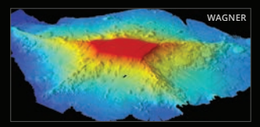
DEEP-WATER RESOURCES

OF THE

NORTHWESTERN HAWAIIAN ISLANDS

DEEP-SEA TECHNOLOGIES

The majority of the seafloor in the Northwestern Hawaiian Islands lies at depths below 3,000 meters. As a result, advanced technologies are required to survey these deep-sea environments.



Beginning in 2001, efforts by NOAA, the University of Hawai'i and the Schmidt Ocean Institute mapped a substantial portion of the Northwestern Hawaiian Islands using multibeam sonars. These efforts have revealed that the seafloor contains numerous seamounts, underwater mountains over 1,000 meters in height, which are considered important habitats for a myriad of deep-water organisms.

In 1902, the U.S. Fish Commission Steamer *Albatross* spent five months surveying the waters off Hawai'i, during which a total of 344 bottom trawls or dredges were performed. Many deep-water species were collected as part of these efforts, some as deep as 3,000 meters.

From 1984 to 2011, the Hawai'i Undersea Research Laboratory (HURL) performed deep-sea explorations in the Northwestern Hawaiian Islands using their manned submersibles and remotely operated vehicles. A total of 256 dives were performed to maximum depths of 2,000 meters.

In 2015 and 2016, NOAA Ship *Okeanos Explorer* conducted deep-sea explorations in the Northwestern Hawaiian Islands, during which a total of 26 remotely operated vehicle dives were performed to depths between 648 and 4,829 meters.

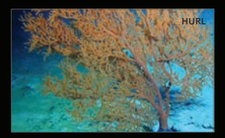
REMARKABLE DEEP-SEA DISCOVERIES

The Northwestern Hawaiian Islands contains a rich and diverse deep-water fauna, including some truly remarkable species.

1 In 2016, a new species of octopus was discovered at over 4,300 meters.

2 Hawaiian monk seals were discovered to forage in deep-sea habitats of Northwestern Hawaiian Islands seamounts within and outside of current PMNM boundaries.

3 The largest sponge in the world was discovered in 2015 at a depth of over 2,000 meters. The sponge is the size of a minivan.



The longest living marine species in the world, a black coral that can live over 4,500 years, was described from specimens collected in the Northwestern Hawaiian Islands at depths between 300-500 meters.

4 The largest gorgonian in the world was discovered at a depth of 1,366 meters. The gorgonian was close to 6 meters in height, the size of an adult giraffe.

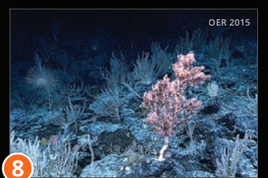
IMAGE CREDITS

DOUBILET: David Doubilet, National Geographic
HURL: Hawai'i Underwater Research Laboratory
OER 2015: NOAA Office of Ocean Exploration and Research, 2015 Hohonu Moana
OER 2016: NOAA Office of Ocean Exploration and Research, 2016 Hohonu Moana
WATT: James Watt, NOAA Office of National Marine Sanctuaries
USFC: U.S. Fish Commission archives
WAGNER: Daniel Wagner, NOAA Office of National Marine Sanctuaries

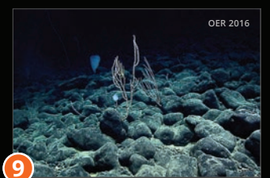
papahanaumokuakea.gov

HIGH-DENSITY COMMUNITIES

Deep-water explorations of the Northwestern Hawaiian Islands have discovered over a dozen high-density communities of corals and sponges. Some of these have densities that are comparable to shallow-water coral reefs.



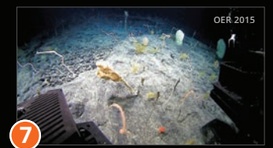
8 The rift zone ridge contains the largest known high-density community of deep-sea corals and sponges in PMNM, extending over 10 miles at depths from 1,800 - 2,200 meters.



9 Moderate to high densities of corals and sponges were discovered at a depth of 4,000 meters, indicating that these important communities are found much deeper than previously thought.

5 A high-density biological community was discovered at over 2,100 meters in 2015.

6 A high-density biological community was discovered at 2,000 meters in 2015.



7 A high-density biological community at a depth of 2,000 meters was discovered in 2015.

10 In 2016, a high-density biological community was discovered at 650 meters.

11 A high-density biological community was discovered at 2,000 meters in 2016.

12 A high-density biological community was discovered at a depth of 1,800 meters in 2011.

BATTLE OF MIDWAY

Ships and aircraft lost during the Battle of Midway (June 4-7, 1942), a pivotal event during World War II, rest on the seafloor in the Northwestern Hawaiian Islands.

One U.S. and three Japanese aircraft carriers were lost during the Battle of Midway. The USS *Yorktown* is shown above.