



PAPAHĀNAUMOKUĀKEA Marine National Monument

MEDIA RELEASE
FOR IMMEDIATE RELEASE
Friday, September 28, 2012

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Deep Diving Technology Aids Coral Reef Exploration in Northwestern Hawaiian Islands *Discoveries of new fish and habitat*

(Honolulu, HI) Members of a research expedition to Papahānaumokuākea Marine National Monument returned today after 25 days of conducting research in the Northwestern Hawaiian Islands (NWHI). The primary mission of the cruise was to explore mesophotic coral ecosystems – deep coral reefs – using technical diving gear.

Most coral reef research occurs in less than 100 feet of water, yet the coral reef habitat extends to depths of 300 feet and beyond. Scientists on this cruise dived to depths of 150-250 feet using advanced mixed gas technical diving methods in order to characterize and explore deep coral reefs. While this type of research has been ongoing for three years in the Monument, this is the first year that the team used rebreather scuba diving technology to explore these deep habitats.

“This was the first research cruise to the NWHI to use electronic closed-circuit rebreathers for scientific exploration of deep reefs,” said Randy Kosaki, NOAA Chief Scientist on the cruise. “Rebreathers allow divers to go deeper and stay longer while minimizing the need for lengthy decompression before surfacing.”

Initial discoveries from the research are exciting.

Researchers documented numerous sightings and observations of fishes never before recorded in the NWHI. The exploration of deep reefs by divers has increased the number of fishes known in the NWHI by about 25%. “This underscores the importance of these reefs and atolls as globally significant repositories of biodiversity,” said Kosaki.

Another highlight was the discovery of a completely new type of coral reef habitat: nursery grounds for deep coral reef fishes in over 200 feet of water. Juvenile fishes of many species, most just 1-to-2 inches in length, hide in deep water algal beds until they are large enough to avoid predation and survive in adult habitats. Researchers also collected specimens of ten probable new species of algae in these algal beds. In addition, the deep coral reefs yielded specimens of several probable new species of corals, sponges, and hydroids. Experts at the University of Hawai‘i Department of Botany and the Smithsonian Institution will be examining these specimens in coming weeks.





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Studies of seawater acidification and carbonate chemistry in relation to climate change were also conducted. Two graduate students from Hawai'i Pacific University collected over 500 water samples from nearshore reef environments and the open ocean at distances up to eight miles from shore, and at depths ranging from the surface to 1,600 feet. This research will establish a baseline against which future environmental changes can be compared, and will compare water chemistry of the nearshore coral reef environment with that of the open ocean.

“Global climate change caused by rising atmospheric carbon dioxide concentrations is a major threat to the world’s coral reef ecosystems,” says Andrea Kealoha, a graduate student at Hawai'i Pacific University. “Of particular concern is that the gradual acidification of seawater, caused by increased CO₂ levels, will reduce growth rates by reef-building corals, and may eventually dissolve the structure of the reef itself.”

In keeping with the mission to integrate the Native Hawaiian perspective into the exploration, interpretation and management of Papahānaumokuākea, critically acclaimed Native Hawaiian artist Solomon Enos was invited to join the research expedition to experience the NWHI and interpret these islands and reefs through art. Enos’ paintings will be on display at various public galleries in Honolulu later this year.

Additionally, a three-person documentary team working for the Office of Hawaiian Affairs accompanied the expedition to film terrestrial cultural and natural resources. Preliminary footage from the OiwTV team can be seen on their Vimeo site (see links from the [PMNM website](#)).

Expedition participants included staff from Papahānaumokuākea Marine National Monument, Hawaiian Islands Humpback Whale National Marine Sanctuary, Gray's Reef National Marine Sanctuary, Hawai'i Pacific University, University of Florida, Bishop Museum, Hawai'i Institute of Marine Biology, and Palikū Documentary Films/OiwTV.

For more information on the expedition, [click here](#).

Papahānaumokuākea is cooperatively managed to ensure ecological integrity and achieve strong, long-term protection and perpetuation of Northwestern Hawaiian Island ecosystems, Native Hawaiian culture, and heritage resources for current and future generations. Three co-trustees - the Department of Commerce, Department of the Interior, and State of Hawai'i - joined by the Office of Hawaiian Affairs, protect this special place. Papahānaumokuākea Marine National Monument was inscribed as the first mixed (natural and cultural) UNESCO World Heritage Site in the United States in July 2010. For more information, please visit www.papahanaumokuakea.gov.

