

Quicklook Cruise Report

Report Date: 12 October 2011

Dates of Mission: 21-30 September 2011

Project Title: Understanding the Capabilities of New Technologies and Methods to Survey West Coast Groundfishes: A Visual Survey using *Dual Deepworker* Submersible

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Summary of Cruise Results: Underwater surveys of demersal fishes and habitats were conducted on two rocky seamounts off southern California using non-extractive transect methodologies and direct observations from the Nuytco *Dual DeepWorker* submersible onboard the F/V *Velero IV*. The study site is located inside the State and Federal Footprint Marine Reserves, offshore of Santa Cruz Island, and includes two seamounts: the Piggy Bank and the Footprint Bank (in the general vicinity of 33.9° N and 119° 5 W; Figure 1).

The overall goal of the study is to assess the capability and efficiency of existing technologies to perform surveys of groundfish species in areas and habitats of the West Coast not surveyed adequately by bottom trawls. There are species such as cowcod and yelloweye rockfish that have high associations with rocky habitat and for which there is a particular need to collect additional information and to provide adequate monitoring of stock status. Non-lethal means of obtaining this information are desirable to minimize impact on these vulnerable species and their habitat.

The specific objectives of our project were to (1) collect data on counts and sizes for several rockfish species (both common and rare, large- and small-bodied, and semi-aggregating and highly demersal/solitary); (2) estimate densities (and associated precision) for these species; (3) estimate total abundance and biomass (and precision) for these species; and (4) estimate biodiversity of fish species within the study site.

Twenty dives were made during daytime (generally 0900-1700 hrs) over 10 days; all equipment was deployed and recovered safely throughout the cruise. We tracked the dives from the support vessel using an ORE Trackpoint II USBL navigation system and WinFrog software. Each dive included multiple 15-minute-long transects, which were randomly located within 100-m depth strata on each of the two seamounts (Figure 1). We conducted 69 quantitative transects (Table 1) to identify, count, and measure fishes on or near (< 1 m) the seafloor. Belt (strip) transects out to 3 meters from the scientific observer were used to quantify all fish species, with the exception of cowcod, which were enumerated using line transect methods.

Table 1. Number of 15-minute transects conducted using the *Dual DeepWorker* submersible in four 100-meter depth strata on the Footprint and Piggy seamounds in southern California, September 21-30 2011.

	100 meters	200 meters	300 meters	400 meters
Footprint:	5	15	21	15
Piggy:	n/a	n/a	5	8

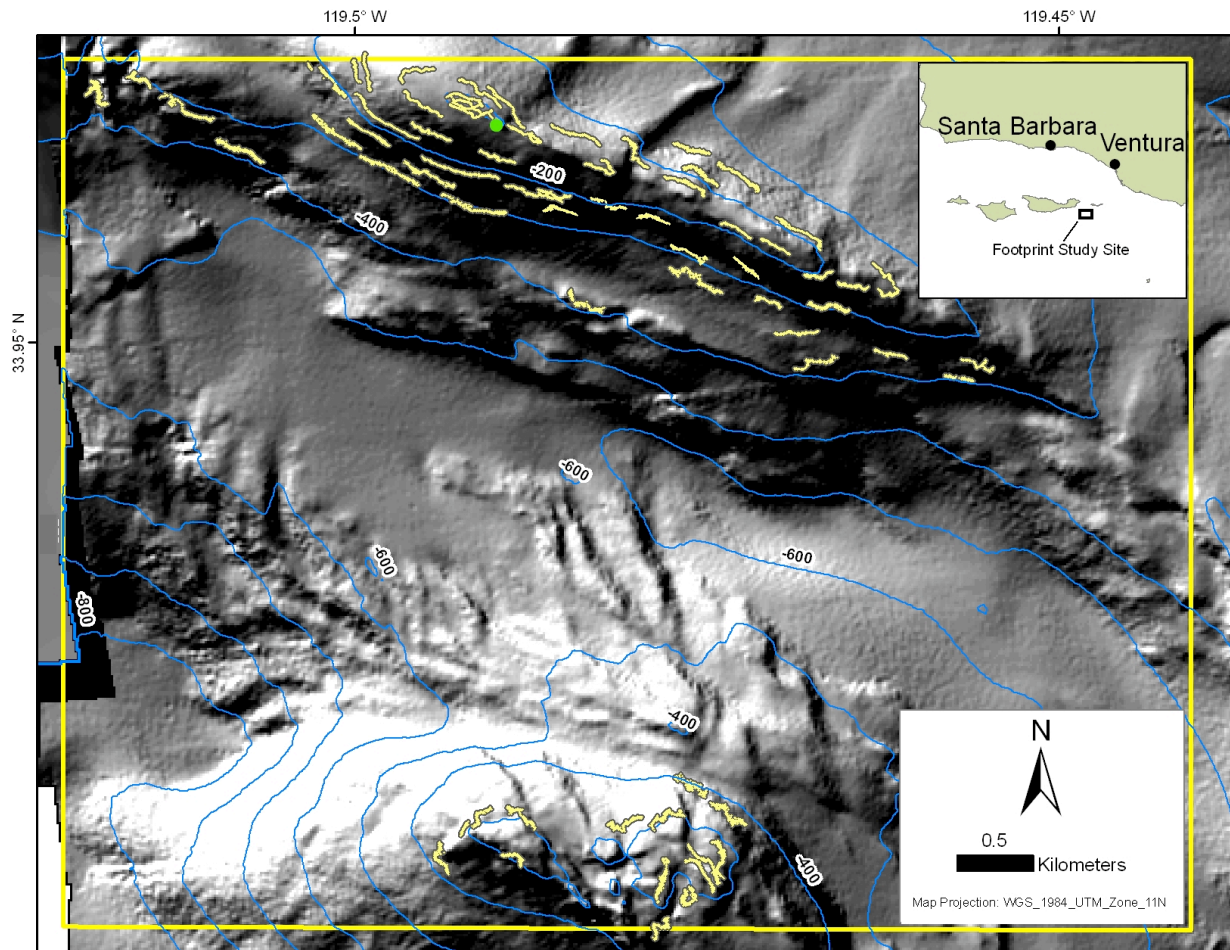


Figure 1. Tracks of visual transects (in yellow), randomly located within 100-meter depth strata on the Footprint (upper feature) and Piggy (lower feature) banks in southern California, as conducted from the *Dual DeepWorker* submersible, September 21-30 2011. Green dot indicates the site of the NWFSC camera sled, which was located during our dives.

A pilot operated the submersible while an experienced scientist identified all fish species and estimated their length. Each transect was documented with two external video cameras and annotated in real-time by the scientist inside the submersible. The scientist estimated size of fishes using paired lasers (installed at 20 cm apart on either side of the main survey video camera) as a guide. The length of each transect was determined accurately using a Doppler

velocity log and ring-laser gyrocompass. Transect width and distance to cowcod were estimated by scientific observers with the aid of a hand-held sonar device, the submersible's sonar, and a crossing laser set at 3 meters from the observer when the submersible was 1 meter above the seafloor. The submersible also was equipped with a Seabird CTD and associated sensors, which continuously recorded temperature, salinity, depth, and oxygen concentration during each dive.

This survey included habitats of high-relief rock boulders and outcrops and steep slopes of soft sediments and rock rubble at depths 93-400 m. We identified at least 60 species of fishes from preliminary observations (Table 2). There were many observations of cowcods (< 50 cm total length), a few sightings of the rare and elusive bronzespotted rockfish, and 26 other rockfish species. Other noteworthy observations (as documented on video) include many Humboldt squid from 400 meters to the surface, a diverse array of deepsea corals and sponges, and the NWFSC's long-lost camera sled at the base of a rock spire on the Footprint Bank. There was a surprisingly small amount of marine debris on either Footprint or Piggy Bank; we sighted only a few old pieces of fishing nets and line, beverage cans, and minor amounts of other items; none of these presented significant navigational hazards to the submersible.

All data from this cruise currently are being processed and entered into our existing database for further analyses. We have sufficient data from this cruise to estimate abundance, size composition, biomass, and species diversity of demersal fish assemblages occurring at 93-400 meters depth on the rocky seamounts inside the study area. The results of our study will be compared with those from two other studies that conducted surveys of these fish assemblages during September and early October 2011 using an AUV and an ROV coupled with hydroacoustics.

Table 2. Preliminary list of fish taxa observed from visual surveys conducted with the *Dual DeepWorker* submersible on the Footprint and Piggy Banks in southern California, September 21-30 2011.

Scientific Name	Common Name	Scientific Name	Common Name
Agonidae	Unidentified poachers	<i>Sebastes aurora</i>	Aurora rockfish
<i>Anoplopoma fimbria</i>	Sablefish	<i>Sebastes chlorostictus</i>	Greenspotted rockfish
<i>Bathyraja interrupta</i>	Sandpaper skate	<i>Sebastes constellatus</i>	Starry rockfish
<i>Careproctus melanurus</i>	Blacktail snailfish	<i>Sebastes diploproa</i>	Splitnose rockfish
<i>Chilara taylori</i>	Spotted cuskeel	<i>Sebastes elongatus</i>	Greenstriped rockfish
<i>Citharichthys sordidus</i>	Pacific Sanddab	<i>Sebastes ensifer</i>	Swordspine rockfish
<i>Cololabus saira</i>	Pacific saury	<i>Sebastes entomelas</i>	Widow rockfish
Cottidae	Unidentified sculpins	<i>Sebastes eos</i>	Pink rockfish
<i>Embassichthys bathybius</i>	Deepsea sole	<i>Sebastes gilli</i>	Bronzespotted rockfish
<i>Eopsetta jordani</i>	Petrale sole	<i>Sebastes helvomaculatus</i>	Rosethorn rockfish
<i>Eptatretus stoutii</i>	Pacific hagfish	<i>Sebastes hopkinsi</i>	Squarespot rockfish
<i>Glyptocephalus zachirus</i>	Rex sole	<i>Sebastes jordani</i>	Shortbelly rockfish
<i>Hydrolagus colliei</i>	Spotted ratfish	<i>Sebastes levis</i>	Cowcod
<i>Icelinus filamentosus</i>	Threadfin sculpin	<i>Sebastes melanostomus</i>	Blackgill rockfish
<i>Icelinus spp.</i>	Icelinid sculpins	<i>Sebastes miniatus</i>	Vermilion rockfish
<i>Lycenchelys crotalinus</i>	Snakehead eelpout	<i>Sebastes ovalis</i>	Speckled rockfish
<i>Lycodapus spp.</i>	Unidentified eelpouts	<i>Sebastes paucispinis</i>	Bocaccio

<i>Lycodes cortezianus</i>	Bigfin eelpout	<i>Sebastes phillipsi</i>	Chameleon rockfish
<i>Lycodes diapterus</i>	Black eelpout	<i>Sebastes rosenblatti</i>	Greenblotched rockfish
<i>Lyconema barbatum</i>	Bearded eelpout	<i>Sebastes rubrivinctus</i>	Flag rockfish
<i>Lyopsetta exilis</i>	Slender sole	<i>Sebastes rufinanus</i>	Dwarf-red rockfish
<i>Merluccius productus</i>	Pacific hake	<i>Sebastes rufus</i>	Bank rockfish
<i>Microstomus pacificus</i>	Dover sole	<i>Sebastes saxicola</i>	Stripetail rockfish
Myctophidae	Unidentified lanternfishes	<i>Sebastes semicinctus</i>	Halfbanded rockfish
<i>Ophiodon elongatus</i>	Lingcod	<i>Sebastes simulator</i>	Pinkrose rockfish
Osteichthyes	Unidentified fishes	<i>Sebastes spp.</i>	Unidentified rockfishes
<i>Parophrys vetulus</i>	English sole	<i>Sebastes spp.</i>	Young-of-the-year rockfishes
<i>Plectobranchnus evides</i>	Bluebarred prickleback	<i>Sebastes wilsoni</i>	Pygmy rockfish
Pleuronectiformes	Unidentified flatfishes	<i>Sebastes zacentrus</i>	Sharpchin rockfish
Pleuronectiformes	Unidentified halibuts	<i>Sebastolobus alascanus</i>	Shortspine thornyhead
<i>Raja binoculata</i>	Big skate	<i>Sebastolobus spp.</i>	Unidentified thornyheads
<i>Raja rhina</i>	Longnose skate	Sebastomus	Unidentified rockfishes
Rajidae	Unidentified skates	Sternoptychidae	Unidentified hatchetfishes
<i>Rhinogobiops nicholsii</i>	Blackeye goby	<i>Torpedo californica</i>	Pacific electric ray
Scyliorhinidae	Unidentified catsharks	<i>Zalembeius rosaceus</i>	Pink seaperch
Scyliorhinidae	Unidentified catshark egg cases	<i>Zaniolepis frenata</i>	Shortspine combfish
		Zoarcidae	Unidentified eelpouts