rate of movement at night than during the day, indicative of nocturnal foraging activity.



Hexanchus griseus, the bluntnose sixgill shark, in Hawaii.



Andrew Gray, controlling a shark for sampling and tagging



A shark swimming back to depth with a satellite tag attached to its back.



A shark swimming back to depth with a satellite tag attached to its back.

ACRONYMS:

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