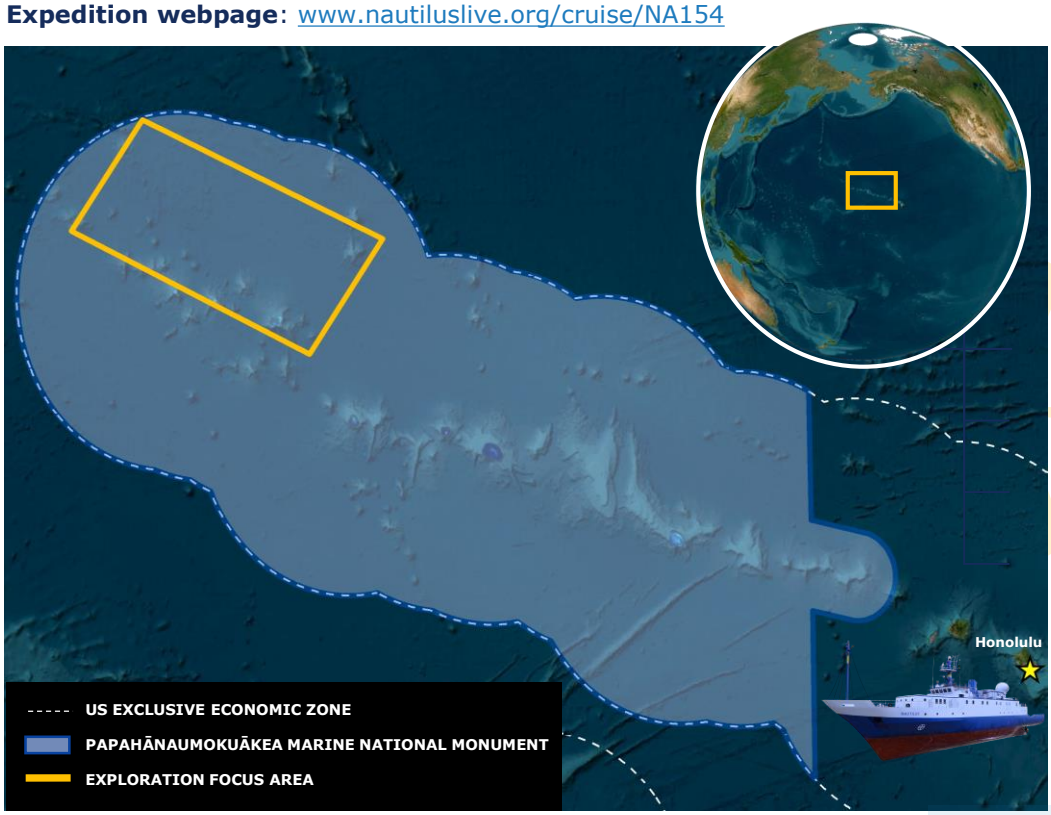
ALA ʻAUMOANA KAI ULI – ROV EXPLORATION OF THE PAPAHĀNAUMOKUĀKEA MARINE NATIONAL MONUMENT (NA154)

September 1– 28, 2023

Geographic Focus: Northwestern end of the Papahānaumokuākea Marine National Monument (PMNM)
Main Operations: Remotely operated vehicle dives and seafloor mapping
Sponsor: NOAA Ocean Exploration via the Ocean Exploration Cooperative Institute
Expedition webpage: www.nautiluslive.org/cruise/NA154



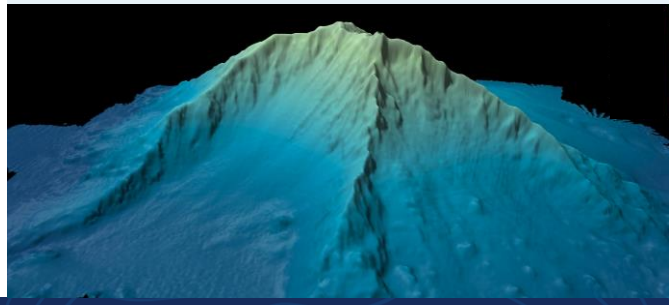
27 days at sea
23,466 km² of seafloor mapped
12 successful ROV dives
264 hours of ROV exploration
166 samples collected
11 students or recent alumni sailed
101 scientists participated remotely
172 live ship-to-shore interactions
>7,900 ship-to-shore participants
>274,000 highlight video views
>1,600,000 live stream views
>11 million social media views
>6.5 billion in press reach

OVERVIEW

From September 1-28, 2023, the Ocean Exploration Trust and partners conducted a telepresence-enabled expedition to explore the deep-sea natural and cultural resources of the Papahānaumokuākea Marine National Monument (PMNM). The expedition used E/V *Nautilus*' remotely operated vehicles (ROVs) and acoustic sonars to survey the northwesternmost and least explored portion of the Monument. A total of 32 scientists, engineers, educators, and students sailed on the expedition, who were supported by 101 professionals from 73 institutions that participated remotely via telepresence technology. Throughout the planning and execution of the mission, the team worked closely with the science and resource management community to ensure that expedition activities addressed priority needs, including those identified in the Monument Management Plan and the proposed designation of the area as a National Marine Sanctuary. This included incorporating Hawaiian worldview, cultural protocols, and Hawaiian language into expedition activities, work conducted in close collaboration with the Native Hawaiian Cultural Working Group facilitated by the Office of Hawaiian Affairs.

MAPPING SUMMARY

Seafloor mapping focused on filling data gaps in the northwestern section of the Monument and during transits to and from Honolulu. A total of 23,466 km² of seafloor were mapped over the course of the expedition, including 21,972 km² inside the Monument. This included filling the remaining mapping gaps over five different seamounts, including one at the northwestern end of the Monument that was mapped in its entirety.



ROV SUMMARY

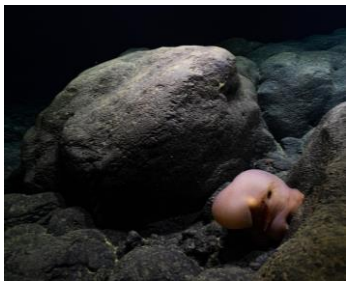
The expedition completed 12 successful ROV dives for a total dive time of over 264 hours and over 218 hours of seafloor exploration. ROV dives focused on exploring deep environments with high conservation value, including seamounts, ridges, and underwater cultural heritage sites associated with the Battle of Midway. Dives surveyed seafloor at depths ranging between 589-5,437 meters, which included the deepest dives ever conducted off E/V *Nautilus*.

GEOLOGY & BIOLOGY HIGHLIGHTS

Nine ROV dives were conducted to explore the deep-sea biodiversity and geological history of the northwesternmost section of the Monument. Eight different seamounts were explored, six of which for the first time, in addition to a ridge on the northern side of Pūhāhonu (Gardner Pinnacles). A total of 114 primary and 52 subsamples were collected during these dives, which will support studies on the deep-sea biodiversity, geological age, and volcanic history of the region. Overall, hundreds of species were observed, including several that are new to science. Other noteworthy observations included numerous high biodiversity areas, several sightings of deep-sea octopods, and an extensive forest of pink corals.

ARCHAEOLOGY HIGHLIGHTS

The expedition included non-invasive, ROV-based archaeological surveys of three historically significant aircraft carriers lost during the Battle of Midway. These detailed archaeological assessments included the first visual survey of *Akagi* 赤城, the first detailed views of USS *Yorktown* since it was first located 25 years ago, and a complete visual survey of *Kaga* 加賀. During a combined 43 hours exploring the seabed at depths below 5,000 meters, each one of these historically significant wrecks was methodically circumnavigated and documented using high-resolution video imagery bringing to light many features in great detail, including their armament, battle, and sinking-related damage.

EDUCATION & OUTREACH

Highlight videos from the expedition were viewed over 1,600,000 times, and live video feeds garnered another 274,000 views. OET's TikTok account gained over 10 million views during the expedition, plus posts on Instagram, Twitter, Facebook, and LinkedIn attracted over 1.1 million impressions. While at sea, the team created 29 new education and outreach products and hosted 172 live ship-to-shore interactions with schools, community events, and professional meetings, reaching over 7,900 people in 20 US states, Guam, Palau, and Canada.

Three Science Communication Fellows, three Science and Engineering Interns, and eight additional students or recent alumni participated in the expedition, gaining valuable at-sea experience. Early expedition results were featured in over 1,350 media stories published in 65 countries and 35 languages for a combined reach of over 6.5 billion.

BROADER IMPACTS

The expedition was planned and executed around priorities of the science and resource management community. Operations were conducted in unexplored Monument areas focusing on high-biodiversity sites, underwater cultural heritage sites, and other sites with high conservation value, thus contributing directly to PMNM management priorities, US National Strategy for Ocean Mapping, Exploration, and Characterization, Seabed 2030, and UN Decade of Ocean Science for Sustainable Development. Data collected on this mission will also support decision-making relating to the proposed designation of the area as a National Marine Sanctuary.

Expedition activities advanced NOAA priorities, particularly in terms of understanding ocean changes, sharing that knowledge with others, and conserving marine ecosystems. This work also advanced priorities on diversity and inclusion by providing opportunities for individuals from underrepresented minority groups to participate in expedition activities.

DATA ACCESS

With the exception of data from underwater cultural heritage sites that are protected from public release by federal regulations, expedition data will be sent to repositories for archiving and public distribution.

Links to these data repositories are provided here. These data sets are also available from OET upon request.

ARCHIVE	DATA TYPES
NautilusLive.org	Background information, highlight imagery and informational materials
Rolling Deck to Repository	Ship navigation, weather and mapping data
Marine Geoscience Data System	Mapping and ROV data
YouTube	Full ROV videos and highlights
Marine Geological Samples Lab at the University of Rhode Island	Geological samples
Harvard University's Museum of Comparative Zoology	Biological samples

ACKNOWLEDGMENTS

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