HAWAI'I UNDERSEA RESEARCH LABORATORY

QUICK LOOK REPORT
DIVE: Pisces V - 654

MISSION STATUS

Location: Northwestern side of Kingman Reef, northern Line Islands

Latitude: 06°25.991'N **Longitude:** 162°26.859'W

Mission Date: 30 July 2005 **Duration:** 7 hours 46 mins

Maximum Depth: 1027 m

Project Title: Exploration of the deep slopes of the US Line and Phoenix Islands to investigate the biogeography of deepwater fish and corals, and identify paleo-shorelines.

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Scientific Data Acquired: Prepare an abstract outlining your objectives, techniques, findings, etc.

Objectives: To collect data for 1) a comparison of fish and coral community structure at 300-500 m between the U. S. Line Islands and the Northwestern Hawaiian Islands (NWHI), and for 2) a comparison of the submerged paleo-shorelines of the U. S. Line Islands with those of the NWHI. Survey protocols are those previously used for surveys in the NWHI.

Observations, findings, etc:

Before the dive could begin, the Pisces IV submersible was placed over the side because it was on the stern of the KOK. The dive plan for this day originally was to dive the Pisces IV, but it developed hydraulic system problems during the previous day's operations and needed repair. The Pisces IV had to be moved off deck to allow the Pisces V to be deployed instead. The Pisces IV was deployed at the surface at 0828. The Pisces V was readied, deployed, and cleared to dive at 0901.

Our survey began when the Pisces V reached the bottom of 1027 m at 0948 (temperature = 4.2° C; position = 06°25.991'N,162°26.859'W). The bottom was a gradual, 30° carbonate slope with a thin sediment dusting and small step-like outcroppings. The most abundant organisms were *Nematocarcinus* shrimps, ophiuroid sea stars, crinoids, and soft gorgonian corals. This dive had two main objectives: to locate a saddle with gold coral (*Gerardia* sp.) seen on a previous dive at ca. 315 m in this area, and to complete the four planned biological survey transects at 500, 450, 400, and 350 m. The dive began with a transit upslope to find the gold coral saddle. We began moving upslope at 1002, noting and obtaining images of various organisms as we transited. The substrate upslope was low relief carbonate steps. Deeper slope organisms were observed between 1026 m and 800 m, including spiny eels (*Aldrovandia* sp.), stalked sponges (*Waltheria* sp.?), and deeper gorgonians (*Chrysogorgia geniculata* and *Metallogorgia* sp.). Oreo dories (*Neocyttus* cf. *acanthorhynchus*) continued to be seen at all depths. The slope changed to a 45° grade by 967 m, then to a steeper slope, and then back to a 40° grade with sediment accumulations at 800 m. By 1047, we had reached 789 m, where we stopped to collect a sample of the fine-grained sediment seen in deeper accumulations (5.8°; 06°25.890'N,162°26.624'W). Small galatheid crabs and sea urchins (*Aspidodiadema*) were dominant organisms at this location. Movement upslope continued after the sediment sample was taken, over gradually steeping carbonate slopes and ridges lightly dusted with sediment. At 661 m, a 50 cm black shark (Dalatiidae, perhaps *Dalatias licha*) was filmed. The base of a steeper escarpment was encountered at ca. 610 m. *Heterocarpus laevigatus* shrimp were seen beginning about here, as were roughies (*Hoplostethus*), and the numerous juveniles of the scorpionfish *Setarches*. A dead gold coral (*Gerardia*) branch was seen at the base of an escarpment at 512 m; the branch was not collected but the position was noted for the next days dive (06°25.806'N,162°26.380'W). Movement upslope continued with hopes of finding the saddle with live *Gerardia* and a steep cliff face was reached by 390 m. An unusual pair of fishes were filmed at two holes on a small shelf at 328 m. One of the fish had a long, oblong caudal fin and white pelvic filaments almost as long as the body. The other did not have these fins elongated. Both were reddish pink above and white below. These were later identified as bandfishes (Cepolidae) in the subfamily Owstoniidae, either *Owstonia* or *Sphenanthias* species, and there is a good probability that these are an undescribed species.

As we continued upslope the topography became more steep, changing from ridge top to a sheer cliff and then a 70-80° slope. The only eteline snappers observed during the dive were seen at this shallow escarpment, and these were *Randallichthys filamentosus*. No *Etelis* or *Pristipomoides* were seen. The uppermost point of the transit was reached at 203 m where the slope had leveled somewhat to 50-60°. The most remarkable thing about this upper area was the almost complete absence of fishes. This is a huge contrast to the Northwestern Hawaiian Islands, where the shelf breaks at 150-250 m often have the greatest abundance of small fish seen on dives. After pausing briefly at the top of the transit, we turned out into midwater to drop down slope for our survey transects. While doing so, we encountered a midwater scattering layer of small (1-2 cm) mysids and fishes. From the shape and color of the fishes, together with midwater trawling in the scattering layer of Palmyra Atoll, strongly suggest that they were the poorly known hatchetfish relative *Araiophos eastropas* (Sternoptychidae). A large (2.5 m) sixgill shark (*Hexanchus griseus*) swam along the cliff face in front of the submersible at the beginning of this descent, as well.

A small shelf on the cliff face suitable for landing the submersible was found at 312 m at 1246, and the first transect was started from here (9.2°; 06°25.566'N,162°26.357'W) at ca. 312-321 m instead of 350 m. This and the three other transects were all done to east because time for the dive was running out. The topography of the transect was primarily cliff face with a few ridges and gullies. Life was relatively sparse. The transect ended at 1323 (321m, 9.1°; 06°25.928'N,162°26.069'W). From there we descended down the cliff face to the 400 m transect depth. During the descent, more small mysids, gelatinous zooplankton, and fishes were seen. The fishes included deeper bodied small sternoptychids that appeared to be *Valencienellus tripunctulatus*.

At 1336 we reached the beginning of the 400 m transect isobath, setting down on a shelf at 407 m (8.6°; 06°26.953'N,162°26.104'W). The transect proceeded from here along a cliff face, across canyons, and over slopes of ca. 60° with boulder slides. Various gorgonians, including *Dendrophyllia* and blue fan-shape paramuraceids, were common, as were *Plesionika* shrimp, *Synagrops*, and *Epigonus*. Macrourids were also observed at this depth. The transect ended at 1415 (403 m, 8.7°; 06°26.252'N,162°25.787'W).

From there we moved directly downslope to 452 m, arriving at 1425 to begin the next transect (8.4°; 06°26.266'W,162°25.834'W). The topography began on a 40-55° slope but changed to ridges, deep canyons, and escarpments, and this again was territory dominated numerically by thousands of juvenile *Setarches*. The transect ended at 1503 (452 m, 8.2°; 06°26.606'N,162°25.462'W). A sediment sample of the *Halimeda* derived sand was taken here at 1513.

From there we moved downslope again to 508 m for the final transect to the east (8.0°; 06°26.647'N,162°25.502'W). A 1.5 m oilfish (*Ruvettus pretiosus*) swam along the cliff face during the descent at 471 m. The transect began at 1527, along 50-70° slopes, sharper ridges, and deeper canyons. The juvenile *Setarches* were rare or absent, and *Plesionika* shrimp were abundant along with the usual gorgonians. The transect ended at 1601 (502 m, 8.1°; 06°26.945'N,162°25.267'W). It was then time to end the dive and move offshore for recovery.

Notable finds during this dive were the same as those during the previous two dives: the nature of the topography, the absence of large eteline snappers and groupers, the abundance of planktivorous fishes including the *Setarches* and scattering layer sternoptychids, the sparse fauna in the upper (400-200 m) parts of the transects. Overall, the project from this and the other four dives was a great success in observing and quantifying the upper slope fauna of the equatorial U. S. Islands. These deepwaters had never before been surveyed, and although our findings were not what we expected when we proposed the study (i.e., with the sparse upper fauna found), we have significant discoveries from this exploration to present to the scientific community and public in general.

Species list:

Porifera:
Regidrella species? (vase-like sponge, Hexactinellida)
Stalked white sponge like *Walteria* species (Hexactinellida)
Unidentified encrusting white sponge

Ctenophora:
Lyrocteis species (creeping comb jelly)

Cnidarians (gorgonians, antipatharians, corals):
Antipathes species (gray, bushy)
Bathypathes conferta (brown and orange-red plume-like antipatharians, Antipatharia)
Gray, wispy, plume-shaped gorgonian resembling *Bathypathes conferta*

Cirrhipathes spiralis (spiral whip coral)
White, stick-like but branched coral, perhaps a *Stichopathes*
Chrysogorgia geniculata (Chrysogorgiidae)
Metallogorgia melanotrichos (Chrysogorgiidae)
Callogorgia species? (white, branching, pinnate gorgonian)
Unidentified branched, twig-like isidid (Isididae)
Narella species (Primnoidae)
Red fan-shaped gorgonian or other soft coral
Orange-brown fan-shaped gorgonian, cf. *Bebryce* species
Blue paramuraceid fan (Paramuraceidae)
Red paramuraceid fan (Paramuraceidae)
Dendrophyllia species 1 (orange hard coral fans)
Dendrophyllia species 2 (bushy, brown, brittle corals)
Dead gold coral branches and stumps (*Gerardia* species)
Small, orange "puff-ball corals"
Unidentified cup corals (on substrate and on bivalve shells)

Cnidarians (other):
Unidentified pelagic siphonophores
Unidentified purple, conical pelagic jellyfish
Corymorpha species (large stalked hydroid)
Unidentified hydroids (small gray-green clumps resembling algae; Hydroida)
Funiculina species? (stalk-like sea pen, Funiculinidae)
Wide, feather shaped sea pen (Kophobelemnidae?)
Large, orange *Corallimorphus* (Coralliomorpharia)
Large actinostolid sea anemone (Actinostolidae)
Small orange colonial sea anemones on dead gold coral branch
Various unidentified sea anemones (Actinia)
Venus flytrap anemones (Hormathiidae)
Brown tube anemones (Cerianthidae)

Mollusca:
Unidentified bivalves (living on cliff faces, with shells similar to *Pinctada* but "tentacles" similar to those of scallops; dead shells abundant on slopes below escarpments)
Unidentified octopus

Crustaceans:
Unidentified pelagic amphipods
Commensal white barnacles on *Histocidaris* urchin spines
Pelagic all-red and half-red mysids (Mysidacea)
Gnathophausia species? (larger pelagic all-red mysids)
Nematocarcinus tenuirostris (Nematocarcinidae)
Plesiopenaeus edwardsianus (Penaeidae)
Heterocarpus laevigatus (Pandalidae)
Plesionika pacifica (candy-striped shrimp, Pandalidae)
Unidentified *Plesionika* shrimps with translucent bodies and charcoal blotches in carapace (Pandalidae)
Geryon species? (large crab with long legs, and robust carapace & chelae [= "Tyrannograpsus"], Geryonidae)
Eumunida species (large squat lobsters living on or near gorgonians, Chirostylidae)
Munida species (small squat lobsters in holes of or on substrate, Galatheidae)

Echinodermata:
Various sea lilies (crinoids), including white, orange, yellow, and brown comatulids

Various brittle sea stars (Ophiuroidei)
Basket sea star (Gorgonocephalidae)
Undentified long-armed sea star, resembling *Linckia* species
Unidentified small, white, pentagonal sea star (Goniasteridae?)
Unidentified orange sea star with long arms and small disk
Unidentified orange sea star with broad disc and short, tapered arms
Unidentified tan sea star with broad disk and tapered, upturned arms
Novodinia cf. *pacifica* (large, orange-red, multi-armed sea star; Brisingidae)
Unidentified tan holothurian with cirri on body
Other unidentified sea cucumbers (Holothuria)
Aspidodiadema species (Aspidodiadematidae)
Araeosoma? Sea urchin
Histocidaris variabilis (Cidaridae)
White *Stylocidaris* sea urchin (Cidaridae)
Unidentified sea urchin resembling or the same as a *Diadema* species
Unidentified whitish-gray sea urchin living in colonies on escarpment edges

Sharks and rays:
Hexanchus griseus (sixgill shark, Hexanchidae)
Etmopterus species (small, black dogfish; Etmopteridae)
Dalatias licha? (kitefin shark, identification needs to be verified, Dalatiidae)

Bony fishes:
Aldrovandia species (spiny eel, Halosauridae)
Snake eels (Ophichthidae)
Unidentified eel with black lateral stripe, green dorsum, and pale ventrum (Congridae, Ophichthidae, or Xenocongridae)
Glossanodon species (argentine, Argentinidae)
Cyclothone species (small, pelagic bristlemouth; Gonostomatidae)
Araiophos eastropas? (small, pelagic, hatchetfish relative; Sternoptychidae)
Valencienellus tripunctulatus? (small, pelagic hatchetfish relative; Sternoptychidae)
Unidentified lanternfishes (Myctophidae, some probably *Diaphus* species)
Unidentified Ophidiidae (silver-gray cusk eel with long pectoral fins)
Caelorinchus cf. *tokianus* (large, barred, sharp-nosed rattail; Macrouridae)
Unidentified *Caelorinchus* species (sharp-nosed rattails, Macrouridae)
Nezumia or *Ventrifossa* species (blunt-nosed rattail, silvery, with black blotches on dorsal and pelvic fins; Macrouridae)
Unidentified rattails (Macrouridae)
Lophiomus or *Lophiodes* species (monkfish, Lophiidae)
Grammicolepis brachiusculus (tinselfish, Grammicolepididae)
Neocyttus cf. *acanthorhynchus* (oreo dory, Oreosomatidae)
Cyttomimus stelgis (green dory, Zeidae)
Unidentified *Hoplostethus* species
Juvenile *Setarches* species (benthopelagic scorpionfish, Scorpaenidae)
Pontinus species (large scorpionfish with long cirri over eyes, Scorpaenidae)
Unidentified adult scorpionfish (Scorpaenidae)
Satyrichthys species (armored sea robin, Peristidiidae)
Synagrops argyrea (silverbelly, Acropomatidae)
Epigonus atherinoides (large, elongate, iridescent blue-green deepwater cardinalfish, Epigonidae)
Unidentifid small *Epigonus* species (deepwater cardinalfish, Epigonidae)
Randallichthys filamentosus (Randall's snapper, Lutjanidae, Etelinae)
Unidentified reddish-pink bandfish (male and female?, Cepolidae, Owstoniinae)
Chrionema chryseres (yellowspotted duckbill, Percophidae)

Rexea species (silver snake mackerel with black spot on front of dorsal fin; Gempylidae)
Ruvettus pretiosus (oilfish, Gempylidae)
Hollardia cf. *goslinei* (Hawaiian spikefish, Triacanthodidae)

MISSION EVALUATION:

Limitations, failures, or operational problems noted:

There were no failures or operational problems, and only minor limitations of little significance. See recommendations below for a couple general improvements that might be made to present operations.

Recommendations for corrective action or improvement:

Two general limitations are noted from our set of six dives during fourteen days of surveys on this leg of the cruise. First, although the controls on the submersible cameras are now configured much better than they were a couple of years ago, and are much more user friendly, the sensitivity of the camera pan and tilt often makes centering subjects difficult. The linkage of this control to the strength to which the hydraulic system is set often makes the camera snap back and forth to extremes when the hydraulics are turned up, or not responsive at all when they are turned down. A system of camera pan and tilt control with more constant, gradual sensitivity would greatly assist in centering and zooming in on subjects without the "whipping" movements of the camera now often encountered.

Second, only one ROV survey was completed on this leg because of vehicle repairs, wind and sea influences on ship control, and ROV-hostile bottom topography. With a newer ROV having contemporary technology for better in-water control and movement capabilities, some of these limitations could have been overcome. We state our strong support for funding for HURL to purchase a modern ROV having state-of-the-art technology.

In your opinion, did the mission essentially achieve its purpose? Compare actual work accomplished with the work that was expected to be accomplished.

All planned elements of the mission were accomplished successfully. Piloting of the submersible was excellent, as it has been throughout our legs of the cruise. Efforts by the submersible crew to switch submersibles and repair problems enabled us to get all planned dives plus three more. HURL did an excellent job of enabling us to meet all objectives for our work. In addition to the daily efforts of the pilots and crew, several things are noted by us as being outstanding contributions to the success of our cruise.

The marathon effort of John Smith to produce Seabeam maps of these islands is greatly appreciated. His work during day and night enabled us to do more with our dives that we would have otherwise, and the maps that he produced are of tremendous value on their own. They are one of the most important products of exploration on this cruise.

The efforts of the ship's electronics technician, Steve Totorri, to repair the Seabeam and assist John in the mapping are also greatly appreciated.

The remarkable ability of HURL to deploy two submersibles during this cruise was the reason that this day's dive was accomplished with all of its planned missions successful. Without HURL's ability to deploy two submersibles, we would have sat this day out on the ship as the Pisces IV was being repaired, instead of finishing all of the work scheduled for our project.

We are grateful to HURL for all of the efforts to keep the submersibles diving without missing a single dive day on this leg of the cruise, and for allowing us to use some of the extra dive days originally scheduled for another scientist who was unable

to participate in this final leg of the cruise. The three dives originally scheduled for us, plus the two additional dives, enabled us to do biological surveys of three of the Line Islands for inter-island comparisons, plus surveys on two sides of two of these islands for intra-island comparisons. This makes our survey results more valuable than anticipated, and strengthens the results of our data collection to make a stronger scientific contribution from our study.

List specimens or samples collected on the mission.

No biological specimens were collected during this dive. Two sediment samples were collected for analysis at the University of Hawai`i.

DATA RELEASE

Data may be retained by the project leader for up to 2 years after the mission date with the following exception. NOAA may request to use photos for publication or publicity purposes at any time.

Fill in the appropriate statement below and sign this form.

I hereby release the data archived by HURL for public consumption following mission "Exploration of the deep slopes of the US Line and Phoenix Islands to investigate the biogeography of deepwater fish and corals, and identify paleo-shorelines."

held on_____(date) in the following way:

a. CTD data by_____(date)

b. video and images by_____(date)

c. other_____(date)

d. I will give my written consent to individuals wishing to use these data prior to the above dates depending on the nature of the request(s).

_____Principal Investigator

Bruce C. Mundy