

Sanctuary Ecologically Significant Area (SESA)

SESA 5: Shelf off Davenport/Cabrillo Canyon

Description

SESA 5 contains a mixture of hard (19%) and soft bottom on the outer shelf and shelf break off Davenport and the head of Cabrillo Canyon (south central portion); and covers a broad depth range (83-964 m). This SESA has the second highest habitat richness (11 habitats) and habitat diversity (index = 6.13). A few corals and brachiopod beds have been observed in this SESA; data on abundance and distribution of structure-forming invertebrates is limited. Richness and diversity of the benthic fish fauna appears to be intermediate based on benthic trawls in and around this SESA. The waters over this SESA is highly productive (in an upwelling zone), is a hotspot for krill, and a foraging hotspot for a variety of predators (e.g., leatherback sea turtle, Ashy Storm-Petrel, Sooty Shearwater, harbor porpoise). Surveys to characterize benthic habitats and communities (using camera sled, submersibles, and ROVs) have occurred on the shelf and shelf break. This SESA is located within MBNMS, and research activities may require a permit

(http://montereybay.noaa.gov/resourcepro/permit/permits_need.html).

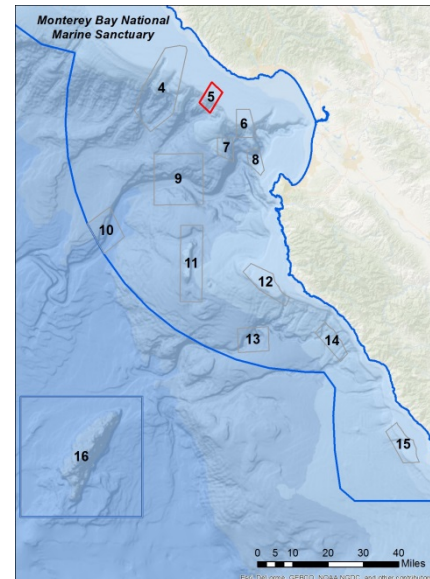


Figure 1. The location of SESA 5 and twelve additional SESAs in Monterey Bay National Marine Sanctuary. Credit: Chad King/MBNMS.

Resource Management Issues

SESA 5 has been used as commercial fishing grounds and also contains proposed demersal fishes conservation area.

- Commercial benthic fixed gear
- Commercial bottom trawl
- Rockfish Conservation Area (trawl)
- Essential Fish Habitat (EFH) Conservation Area
- EFH bottom trawl closure proposed (2013)
- Recreational fishing
- Wildlife viewing
- Leatherback sea turtle critical habitat
- Green Sturgeon critical habitat



Figure 2. Close-up map of SESA 5. Grey border=SESA boundary; yellow=Rockfish Conservation Area; light orange border=EFH Conservation Area; orange=commercial benthic fixed gear dominant use. Source: SESAs Interactive Map, <http://sanctuarymonitoring.org/maps/sesa/>.

Living Marine Resources & Uses

Table 1. Species known to occur within SESA 5: Shelf off Davenport/Cabrillo Canyon.

Invertebrates	<ul style="list-style-type: none"> -black corals† (Antipatharia) -anemones (Actiniaria), e.g., <i>Metridium</i> sp. -soft corals† (Alcyonacea), e.g., Plexauridae -octopi (Cephalopoda) -krill (Euphausiacea) -brachiopods† (Brachiopoda) -sea lilies (Crinoidea) -sunflower star (<i>Pycnopodia</i> sp. or <i>Rathbunaster</i> sp.) -basket stars, brittle stars (Ophiuroidea), e.g., <i>Ophiocoma</i> sp. -sea cucumbers (Holothuroidea) (CSUMB/MBNMS videos, stills; NMFS West Coast Bottom Trawl Groundfish Survey)
Fishes	<ul style="list-style-type: none"> -skates (Rajidae) -rockfishes (<i>Sebastes</i> spp.), e.g., Halfbanded, Cowcod⁴, Flag, Pygmy, Rosy, Yellowtail, Starry, Greenstriped, Canary⁴, Boccacio⁴ -Kelp Greenling (<i>Hexagrammos decagrammus</i>) -Lingcod (<i>Ophiodon elongatus</i>) -combfish (<i>Zaniolepis</i> sp.) -sculpins (Cottidae) -poachers (Agonidae) -Pink Seaperch (<i>Zalembius rosaceus</i>) -Blackeye Goby (<i>Rhinogobiops nicholsii</i>) -flatfishes (Pleuronectiformes) (CSUMB/MBNMS videos, stills; Laidig et al. 2009)
Marine birds	<ul style="list-style-type: none"> -Pacific Loon (<i>Gavia pacifica</i>) -Clark's Grebe (<i>Aechmophorus clarkia</i>), Western Grebe (<i>A. occidentalis</i>) -Northern Fulmar (<i>Fulmarus glacialis</i>) -Pink-footed Shearwater³ (<i>Puffinus creatopus</i>), Sooty Shearwater (<i>P. griseus</i>) -Ashy Storm-Petrel³ (<i>Oceanodroma homochroa</i>) -California Brown Pelican (<i>Pelecanus occidentalis californicus</i>) -Red-necked Phalarope (<i>Phalaropus lobatus</i>) -California Gull (<i>Larus californicus</i>), Western Gull (<i>L. occidentalis</i>) -Common Murre (<i>Uria aalge</i>) -Cassin's Auklet³ (<i>Ptychoramphus aleuticus</i>) -Rhinoceros Auklet (<i>Cerorhina monocerata</i>) (Ainley et al. 2012)
Marine mammals	<ul style="list-style-type: none"> -blue whale¹ (<i>Balaenoptera musculus</i>) -humpback whale¹ (<i>Megaptera novaeangliae</i>) -gray whale (<i>Eschrichtius robustus</i>) -dolphins (Odontoceti), e.g., Risso's dolphin (<i>Grampus griseus</i>), Pacific white-sided dolphin (<i>Lagenorhynchus obliquidens</i>), Dall's porpoise (<i>Phocoenoides dalli</i>), harbor porpoise (<i>Phocoena phocoena</i>) -seals (Phocidae), e.g., harbor seal (<i>Phoca vitulina</i>), Northern elephant seal (<i>Mirounga angustirostris</i>) -sea lions (Otariinae), e.g., Stellar sea lion² (<i>Eumetopias jubatus</i>), California sea lion (<i>Zalophus californianus</i>) (NOAA, 2003)
Marine reptiles	<ul style="list-style-type: none"> -leatherback sea turtle¹ (<i>Dermochelys coriacea</i>) (NOAA, 2003)

Special Status Species: Endangered¹, Threatened², Birds of Conservation Concern³, Overfished⁴;
Biogenic habitat†

Diverse or productive communities:

- high primary productivity
- krill hotspot
- marine bird and mammal high diversity

Migration, breeding, or foraging areas:

- Ashy Storm-Petrel (ESI, Environmental Sensitivity Index)
- harbor porpoise (ESI)
- 75% in leatherback sea turtle principal foraging area
- 100% in leatherback sea turtle NMFS critical habitat and 10% in leatherback sea turtle hotspot
- harbor porpoise (ESI) to the NE of area (depending on boundaries)
- 100% in Sooty Shearwater (IBA, Important Bird Area)

Research

SIMoN projects:

CSCAPE: Collaborative Survey of Cetacean Abundance and the Pelagic Ecosystem (2005-07)

<http://sanctuarysimon.org/projects/100273/cscape%3a--collaborative-survey-of-cetacean-abundance-and-the-pelagic-ecosystem>.

Center for Integrated Marine Technologies: Wind to Whales (1997-2008)

<http://sanctuarysimon.org/projects/100155/center-for-integrated-marine-technologies%3a-wind-to-whales>

Deepwater Characterization and Baseline Monitoring in the Monterey Bay National Marine Sanctuary (2009-current)

<http://sanctuarymonitoring.org/projects/100373/deepwater-characterization-and-baseline-monitoring-in-the-monterey-bay-national-marine-sanctuary>

Marine Protected Area Monitoring and Shelf Characterization in Monterey Bay National Marine Sanctuary (2007-09)

http://www.sanctuarysimon.org/projects/project_info.php?projectId=100320

Midwater Trawl Pre-recruit Survey 1983-current)

<http://sanctuarymonitoring.org/projects/100118/midwater-trawl-pre-recruit-survey>

Monitoring whales by Cascadia Research Collective (1991-current)

<http://sanctuarymonitoring.org/projects/100152/monitoring-whales-by-cascadia-research-collective>

Sea Turtle Restoration Project: Leatherback Watch Program (2010-current)

<http://sanctuarymonitoring.org/projects/100395/sea-turtle-restoration-project%3a-leatherback-watch-program->

Structure of Populations, Levels of Abundance and Status of Humpbacks (SPLASH) (2004-current)

<http://sanctuarymonitoring.org/projects/100224/structure-of-populations%2c-levels-of-abundance-and-status-of-humpbacks-%28splash%29>

Tagging of Pacific Predators (TOPP) (2000-current)

<http://sanctuarymonitoring.org/projects/100137/tagging-of-pacific-predators-%28topp%29>

Tracking Black-footed Albatross Movements and Conservation (2004-08)

<http://sanctuarysimon.org/projects/100305/tracking-black-footed-albatross-movements-and-conservation>

Underwater Behavior of Large Whales Using Suction-cup Attached Tags (2000-current)

<http://sanctuarymonitoring.org/projects/100153/underwater-behavior-of-large-whales-using-suction-cup-attached-tags>

usSEABED: A USGS Pacific Coast Offshore Surficial Sediment Data and Mapping Project (2005-current)

<http://sanctuarymonitoring.org/projects/100247/usseabed%3a-a-usgs-pacific-coast-offshore-surficial-sediment-data-and-mapping-project>

Monitoring stations and/or data collection instruments:

- NMFS West Coast Bottom Trawl Groundfish Survey
- Delta submersible, NMFS

MBNMS research:

- CTD profile (NOAA Ship Shimada, 2015)
- Mid-water fish trawl (NOAA Ship Shimada, 2015)
- CSUMB shelf characterization 2007-2011

Science Needs & Research Questions

Bottom Trawling: Habitat and Species Recovery

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_extraction_trawling.pdf

- Which habitats are sensitive to bottom trawling?

Habitat Characterization of the Continental Shelf

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_characterization.pdf

- What are the distribution and abundance of organisms and habitats on the continental shelf?

Habitat Characterization of the Continental Slope

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_characterization_slope.pdf

- How do corals and chemosynthetic communities on the continental slope provide biogenic habitat for other species?

Human Health - Harmful Algal Blooms

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_habs.pdf

- How do HABs affect local species populations?

Impacts on Whales from Human Uses

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_whale_science.pdf

- What are the spatial and temporal patterns of habitat use of large whales throughout sanctuary waters (both inshore and offshore)?

Socioeconomics and the Human Dimension

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_socioeconomics.pdf

- What is the geographic distribution of human activities that influence the condition of Sanctuary resources? Are there hot spots?

Water Quality Integrated Analyses

http://sanctuaries.noaa.gov/science/assessment/pdfs/mbnms_water_quality.pdf

- Determine and implement the necessary monitoring to assess the condition of water quality in the Sanctuary.

SESAs Interactive Map: <http://sanctuarysimon.org/maps/sesa>

Publically Available Imagery

- CSUMB/MBNMS camera sled and ROV (<http://sep.csUMB.edu/ifame/scid/>)



Figure 3. Sunflower star (*Pycnopodia* sp. or *Rathbunaster* sp.). Credit: IfAME/CSUMB/MBNMS (<http://sep.csUMB.edu/ifame/scid/>).



Figure 4. Brachiopods (Phylum Brachiopoda). Credit: IfAME/CSUMB/MBNMS (<http://sep.csUMB.edu/ifame/scid/>).


SESA Data Layers

Table 2. The 13 SESAs of the MBNMS are comprised of a variety of biological and environmental characteristics that describe unique pelagic and benthic deep sea communities. Listed are a subset of these qualities which include habitat diversity (Shannon-Wiener diversity index); hard substrate area coverage (%); the most common type of habitat; the presence and abundances of corals and sponges, demersal fishes, and marine birds; and the area coverage (%) of upwelling zone within each SESA. Sources: Draft MBNMS report in preparation; SESAs Interactive Map, <http://sanctuarymonitoring.org/maps/sesa/>.

SESA	Habitat diversity (H')	Hard substrate (%)	Primary habitat	Corals & sponges	Demersal fishes	Marine birds	Upwelling zone (%)
4	5.43	8%	Slope 2 soft canyon	yes-high	yes-high	yes-high	yes-50%
5	6.13	19%	Slope 1 Soft Canyon	yes-high	yes-med	yes-med	yes-100%
6	6.62	13%	Shelf Break soft	yes-high	yes-low	yes-med	no
7	3.52	9%	Slope 2 soft canyon	yes-med	yes-high	yes-med	no
8	5.32	33%	Slope 2 soft canyon	yes-med	yes-med	yes-high	no
9	2.34	5%	Slope 2 soft canyon	yes-high	yes-high	yes-low	no
10	3.23	1%	Rise soft canyon	yes-med	not sampled	yes-low	no
11	1.56	16%	Slope 2 soft	yes-med	yes-high	yes-low	no
12	4.17	32%	Shelf hard	yes-med	yes-high	yes-med	yes-50%
13	2.00	0%	Slope 2 soft	yes-low	not sampled	yes-low	no
14	2.41	0%	Slope 1 Soft	yes-med	yes-high	yes-med	yes-50%
15	5.31	18%	Shelf Break soft	yes-med	yes-med	yes-med	yes-25%
16	3.12	73%	Slope 2 hard	yes-high	yes-high	yes-low	no

Selected Publications

- Aiken E, Baruch N, Basset M, Carlson R, Cuzick M, et al., Lindholm J. 2013. Characterization of Demersal Fish Assemblages Within Seven Sanctuary Ecologically Significant Areas in the MBNMS. Poster presentation at Sanctuary Currents Symposium, Seaside, CA. Available at: <http://montereybay.noaa.gov/research/techreports/trmsci4702013.html>
- Ainley D, Spear L, Casey J, Ford RG, Gill T, et al. 2012. Chapter 3: Biogeography of Marine Birds. A Biogeographic Assessment off North/Central California. Retrieved from Center for Coastal Monitoring and Assessment (NCCOS), National Ocean Service. Available at: <http://ccma.nos.noaa.gov/ecosystems/sanctuaries/california/html/birds/>
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<http://montereybay.noaa.gov/research/techreports/trbenson2007.html>.
- Brown JA, EJ Burton, S De Beukelaer. 2013. The Natural Resources of Monterey Bay National Marine Sanctuary: A Focus on Federal Waters. Marine Sanctuaries Conservation Series ONMS-13-05. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 264 pp. Available at: <http://montereybay.noaa.gov/research/techreports/trbrown2013.html>
- California State University of Monterey Bay (CSUMB). 2005. *Shelf Characterization and Image Display (SCID)*. World Wide Web electronic publication. [<http://sep.csUMB.edu/ifame/scid/>]. Accessed [08/01/15].
- Ebert DA, Davis CD. 2007. Descriptions of Skate Egg Cases (Chondrichthyes: Rajiformes: Rajoidei) from the Eastern North Pacific. *Zootaxa*, 1393: 1-18.
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- Kelly M. 2010. Distribution of the Blackeye Goby, *Rhinogobiops nicholsi*, Around Temperate Reefs Along the Central Coast of California. A Capstone Project, California State University, Monterey Bay. MBNMS Technical report, 28 pp. Available at: http://sanctuariesimon.org/regional_docs/monitoring_projects/100373_Kelly_2010.pdf
<http://montereybay.noaa.gov/research/techreports/trkelly2010.html>
- Laidig TE, Watters DL, Yoklavich MM. 2009. Demersal Fish and Habitat Associations from Visual Surveys on the Central California Shelf. *Estuarine, Coastal and Shelf Science*, 83(4): 629-637.
- Leeworthy VR, Jerome D, Schueler K. 2014. Economic Impact of the Commercial Fisheries on Local County Economies from Catch in All California National Marine Sanctuaries 2010, 2011 and 2012. Marine Sanctuaries Conservation Series ONMS-14-03. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 46pp. Available at: <http://montereybay.noaa.gov/research/techreports/trleeworthy2014.html>
- McGann M. 2014. Delivery of Terrigenous Material to Submarine Fans: Biological Evidence of Local, Staged, and Full-Canyon Sediment Transport Down the Ascension-Monterey Canyon system. *Geosphere*, 10(6): 1061-1075.
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Orange DL. 1999. Widespread Fluid Expulsion on a Translational Continental Margin: Mud Volcanoes, Fault Zones, Headless Canyons, and Organic-Rich Substrate in Monterey Bay, California. *Geological Society of America Bulletin*, 111(7): 992 -1009.