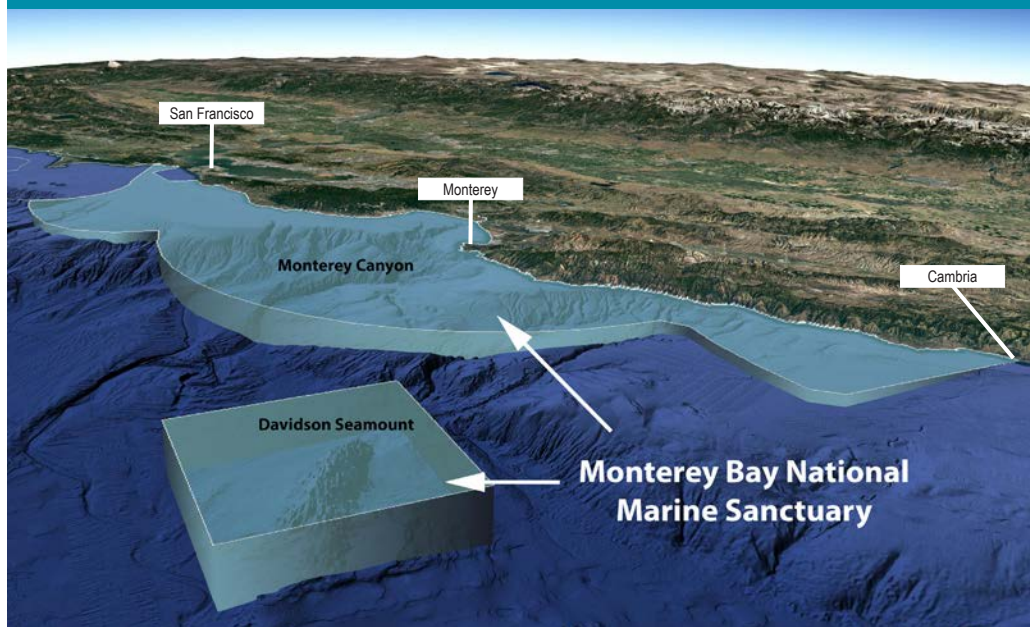
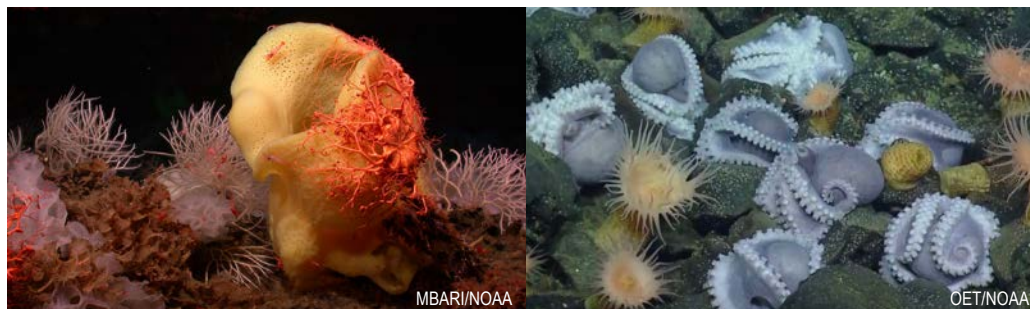


## Davidson Seamount: A National Treasure



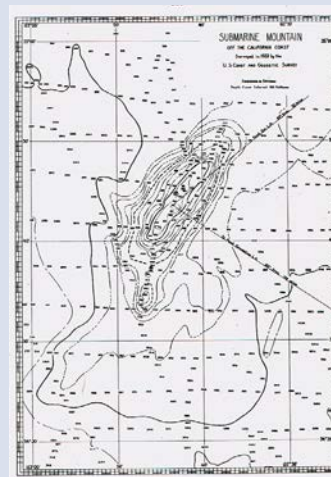
Davidson Seamount was added to Monterey Bay National Marine Sanctuary (MBNMS) in 2008, and has since been recognized as one of the best explored and most protected seamounts in the world. Davidson Seamount is located 80 miles southwest of Monterey, offshore of central California and is 26 miles long, 8 miles wide, 4,101 feet deep at the summit, and 12,743 feet deep at the base. It last erupted as an undersea volcano approximately 9.8 million years ago.

Research has revealed a pristine area with large, ancient corals in the deep, near-freezing waters thousands of feet deep, while commercial fishing is still active in surface waters. Recent explorations have captivated the public with world-record abundances of the seabird, Cook's Petrel, and deep-sea octopus brooding gardens. The origin of conservation of Davidson Seamount has been bipartisan at the highest level of the federal government. Specifically, President William Clinton listed Davidson Seamount as one of three locations to launch a new era of ocean exploration and President George W. Bush announced its sanctuary designation in 2008. Information on research findings and the seamount's protection are included in a permanent exhibit in President Bush's Library and Museum.



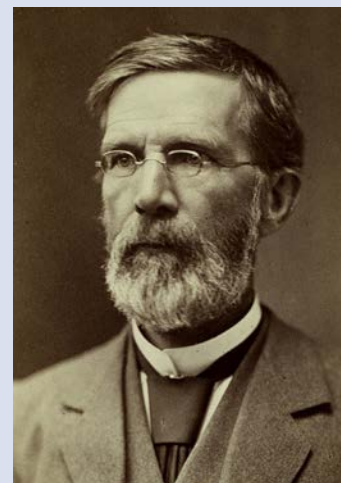
### Davidson: The First Seamount

Seamounts are undersea mountains (often of volcanic origin), standing at least 3,280 feet from seafloor, and the peaks are often in deep-sea (>650 feet).



Davidson Seamount Survey Map. Credit: NOAA Central Library Historical Collection (NOAA Photo Library) and original chart from the Association of Commissioned Officers (1933).

Davidson Seamount was first mapped in 1933, and, in 1938, was the first geographic feature characterized as a "seamount," named in honor of George Davidson, a leader in charting the waters of the west coast.

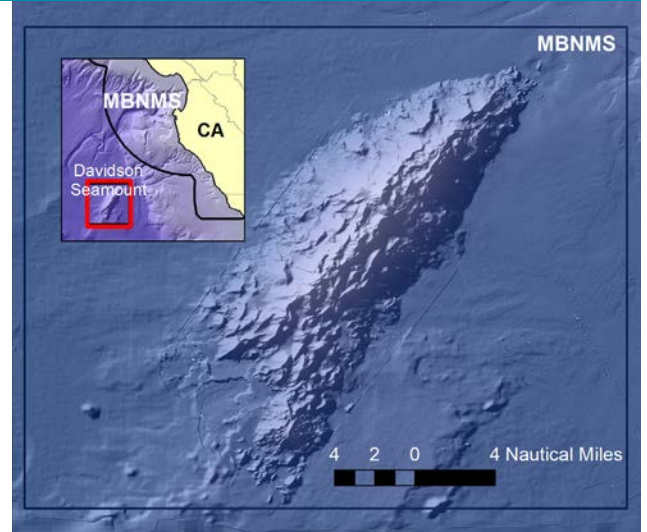


George Davidson, 1825-1911. Credit: NOAA, B.A. Colonna Album (NOAA Photo Library).

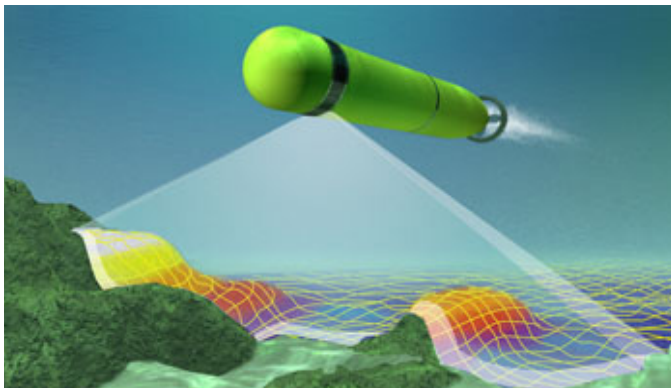
# Davidson Seamount: A National Treasure

## Discoveries at this Unique Habitat

- Davidson Seamount has a distinctive shape. Instead of the more common conical structure of seamounts that look like circles on maps, Davidson Seamount formed over a long period of time over an earthquake fault, erupting for about one million years, creating an oblong series of cones on parallel ridges.
- Davidson Seamount is considered an oasis for deep-sea corals and sponges, with relatively bigger individuals and more abundant populations than found in the broader region.
- In the early 2000s, deep-sea technology, developed by Monterey Bay Aquarium Research Institute, allowed for detailed surveys of formerly unvisited deep-sea habitats located only hours away from central California harbors.



Davidson Seamount Mapped Features. Credit: Chad King/NOAA



- More conventional surveys from airplanes and large ships show the area above Davidson Seamount is abundant with large whales and seabirds, likely because of deep-sea currents being directed towards the sea surface by the structure of the seamount.
- Thousands of brooding deep-sea octopuses were discovered in two distinct “nesting” sites around the base of Davidson Seamount associated with warm seeps. Such brooding aggregations have only been seen one other place in the world. Similar species have been known to brood their eggs for over 4 years.
- The *Davidson Seamount Taxonomic Guide* documents 18 species new to science (8 sponges, 1 hydroid, 4 corals, 1 ctenophore, 1 nudibranch, 1 polychaete, 1 seastar, and 1 tunicate), and provides identifications to the lowest possible level for at least 237 taxa (e.g., species, genus, family). This guide is being used regularly in other seamount and deep-sea expeditions.



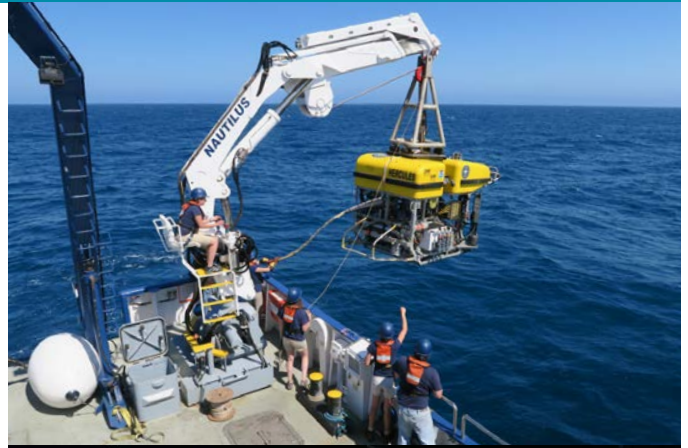
Top left: Seafloor mapping with an autonomous underwater vehicle (AUV). Credit: MBARI; Middle left: Fin whale feeding above Davidson Seamount. Credit: Allison Henry/NOAA; Bottom left: Deep-sea corals and crinoids. Credit: NOAA/MBARI; Bottom middle: Cook's Petrel at Davidson Seamount. Credit: Chad King/NOAA; Bottom right: Dumbo octopus spotted at Davidson Seamount. Credit: OET/NOAA



# Davidson Seamount: A National Treasure

## Captivating Public and Media Interest

- The first expedition to assess deep-sea biology at Davidson Seamount took place in 2002 and was shared with the public through a website with daily updates and included email exchanges with scientists on shore.
- As outreach technology has developed, live video streaming during subsequent missions have been shared internationally online.
- Davidson Seamount biology and expeditions have been featured on BBC, National Geographic, NPR, and national news programs; awareness of the seamount's biology led to a public campaign to protect the area as a national marine sanctuary.
- During a live-streamed mission, scientists' discovery of a whale fall being scavenged by a wide variety of animals greatly engaged the public and also yielded new species of the bone-eating worm.
- The Smithsonian Institution identified the unique congregation of brooding deep-sea octopuses as one of "The Top Ten Scientific Discoveries of the Decade" in 2019.



## Inspiring Students with Science, Technology, Engineering, and Math



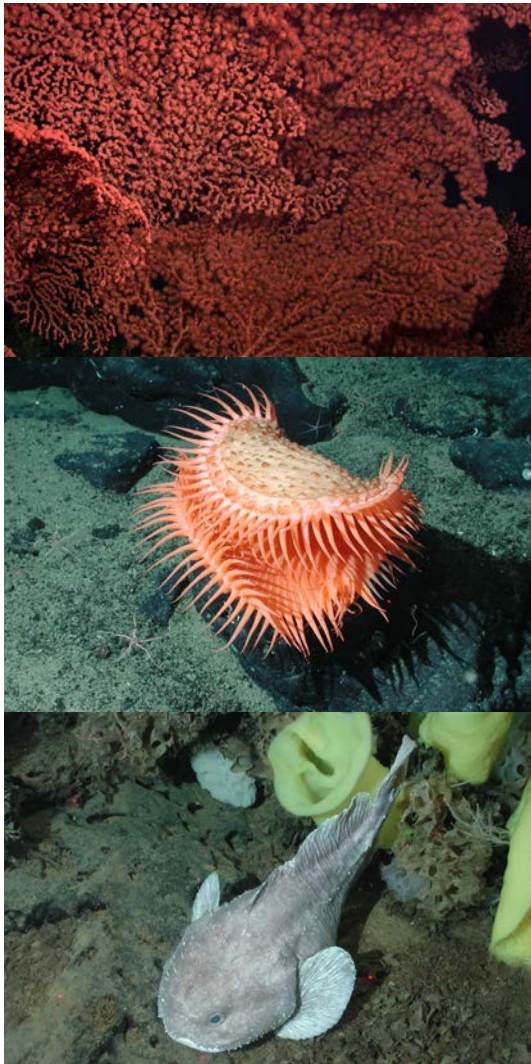
- A partnership with the Ocean Exploration Trust and the capacity for live-streaming has generated an explosion of interest in deep-sea exploration and engineering careers in youth.
- Numerous outreach opportunities and tools have been developed to connect teachers and students with Davidson Seamount, including education curriculum, classroom presentations, direct ship to shore live interactions with scientists at sea, and visitor center exhibits.
- Research expeditions have been followed by telepresence in national classrooms, science museums, globally on-line, and shared through thousands of social media engagements.
- Special science and engineering programs like BBC's Planet Earth and PBS's Quest have featured Davidson Seamount expeditions.

Top right: Launching ROV Hercules aboard the EV Nautilus. Credit: Amity Wood/NOAA; Lower right: Scientists control instruments to explore the octopus garden at Davidson Seamount. Credit: Amity Wood/NOAA; Top left: Whale fall discovered with ROV Hercules. Credit: OET/NOAA; Bottom left: Scientists communicate with students through live interactions while at sea. Credit: Claire Fackler/NOAA

# Davidson Seamount: A National Treasure

## Model for Conserving a Seamount

- NOAA's actions for conserving Davidson Seamount took place over a three-year period. The first steps began during review of the MBNMS management plan, which included a public process and stakeholder group of scientists, educators, fishermen, military, and conservation interests regarding protection of resources at the seamount.
- Next, in 2006, the Pacific Fishery Management Council and the National Marine Fisheries Service designated Davidson Seamount as Essential Fish Habitat (EFH), protecting waters below 3,000 feet from fishing, while allowing fishing in shallower waters.
- NOAA took further actions in 2008 when it created the Davidson Seamount Management Zone and expanded MBNMS by 775 square statute miles to protect the seamount. Standard MBNMS regulatory protection (e.g., no discharges, seabed disturbance, or oil and gas development) apply with other standard exceptions in place (e.g., military exercises and commercial fishing allowed in shallower waters). The revised management plan includes specific activities for research and resource protection at the seamount as well as new education and outreach initiatives.
- As research, exploration, and fishing activities thrive at Davidson Seamount, it is also recognized as one of the best studied and best protected seamounts in the world.



## The Future

- Warmer areas on flanks of seamounts may be more common than previously thought. More exploration of octopus-related associations may confirm this theory applied to Davidson Seamount, potentially driving additional research at other seamounts, which could confirm a broader distribution of these nurseries and warm water seeps.
- Unfortunately, preliminary research suggests microplastics are abundant at this offshore site, implying a globally broader need to address the issue.
- Deep waters off the California coast are naturally, relatively more acidic than other ocean areas. Studies at Davidson Seamount can help predict the future of ocean acidification on deep-sea corals throughout the world.
- Data from Davidson Seamount are being used to develop ways for sharing information on ecosystem health through new and standardized national reports, web images with "one click" graphics, and through simplified data portals where users can create their own graphics.
- There are more than 30,000 known seamounts in the Pacific Ocean alone, but less than 0.1% of the world's seamounts have been explored with very few protected. The Davidson Seamount "story" – its exploration, study and conservation – offers a model for future protection of offshore seamounts.

For more information, visit: <https://montereybay.noaa.gov/research/dsmz/welcome.html>

Top left: Bubble gum coral found at Davidson Seamount. Credit: NOAA/MBARI; Middle left: Anemone on the Davidson Seamount. Credit: NOAA/MBARI; Bottom left: Deep-sea blob sculpin, yellow Picasso sponge, and white ruffle sponge at Davidson Seamount. Credit: MBARI/NOAA