

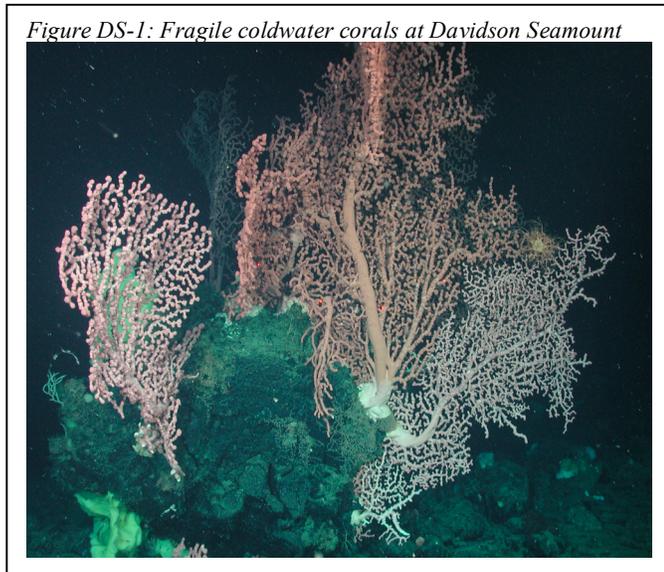
## Davidson Seamount Action Plan

### Goal

Incorporate the Davidson Seamount into the Monterey Bay National Marine Sanctuary (MBNMS) and develop and implement a resource protection plan for the seamount, increase understanding of the seamount through characterization and ecological process studies, and develop education programs for the seamount and other seamounts throughout the nation.

### Introduction

Less than 0.1 percent of the world's seamounts have been explored for what species live on them, and many species found on the seamounts that have been explored are new to science. Studies indicate that seamounts function as deep-sea "islands" of localized species distributions, dominated by suspension feeders, like corals, that grow on rock in an otherwise flat, low biomass, sediment-covered abyssal plain. Seamounts create complex current patterns that can influence sea life above them. Commercially valuable fish species often concentrate around relatively shallow seamounts. Conservation issues relevant to seamounts revolve around endemism, harvest, and the low resilience of species. A survey in the southwest Pacific suggests that up to one-third of the species on seamounts can be endemics.



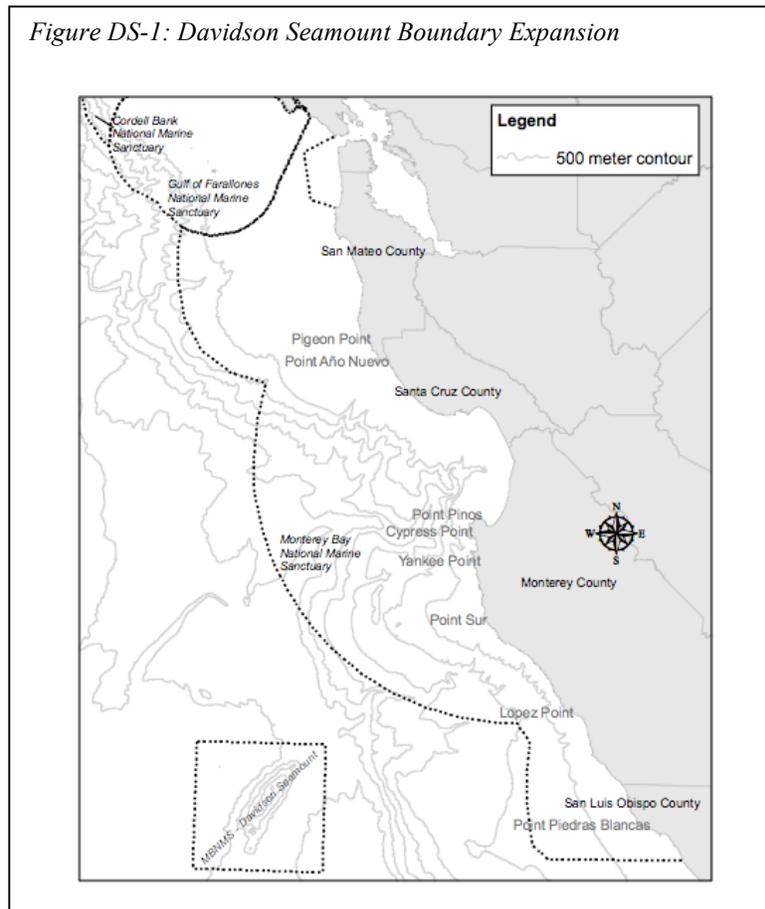
Davidson Seamount is located seventy-five miles to the southwest of Monterey, due west of San Simeon, and is one of the largest known seamounts in U.S. waters. Davidson Seamount is twenty-six miles long and eight miles wide. From base to crest, Davidson Seamount is 7,874 feet tall; yet, it is still 4,101 feet below the sea surface. Davidson Seamount has an atypical seamount shape, having northeast-trending ridges created by a type of volcanism only recently described. It last erupted about 12 million years ago.<sup>5</sup> This large geographic feature was the first underwater formation to be characterized as a "seamount" and was named after the Coast and Geodetic Survey (forerunner to the National Ocean Service) scientist George Davidson.

Species associated with the Davidson Seamount can be divided into habitats including: the sea surface habitat (birds in flight and on the sea surface), the midwater habitat (0 – 4,100 feet below sea surface), the seamount crest habitat (4,100 – 4,900 feet), the seamount slope habitat (4,900 – 8,200 feet), and the seamount base habitat (8,200 – 11,500 feet)<sup>6</sup>. The surface habitat hosts a variety of seabirds, marine mammals, and surface fishes, including albatross, shearwaters, jaegers, sperm whales, killer whales, albacore tuna, and ocean sunfish. At this time, there is no published evidence that the species composition in this surface habitat is different than adjacent areas without a seamount below, although in some years the Davidson Seamount may enhance albacore fishing<sup>7</sup>. Organisms in the midwater habitat have a patchy distribution with marine

snow, organic matter that continually “rains” down from the sea surface, most likely providing an important food source for deep-sea animals. Swimming worms, an undescribed mollusk, and a recently described, basketball-sized, red jellyfish have been seen above Davidson Seamount.<sup>8</sup> The seamount crest habitat is the most diverse, including large gorgonian coral (*Paragorgia* sp.) forests, vast sponge fields (many undescribed species), crabs, deep-sea fishes, shrimp, and basket stars. The seamount slope habitat is composed of cobble and rocky areas interspersed with areas of ash and sediment and hosts a diverse assemblage of sessile invertebrates and rare deep-sea fishes. The seamount base habitat is the interface between rocky outcrops and the deep soft bottom. Species here are similar looking to their relatives in the nearshore, including sea cucumbers, urchins, anemones, and sea stars.

Human influence on the Davidson Seamount has been detected in the form of DDT in sediments near its base and trash (e.g., bottles, cans, brooms, newspapers, buckets, curtains) discarded from the seafloor.<sup>9</sup> However, because of the abundance of large, fragile species (e.g., corals > eight feet tall, and at least 200 years old, as well as vast fields of sponges) and an apparently physically undisturbed seafloor, the area appears relatively pristine. The top of the seamount is too deep for most fish trawling technology; moreover, fish density is very low, and the species seen to date are not commercially desirable.<sup>10</sup> The existing albacore tuna and swordfish/shark fisheries operate in the top 150 feet of water, thousands of meters above the seamount<sup>11</sup>.

Figure DS-1: Davidson Seamount Boundary Expansion



The Davidson Seamount is important for science to study how the seamount is linked ecologically with the coastal waters, nearshore canyons and species currently protected in the MBNMS. Protecting it will help facilitate research to understand how the Monterey Bay and Big Sur canyon complexes have an effect on the Davidson Seamount and what the migration pattern of species is between the seamount and nearshore.

### Threats to the Davidson Seamount

Conservation issues related to seamounts revolve around endemism (species found on only one seamount), harvest, and low resilience of species. Existing and potential threats to the Davidson Seamount include bio-prospecting, cumulative impacts from research collecting of long-lived species, new or unknown forms of seafloor disturbance, new technologies to harvest from the seabed, “exploratory” benthic fishing which could destroy habitat and long-lived species, and marine debris/dumping. Although management agencies are responsible for some activities that may occur at the seamount, there is currently no comprehensive protection and management of organisms on the seamount or the surrounding ecosystem. Also, there are no coordinated education or research programs addressing Davidson Seamount issues. By incorporating the seamount into the MBNMS, its resources will be protected and opportunities will be provided for a better understanding of the seamount.

### Expansion of the MBNMS to Include Davidson Seamount Management Zone

The Davidson Seamount Management Zone (DSMZ) is proposed to be included within the MBNMS boundary as part of the adoption of this management plan. This area encompasses approximately 585 square nautical miles of ocean waters and the submerged lands there under. The boundary resembles a square box, approximately twenty-five nautical miles per side, centered on the summit of Davidson Seamount. The preferred alternative of uniform lines and symmetry of the boundary configuration offer easy navigation by longitude and latitude even though the seamount is physically disconnected from the MBNMS boundaries contiguous with the shoreline (See Figure DS-1). If incorporated into the MBNMS, within the DSMZ, standard MBNMS regulations would apply without the exemptions for seabed alteration. Below 3,000 feet, a prohibition on collecting plants and animals is proposed to address potential threats to the seamount and natural resources.

New or Modified Regulation: The Davidson Seamount Management Zone would be defined as the ocean waters and submerged lands thereunder, bounded by coordinates West: 123W; East: 122.5W; North: 35.9N; South: 35.5N. All of the current MBNMS regulations would apply within the Davidson Seamount Management Zone.

The existing MBNMS regulations include seven exceptions to the prohibition against disturbing or otherwise altering the submerged lands. The only one of these that would apply in the DSMZ would be that for traditional fishing. While Sanctuary regulations do not prohibit fishing in the DSMZ, NOAA fisheries regulation prohibit all fishing below 3000 feet in this area.

A new Sanctuary regulation which would apply only in the Davidson Seamount Management Zone would prohibit:

- (i) Moving, removing, taking, collecting, catching, harvesting, disturbing, breaking, cutting, or otherwise injuring, or attempting to move, remove, take, collect, catch, harvest, disturb, break, cut, or otherwise injure, any Sanctuary resource located more than 3,000 feet below the sea surface within the Davidson Seamount Management Zone. This prohibition does not apply to fishing below 3000 feet within the DSMZ, which is prohibited pursuant to 50 CFR part 660 (Fisheries off West Coast States and in the Western Pacific).
- (ii) Possessing any Sanctuary resource the source of which is more than 3,000 feet below the sea surface within the Davidson Seamount Management Zone. This prohibition does not apply to possession of fish resulting from fishing below 3000 feet within the DSMZ, which is prohibited pursuant to 50 CFR part 660 (Fisheries off West Coast States and in the Western Pacific).

## **Strategy DS-1: Conduct Site Characterization**

The purpose of this strategy is to complete a number of already initiated studies on the DSMZ ranging from geological and biological characterization to zoological and oceanographic surveys, while further initiating a socioeconomic survey. The strategy will also result in a complete cultural history analysis and site characterization document for the Davidson Seamount.

### ***Activity 1.1: Complete Geologic and Biological Characterization of the Seamount***

In addition to initiated studies, a complete analysis of existing video transects from the Davidson Seamount Management Zone (DSMZ) of species and habitat types from past National Oceanic and Atmospheric Administration (NOAA) and the Monterey Bay Aquarium Research Institute (MBARI) research cruises will be completed. In 2005, a collaborative research cruise is planned with MBARI and the British Broadcasting Corporation (BBC) to obtain information from other unvisited areas of the Davidson Seamount and to produce an education video.

### ***Activity 1.2: Identify Taxonomy and Natural History of Rare or New Species***

Seamounts are known to have a high percentage of endemism. This creates many taxonomic questions concerning the possible discovery of new deep-water corals. Past surveys of the Davidson Seamount indicate species that are rare or new to science altogether.

### ***Activity 1.3: Conduct Zoological Survey of Surface and Midwater Areas Above the Seamount***

Additional cruises from the NOAA ship McArthur II are necessary to describe midwater species, birds, and mammals. At the outset, aerial surveys will also be conducted with NOAA planes for several seasons. These surveys will be incorporated into the MBNMS's monitoring program.

### ***Activity 1.4: Initiate Oceanographic Surveys of Seamount Region***

Oceanographic surveys will be conducted using the NOAA ship McArthur II and satellite imagery. The data from the surveys will be linked with national coastal observatories (i.e., Central and Northern California Ocean Observing System) resulting in a better understanding of ocean current patterns on and around the Davidson Seamount. This will also enable researchers to determine how the ocean current patterns affect life on and around the Davidson Seamount and generally, how the Davidson Seamount has an influence on the regional ecology.

### ***Activity 1.5: Complete Socioeconomic (Commercial, Recreational, Research Uses) Analysis***

In comparison to the rest of the MBNMS, there are relatively few user groups in the Davidson Seamount region. However, a better understanding of who uses the seamount region is needed. Learning more about who uses the seamount region over a period of time is critical to effective education and protection.

### ***Activity 1.6: Characterize Cultural History of Davidson Seamount***

Throughout history the Davidson Seamount has played a role in mapping, fishing, whaling, and research. By working with the Monterey History and Art Association / Maritime Museum of Monterey, the MBNMS can characterize this past and further highlight the history of the seamount's namesake, George Davidson. His many contributions to maritime history and his personality as a maritime figure are important and have heuristic value. Additionally, a history

concerning the types of seamounts nationally and worldwide will be included. Among the results of this activity will be reports and a video to aid in developing visitor center displays.

***Activity 1.7: Incorporate Site Characterization Document in MBNMS Websites***

All relevant data from above activities (1.1-1.5) will be incorporated into the MBNMS websites, updating all physical and biological information. A Davidson Seamount chapter will be added to the MBNMS Site Characterization, while incorporating all seamount information into the geology chapter.

**Strategy DS-2: Conduct Ecological Processes Investigations**

In addition to characterizing the seamount region, Strategy DS-2 will result in the description of seamount oceanography, as well as in process studies to determine the causes of distribution and abundance of species.

***Activity 2.1: Conduct Regular Benthic Surveys of the Davidson Seamount***

The DSMA benthos must be monitored. Based on information from early site characterization and preliminary studies, a benthic monitoring plan will be developed for the Davidson Seamount. The data from this monitoring program will be made available through the Sanctuary Integrated Monitoring Network (SIMoN) website.

***Activity 2.2: Conduct Deepwater Coral Aging and Restoration Studies***

Cold-water corals are receiving increased attention in terms of scientific studies and conservation. The relatively pristine nature of Davidson Seamount and its diverse coral populations provide for a number of opportunities for aging and restoration efforts to historical locations of corals in impacted areas of the MBNMS. A research plan for deep water coral studies will be developed, linking the activities to the resource protection portion of the Davidson Seamount action plan.

***Activity 2.3: Perform Research on Seamount to Expand Understanding Distribution and Abundance of Species***

Designation of Davidson Seamount as a managed area will provide the status and opportunity for advancing the basic ecological understanding of seamounts. One such example would be to determine causes of high diversity and patchiness of Davidson Seamount corals and sponges.

***Activity 2.4: Understand Links with Coastal Area of Sanctuary***

It is important to understand how the seamount is linked ecologically with the coastal area of the Sanctuary. For effective ecosystem management, we should understand questions, such as how the Monterey Bay and Big Sur canyon complexes have an effect on the DSMZ, or what the migration pattern of species is between these diverse systems.

**Strategy DS-3: Develop Resource Protection Program**

MBNMS regulations will protect and enhance understanding of the Davidson Seamount, if incorporated into the MBNMS. Two modifications are also proposed to address resource threats: (1) because of the depth of the seamount, there is no need to have exceptions to the regulation prohibiting drilling into, dredging or otherwise altering the seabed that allow for anchoring

vessels, aquaculture, kelp harvesting or traditional fishing operations, harbor maintenance, or collection of jade, therefore these exceptions will not apply in the DSMA; and (2) an additional regulation has been initiated to prohibit the removal, collection or extraction of animals or other biological material in areas below 3,000 feet of the sea surface (unless a permit is obtained for this activity).

***Activity 3.1: Continuously Characterize the Potential Threats to the Davidson Seamount***

A threats and protection plan will be developed based on a thorough literature review, workshops with experts, and a socioeconomic and biological characterization. Initial research has enabled the identification of potential threats to the Davidson Seamount and associated resources, including the following.

A. *Bio-prospecting*

Some groups of organisms found on the Davidson Seamount have been targeted for collection in other areas of the world for developing medicine. Discovering medicinal uses for natural products is important for enhancing human health services however over-collection of rare or sensitive species can disrupt natural habitats.

B. *Cumulative research collecting of long-lived species*

Where there are limited populations of slow growing species, research collection can be detrimental. Over the last two years, there has been increased worldwide interest in studying deep-sea corals such as the large pink, *Paragorgia*, found on the Davidson Seamount, and they are often collected. This problem is exacerbated on seamounts where there is a high degree of endemism, and Davidson Seamount has several taxa that are slow growing and rare. Research is critical to understanding and managing ecosystems, so appropriate scientific collecting is often encouraged with permits to ensure minimal impacts.

C. *New or unknown forms of seafloor disturbance, including exploratory fishing/new technologies to harvest from the seabed*

Harvesting from the Davidson Seamount is not a currently known commercial activity. With new discoveries of precious corals or other commercial species, in concert with more effective harvest technologies being explored at depths of greater than 4,000 feet, commercial harvest at the Davidson Seamount could quickly cause severe impacts before mitigating regulations could be enacted. The concerns relative to impacts to the Davidson Seamount are largely for protecting a fragile area before it is severely impacted.

D. *Marine debris/dumping*

The Davidson Seamount area should be excluded from targeted dumping, while education about the site's significance could augment existing federal regulations regarding at-sea dumping.

***Activity 3.2: Initiate Resource Protection Measures as Necessary***

Characterization of the potential threats to the Davidson Seamount may require initiation of additional protective measures or enhanced enforcement of existing regulatory measures to ensure adequate protection.

***Activity 3.3: Develop and Implement Enforcement Plan for DSMZ***

Based on Activities 3.1 and 3.2, a threats management plan will be developed. Incorporated into this plan will be the identification of collaborative agencies to develop enforcement partnerships. Enforcement of Sanctuary regulations relevant to the Davidson Seamount will be integrated into the MBNMS enforcement program. The distance of the Davidson Seamount from the coastline will require coordination of the U.S. Coast Guard, NOAA Office of Law Enforcement, and the California Department of Fish and Game to establish surveillance and response capabilities for the area. Aerial surveys will be incorporated into the enforcement effort as well as patrols on USCG and NOAA ships.

***Activity 3.4: Develop Permitting Criteria to Facilitate Continued Research and Education***

This permit process should facilitate the continuation of research and education while minimizing impacts to the benthic habitat of the seamount, to accompany extending the regulations and the MBNMS permit program into this new habitat.

**Strategy DS-4: Conduct Seamount Education and Outreach Initiatives**

The Davidson Seamount has captivated the public through numerous media reports (including the CBS Nightly News and American Airlines in-flight news) and through a popular Ocean Exploration web site (<http://oceanexplorer.noaa.gov/explorations/02davidson/davidson.html>). A recent survey of the public, related to developing a visitor center for the MBNMS, found that one of their top interests was in “seafloor topography” (of which canyons and seamounts are dramatic examples). Proximity to the Monterey Bay Aquarium and other education institutions provides excellent education opportunities (e.g., displays on seamounts). The proximity of education and research institutions in the Monterey Bay region facilitates interdisciplinary collaborations that enhance research and education. Davidson Seamount and MBNMS’s research efforts have generated significant interest in the Cambria and San Simeon area south of Big Sur and will be prominently featured in the San Simeon Visitor Center.

***Activity 4.1: Conduct an Educational Needs Assessment***

The MBNMS will actively work with the Sanctuary Education Panel to identify target audiences. Subsequently, an educational needs assessment will be completed. Finally, relevant information regarding the DSMZ will be synthesized.

***Activity 4.2: Develop and Implement Davidson Seamount Education and Outreach Program***

Information on the DSMZ will be incorporated into educational material and interpretive centers. These will include items such as CD-ROMs, a website, and print material. Building on the opportunity that the DSMZ is the only seamount in the National Marine Sanctuaries Program, educational information on seamount biological diversity, habitats, and species of related interest (such as cold-water corals and sponges) will be provided to all relevant NOAA programs.

***Activity 4.3: Explore the Potential for Use of Davidson Seamount Footage for Use with the MBNMS Interpretive Center and Other Virtual Experiences***

Incorporate the Davidson Seamount video and still photos into the exhibits of the proposed interpretive center. Creating a narrative of selected footage will encourage use of the video footage obtained beyond the MBNMS. As the National Marine Sanctuary Program (NMSP)

telepresence program develops, the potential for use of this high quality footage is very likely, creating prepared footage for use will be key to its use across the nation.

***Activity 4.4: Involve MBNMS Education Staff in Davidson Seamount Research***

Involvement by the education staff in research on the Davidson Seamount will increase public knowledge of the seamount, expose the uniqueness of the region and ensure necessary outreach pieces are created for use in resource management decision making.

***Activity 4.5: Involve the Education and Outreach Mechanisms within NOAA to Promote the Existing and New Research on the Davidson Seamount***

The recent mission to the seamount, in conjunction with NOAA’s Office of Exploration, was hugely successful due to the combined efforts of the MBNMS, NMSP, and OE. This relationship and others should always be considered when new cruises and campaigns are considered.

***Activity 4.6: Expand Outreach and Education Efforts in San Simeon / Cambria Region***

MBNMS will develop outreach materials and displays for the San Simeon Visitors Center to address the increased interest in the region regarding the natural resources of the Davidson Seamount. MBNMS staff will also incorporate discussion of the Davidson Seamount into local presentations and outreach events.

*Action Plan Partners:* Monterey History and Art Association / Maritime Museum of Monterey, Monterey Bay Aquarium Research Institute, Moss Landing Marine Labs, Monterey Bay Aquarium, United States Coast Guard, National Marine Fisheries Service, UC Sea Grant, fishermen, The Ocean Conservancy

Table DS.1: Measuring Performance of the Davidson Seamount Action Plan

Desired Outcome(s) For This Action Plan:	
Protect the Davidson Seamount from potential threats while increasing understanding of the seamount through characterization, public education efforts and ecological process studies.	
Performance Measure	Explanation
By 2010, the Davidson Seamount is adequately characterized.	Implementation of this action plan will result in protection of the seamount, but more importantly, an understanding of the fragile communities and habitat associated with the Davidson Seamount. A research cruise to the Davidson Seamount is planned for 2006, which will add to the body of knowledge in the site characterization. Performance will be measured for this action plan through an annual assessment of our understanding of the habitats and species of the Davidson Seamount.
By 2010, increase by 20% public awareness of the Davidson Seamount.	NMSP will incorporate awareness of Davidson Seamount into surveys related to national marine sanctuaries and the sanctuary system.

Table DS.2: Estimated Timelines for the Davidson Seamount Action Plan

Davidson Seamount Action Plan	YR 1	YR 2	YR 3	YR 4	YR 5
Strategy DS-1: Conduct Site Characterization			●—————▶		
Strategy DS-2: Conduct Ecological Processes Investigations		●—————▶			
Strategy DS-3: Develop Resource Protection Program	●.....●—————▶				
Strategy DS-4: Conduct Seamount Education and Outreach Initiatives			●—————▶		
Legend					
Year Beginning/Ending	: ●—————●		Major Level of Implementation: —————		
Ongoing Strategy	: ●—————▶		Minor Level of Implementation: .....		

Table DS.3: Estimated Costs for the Davidson Seamount Action Plan

Strategy	Estimated Annual Cost (in thousands)*				
	YR 1	YR 2	YR 3	YR 4	YR 5
<b>Strategy DS-1: Conduct Site Characterization</b>	\$24	\$28	\$16	\$8	\$12
<b>Strategy DS-2: Conduct Ecological Processes Investigations</b>	\$285	\$0	\$33.5	\$10	\$6
<b>Strategy DS-3: Develop Resource Protection Program</b>	\$36	\$40	\$40	\$72	\$76
<b>Strategy DS-4: Conduct Seamount Education and Outreach Initiatives</b>	\$30	\$70	\$14.5	\$8	\$14
<b>Total Estimated Annual Cost</b>	<i>\$375</i>	<i>\$138</i>	<i>\$104</i>	<i>\$98</i>	<i>\$108</i>

\* Cost estimates are for both “programmatic” and “base” (salaries and overhead) expenses.