# Lebuu's Voyage - Exploring the Palau National Marine Sanctuary (NA167-NA168)

October 29-November 22, 2024



## **OVERVIEW**

Between October 29-November 22, E/V *Nautilus* conducted two back-to-back expeditions focused on exploring the rich natural and cultural resources of the Palau National Marine Sanctuary (PMNS). <u>Funded by NOAA</u> <u>Ocean Exploration as a contribution to the US Government commitment to</u> <u>support mapping of the Sanctuary</u>, these Ocean Exploration Cooperative Institute expeditions utilized the <u>remotely operated vehicle (ROV)</u>, <u>mapping</u>, and <u>telepresence systems</u> of E/V *Nautilus* to explore deep-sea habitats around Palau. Throughout the planning and execution of the mission, the team worked closely with Palauan stakeholders to ensure that expedition activities addressed local management, science, and education needs, including <u>incorporating Palauan language</u>, worldview, and cultural protocols into expedition activities. <u>Eleven Palau-based scientists</u>, educators, and <u>students sailed on the expeditions</u> to facilitate this process, with many more participating from shore.

## **MAPPING SUMMARY**

Seafloor mapping focused on filling data gaps, and primarily occurred over ROV survey sites without publicly-accessible mapping data, and during transits between ROV sites. A total of 19,052 square kilometers of seafloor were mapped over the course of the expedition, an area that is over 41 times bigger than the land area of the Palauan Islands. This included mapping over 14,781 square kilometers of seafloor inside the Sanctuary, where 11 seamounts were mapped for the first time.









Geographic Focus: Palau Exclusive Economic Zone (EEZ), including within the Palau National Marine Sanctuary (PNMS) Main Operations: ROV dives and seafloor mapping Sponsor: NOAA Ocean Exploration via the Ocean Exploration Cooperative Institute

Expedition Webpages: <u>https://NautilusLive.org/cruise/na167</u> & <u>https://NautilusLive.org/cruise/na168</u>



#### **ROV SUMMARY**

The expedition completed 13 successful ROV dives for a total dive time of 192 hours and 156 hours exploring the seafloor at depths between 528-3,038 meters. ROV dives focused on exploring deep-sea environments with high conservation value, focusing on offshore seamounts and slope habitats. Noteworthy ROV observations included high-density coral gardens at eight different locations, the collection of several new species, the first-ever live observations of two species of anglerfish, and the documentation of large areas of fossilized coral reefs that will contribute to the understanding of previous climatic conditions of the region. Unlike many other Pacific Island seamounts, ROV surveys documented large amounts of wood on the seafloor, which harbored specialized invertebrate communities. While no underwater cultural heritage sites were documented, ROV surveys documented a single artillery shell, likely from an anti-aircraft gun used in World War II. A total of 210 primary biological, 15 rock, and 72 water samples were collected during ROV dives to support studies on the biodiversity, biogeography, and geological context of the region.



## ACKNOWLEDGEMENTS

Special thanks to the captain and crew of E/V *Nautilus*, the Nautilus Corps of Exploration, the Ocean Exploration Trust, and all that supported the expedition from shore. The expedition was funded by NOAA Ocean Exploration via the Ocean Exploration Cooperative Institute, and executed under Marine Research Permit RE-24-17 authorized by the Palau Ministry of Agriculture, Fisheries, and the Environment; Research Permit 15783 authorized by the Ngarchelong State Government; and Historic Clearance 8175 authorized by the Palau Bureau of Cultural and Historical Preservation.

#### eDNA SAMPLING SUMMARY

A total of 142 eDNA samples were collected at depths between the sea surface and 3,000 meters to support the <u>environmental DNA monitoring program of</u> <u>the Sanctuary</u>. This included 70 samples collected at the sea surface using a Niskin bottle deployed via hand-line from the back deck of E/V *Nautilus*, and 72 samples collected using the Niskin bottles mounted on ROV *Hercules*. The latter represent the first ever eDNA samples collected on the seafloor and in the water column in the Palau National Marine Sanctuary.



#### **EDUCATION & OUTREACH**

Over the course of the expedition, live-stream video feeds received over 200,000 views, and highlight videos garnered over 202,000 views. Expedition content on OET's social media channels attracted over 2.176 million impressions. While at sea, the team created 30 new education and outreach products, and hosted 126 live ship-to-shore interactions with schools, community events, and professional meetings, reaching over 5,350 people across Palau, 21 US States, Guam, American Samoa, and five other countries. This included connecting with 14 different schools in Palau. Early expedition results were featured in 55 media stories.

## **DATA ACCESS**

Data collected during the expedition has been given to government agencies in Palau, as well as sent to repositories for archiving and public distribution, links to which are provided below. These datasets are also available from <u>OET upon</u> request. Data analysis is underway, including annotations of ROV videos by the <u>Deep-Sea Animal Research Center</u>.

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
Marine Geological Samples Laboratory at the University of Rhode Island	Geological samples
Harvard University's Museum of Comparative Zoology	Biological samples
National Center for Biotechnology Information Sequence Read Archive	eDNA genetic sequence information

