

SECTION 2: ISSUE BASED ACTION PLANS



- Climate Change Action Plan
- Coastal Erosion and Sediment Management Action Plan
- Davidson Seamount Action Plan
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- Marine Debris Action Plan
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Images from left to right:

Members of the West Coast Entangled Whale Response Network practice their line grappling and release techniques. Photo: Nicole Capps/NOAA

Example of invasive Bryozoan surrounding pier pilings in Elkhorn Slough. Photo: NOAA

Coastal armoring on Del Monte Beach. Photo: NOAA

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Climate Change Action Plan

Goal: Address coastal resilience, climate adaptation, and ocean acidification through capacity building and collaborative partnerships.

Introduction

The waters of MBNMS, as well as surrounding coastal areas and communities, are experiencing the effects of climate-related stressors (e.g., sea level rise, extreme storms, and ocean acidification). These stressors are expected to worsen over the coming decades. Through regional collaboration and coordination, coastal communities are preparing for the effects of increasing greenhouse gas emissions, increased levels of ocean carbon dioxide (CO₂) and ocean acidification. Climate change is a global problem requiring solutions at many levels. This action plan focuses on the activities needed at the local/regional level to contribute to the understanding of and response to climate change.

MBNMS staff have worked on a number of climate change projects in recent years, including coordinating a set of collaborative workshops for regional public works staff, developing a West Coast action plan on ocean acidification, and contributing to a report clarifying the benefits, costs, and effectiveness of a range of erosion mitigation management measures for the entire California shoreline. Staff will continue to work with other West Coast national marine sanctuaries and partners to integrate coastal resilience adaptation planning, climate change monitoring, education, and adaptation into sanctuary management through the following five strategies.

Strategy CC-1: Address coastal resilience and adaptation planning

Addressing coastal resilience and developing adaptations to reduce effects from climate change has been worked on collaboratively over the past decade (Abeles 2011). ONMS has worked across the organization and with partners as they implement the Climate Smart Conservation Project, an effort to integrate climate change mitigation, monitoring, education, and adaptation into sanctuary management.

Activity 1.1: Conduct vulnerability assessment stakeholder workshop. Modeling from the Greater Farallones National Marine Sanctuary vulnerability assessment, MBNMS staff will coordinate a science-based effort to identify how and why focal resources (habitats, species, and ecosystem services) across the Central California coast and ocean region are likely to be affected by future climate/ocean conditions. An outcome will be climate indicators for MBNMS that link to regional indicators (e.g., ocean acidification, sea surface temperature) for focused research and monitoring across the region to detect climate effects.

Activity 1.2: Develop a vulnerability assessment report. Using the information from the stakeholder workshop, provide expert-driven, scientifically sound assessments to

enable marine resource managers to respond to, plan for, and manage for the impacts of climate change to habitats, species, and ecosystem services within the region.

Activity 1.3: Develop a climate adaptation plan. The plan will identify actions to address specific aspects of MBNMS resources vulnerable to climate change stressors and to build adaptive capacity. The plan will lay the foundation for implementing management actions to achieve the action plan's vision of a healthier central California coast and ocean that is more resilient to climate change. By implementing living shorelines, promoting education, protecting and restoring habitat, limiting human disturbance, eliminating invasive species to the extent possible, and investing in science needs, the sanctuary can effectively enhance resource resilience to climate impacts and ensure the health and viability of the sanctuary's natural resources.

Strategy CC-2: Reduce greenhouse gas emissions

As part of the sanctuary's mission to reduce its carbon footprint, MBNMS has conducted an annual emissions inventory. This approach will be used for the current sanctuary offices, visitor centers, and cars and other transportation. Emissions will be measured for energy, transportation, waste, and water use and tallied up annually for comparison.

Activity 2.1: Complete an annual emissions inventory for MBNMS facilities and operations. The emissions inventory is the first step in taking a baseline on the sanctuary's use of cars and travel, use of energy in offices and other facilities, and reduction of waste with on-site recycling and composting, as well as water conservation.

Activity 2.2: Develop, implement, and evaluate a green operations plan. The assessment will yield areas in which MBNMS can improve. Staff will need to develop and implement a green operations plan to address, where it can, transportation management, energy efficiency, waste management, water management, and education and outreach, with the goal of ultimately reducing the sanctuary's carbon footprint. Implementation strategies and assessment will be included in the plan.

Strategy CC-3: Communicate ocean-climate impacts and solutions

MBNMS will develop a variety of education resources for the public to interpret the effects of climate impacts on the ocean and provide ideas and solutions to reduce impacts.

Activity 3.1: Develop an ocean climate education plan outlining future sanctuary outreach efforts to address a changing ocean climate, including ocean acidification, sea level rise, and strengthening coastal resilience.

Activity 3.2: Use NOAA-developed curriculum resources for K-12 students through visitor center education programs highlighting emerging ocean issues such as climate change, ocean acidification, and rising sea levels.

Activity 3.3: Maintain and improve sanctuary visitor center-based exhibits for interpretation of sanctuary resources, research, and ecosystem protection issues (e.g., ocean acidification, harmful algal blooms, climate change, sea level rise, water quality, marine debris, wildlife disturbance).

Activity 3.4: Participate in ongoing ONMS Climate Committee and West Coast Region efforts, as needed.

Strategy CC-4: Implement Coastal Regional Sediment Management Plans (CRSMP)

ONMS and partners have developed two regional coastal sediment management plans, for southern Monterey Bay (ESA PWA 2012) and for the Santa Cruz Littoral Cell. The plan's objectives are to restore, preserve, and maintain coastal beaches, enhance sustainable recreation and tourism, enhance public safety and access, and identify areas that could benefit from restoration.

Activity 4.1: Continue to participate in planning for and support projects to restore natural sources of sediment. For example, Elkhorn Slough has a scouring/erosion issue and could benefit from placement of clean sediment in eroded areas.

Activity 4.2: Work with partners to identify components supporting site-specific adaptation actions, such as managed retreat and rolling easements and reduce coastal armoring. There are a number of areas along the coast that are heavily impacted by erosion. The CRSMPs lay out ideas for management solutions on a case by case basis.

Strategy CC-5: Track and share ocean acidification research

Oceanic and coastal waters are expected to become more acidic as pH lowers in response to increased concentrations of atmospheric carbon dioxide settling in the ocean. Current knowledge is insufficient to be certain how pH will change in MBNMS (Lott 2011). However, research is critical, as this phenomenon is likely to decrease the availability of chemical building blocks for marine organisms that use structural components made out of calcium carbonate (e.g., shells, spines, bones). Ocean acidification leads to decreased shell growth in key species (e.g., sea urchins, mussels, oysters, abalone, and crabs) making animals more susceptible to predation or mortality at early life stages. It also decreases skeleton production of deep-sea corals and hydrocorals. As deeper water tends to be more acidic naturally, deep-sea corals may be among the first to experience the deleterious effects of ocean acidification. The larval and juvenile stages of many marine organisms rely on calcium structures and will be more susceptible to the effects of ocean acidification due to their small size. In addition, there is concern for negative effects on shell-building plankton at the base of the food web.

Activity 5.1: Collaborate with partners to monitor changes in pH and effects on organisms and promote sharing of data and information.

Relevant strategies/activities located elsewhere within this management plan:

Activity CC-3.1 → Education, Outreach, and Communication Activity 1.3

Activity CC-3.2 → Education, Outreach, and Communication Activity 1.3

Activity CC-3.3 → Education, Outreach, and Communication Activity 4.3

Potential Partners

Ocean Protection Council, California Department of Fish and Wildlife, U.S. Fish and Wildlife, California Coastal Commission, California State Parks, National Marine Fisheries Service, Monterey Bay National Marine Sanctuary Research Activity Panel, citizen science monitoring groups, nonprofit organizations, Monterey Bay Aquarium, Monterey Bay Aquarium Research Institute, Moss Landing Marine Labs, University of California Santa Cruz.

Climate Change Action Plan Goal: Address coastal resilience, climate adaptation, and ocean acidification through capacity building and collaborative partnerships.

Performance Measures Table

Strategy Title	Desired Outcome (Objective)	Output Measure	Who Measures	Timeline
Strategy CC-1: Address coastal resilience and adaptation planning	Identification of coastal and ocean resources likely to be affected by future climate conditions	Vulnerability assessment workshop	Project Coordinator Research Coordinator	Annual Year 1-2
		Vulnerability assessment report published	Climate Project Coordinator	Year 3
Strategy CC-2: Reduce greenhouse gas emissions	Identification of MBNMS's carbon footprint	Emissions inventory	Climate Project Coordinator	Year 3
		Green operations plan	Climate Project Coordinator	Year 4
	Implementation of plan to reduce emissions	Annual progress report	Climate Project Coordinator	Annually, after year 4
Strategy CC-3: Communicate ocean-climate impacts and solutions	Resources developed for public awareness of ocean and coastal climate issues	Ocean climate education plan	Education & Outreach Coordinator Climate Project Coordinator	Year 2-3

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Coastal Erosion and Sediment Management Action Plan

Goal: Reduce human-caused coastal erosion and collaborate with local, state, and federal agencies to address and restore sediment balance in nearshore habitats throughout MBNMS.

Introduction

The natural shoreline of MBNMS has been altered by humans conducting activities such as coastal armoring, mining operations, building breakwaters, and altering streams and rivers. These activities limit or preclude the natural flow of sediments. Eighty-five percent of the California coast experiences active erosion, and southern Monterey Bay experiences the highest erosion rates in California. Many beaches have lost their width and valuable sand, placing coastal infrastructure (roads, buildings, and habitats) at risk. Impacts are both site-specific and cumulative. Some mitigation can be done through nourishing eroded beaches through use of clean dredged sand from harbors.

Coastal Regional Sediment Management Plans

A coastal regional sediment management plan (CRSMP) is a consensus-driven guidance and policy document for specific areas of the California coast. These plans present ways to: restore and maintain coastal beaches and other critical areas with sediment deficit; reduce the proliferation of protective shoreline structures (which exacerbate erosion); sustain recreation and tourism; enhance public safety and access; and restore coastal sandy habitats.

A littoral cell is a coastal compartment that contains a complete cycle of sedimentation including sources, transport paths, and sinks. A CRSMP compiles the best available data on sources of sediment inputs into the littoral cell (e.g., rivers, bluff erosion), sediment sinks (e.g. harbors, submarine canyons), shoreline erosion rates, threatened infrastructure, erosion hotspots) and recommends future regional and site-specific strategies managing and responding to these issues to best protect coastal resources and infrastructure.

The coastal regional sediment management plan for southern Monterey Bay was completed in November 2008 and the coastal regional sediment management plan for the Santa Cruz Littoral Cell was completed in September 2015. MBNMS will continue to implement and support strategies outlined in the plans, addressing issues such as coastal erosion, coastal armoring, sand mining, and beach nourishment. These are described in the following paragraphs, along with additional issues affecting coastal processes such as beach nourishment, dredge disposal, landslides, and lagoon and river mouth breaching.

Sand Mining

One of the key recommendations included in the 2008 Southern Monterey Bay CRSMP was to eliminate the removal of sand from the beach at Marina. The large extraction of beach sand permanently removes sediment that would otherwise feed beaches elsewhere along southern Monterey Bay. If this sand is released and subsequently transported alongshore, it could provide a significant additional buffer to dune erosion

by waves. For example, the beach in front of the Sanctuary Beach Resort and the Marina Coast Water District buildings are critical erosion sites and would eventually benefit as the sand migrates.

In March 2016, the California Coastal Commission issued a [notice to cease and desist](#) to the owner of the last remaining coastal sand mine located in the U.S. In July 2017, all parties, including the California State Lands Commission and the city of Marina, signed a settlement agreement stipulating closure of the plant by December 31, 2020. In addition, the property will be transferred to a nonprofit or government entity to hold and manage the property primarily for conservation purposes, with the only other allowable uses being for low-impact, passive recreation purposes or activities, public access, public education, and removal activities to restore native habitat. MBNMS is a participant in the community visioning for this property transfer and will partner on research and monitoring for this coastal region.

Beach Nourishment

Beach nourishment means the introduction of sand onto a beach to supplement a decreased supply of sand, for the purpose of beach restoration, enhancement, or maintenance. Two different beach nourishment approaches include placement on the beach (above mean high water, and placement in the surf zone (below mean high water). Waves will then move the sand around until an equilibrium is reached. The intent is that the subtidal sand will buffer waves and at the same time the waves will transport some of the sand onshore, with the ultimate outcome being a larger beach.

Since 2012, the city of Monterey has conducted the Monterey Harbor Dredging and Beach Restoration Project, which entails the removal of up to 10,000 cubic yards of dredged sediment annually in the Monterey Harbor, with disposal of those sediments at two onshore locations adjacent to Del Monte Beach. MBNMS has authorized the coastal development permit based on the assumption only clean sand, as verified by the EPA, would be placed on the beaches and the decant water (which re-enters the sanctuary) would not be contaminated, and thus, no sanctuary resources would be injured. The inclusion of various PCB congeners in the sampling and analysis plans allows monitoring results to be more effectively compared to other sediment monitoring in the region.

In 2019, multiple agency approvals permitted dredging in Moss Landing Harbor of up to 550,000 cubic yards of sediment over a 10-year period, with a dredging cap of no more than 80,000 cubic yards in any given year. Clean sediments greater than or equal to 80% sand composition could be placed on harbor beaches. Clean sediments less than or equal to 80% sand composition had to be placed at SF-12 or SF-14, two historic dredge disposal sites within MBNMS.

The Santa Cruz Port District dredges the Santa Cruz harbor entrance channel on an annual basis. The dredging is typically accomplished with the Port District owned and operated dredge plant during the winter or early spring months, as the dredging season is confined to November 30 to April 1. MBNMS authorizes the Army Corps permit for the Santa Cruz Port District to place dredged material at the federally approved nearshore beach area at Harbor Beach and Twin Lakes State Beach, and the offshore dredge disposal site.

The San Mateo Harbor District is conducting planning for the Surfer's Beach Pilot Sand Replenishment Project to protect and restore the shoreline at Surfer's Beach. Surfer's Beach has suffered from significant beach and bluff erosion and the [goal of the project](#) is to place clean sand from inside the jetty (or other land-based sources) along the shoreline to restore the beach.

Dredge Disposal in MBNMS waters

The sanctuary does not directly regulate harbor dredging (i.e., the removal of sediment from the harbors and their channels) but does have a regulatory role in the disposal of dredged materials (see Section 922.132(2)(f)). Staff have carefully examined this issue, recognizing while dredging is necessary to ongoing harbor operations, dredged material disposal may affect water quality and can bury or alter habitat, bathymetry, and physical processes. Disposal of dredged material from the four harbors (Pillar Point, Santa Cruz, Moss Landing, and Monterey) is allowed at designated disposal sites within MBNMS, provided it complies with U.S. Army Corps and EPA standards for grain size and contaminant levels, as defined by the Clean Water Act. Dredged materials from certain harbors in the region are sometimes contaminated with toxins, including persistent pesticides such as DDT, and such material is not approved for ocean disposal according to [EPA standards](#).

Coastal Erosion and Armoring

Development along the coast increases the pressure to protect coastal structures with various types of coastal armoring such as seawalls, bulkheads, and revetments to manage erosion. Approximately 14 miles (22.5 kilometers) of the 276 miles (444.2 kilometers) of coastline is already armored in MBNMS and this amount is estimated to double if trends in sea level rise and coastal erosion continue. The two coastal regional sediment management plans previously mentioned compiled the best existing information on coastal processes, erosion rates, and geomorphology; identified sources of sediment that could potentially be used in beach nourishment projects to reduce erosion hazards; and evaluated some of the regulatory and permitting framework involved in managing sediment within the sanctuary. The plans recommend sediment management approaches to be pursued for the sanctuary including cessation of sand mining from the beach, continuation of natural dune erosion in the less developed reaches, and a sand nourishment project in the southern portion of the littoral cell to provide additional storm protection. Some of these activities have already been successfully implemented. The plans also identify potential sources of sediment for use in nourishment projects to reduce erosion hazards, evaluate the traditional cost benefits of various scales of nourishment projects, and include potential recreational benefits (ESA PWA 2012).

Landslides

MBNMS regulations prohibit side-casting of materials (e.g., discharging soil, rocks, and vegetation) into the sanctuary. During emergency road closures due to landslides, Caltrans can request permits from the sanctuary to conduct those activities and has been granted authorizations in the past. During such an event MBNMS coordinates with all agencies to ensure protection of sanctuary resources. Occasionally, landslides impact endangered species (e.g., black abalone) or designated critical habitat and sanctuary staff works with NMFS, CDFW, and other partners to determine and implement plans of

action. Actions are case specific, but may include monitoring species and their habitat, baseline assessments to characterize the status of marine resources, or efforts to rescue organisms in imminent danger (e.g., black abalone about to be buried by ongoing, wave-generated movement of sediment). Caltrans issues an emergency notification form during road closures and subsequent emergency response, which opens up the communication between agencies for developing, reviewing, and approving plans to re-open the highway while using best practices for construction activities to protect critical habitat and species on land and in the sanctuary. In addition, MBNMS staff have [developed and implemented](#) a GIS decision support tool to provide data on the sensitivity of shoreline habitats in order to minimize the negative effects of landslide material deposition or redistribution on or near the shoreline.

Lagoon and river mouth breaching

Rivers are sometimes breached mechanically to alleviate upland flooding. There are five primary rivers draining into MBNMS (not including the northern management area): the San Lorenzo, Soquel Creek, Pajaro, Salinas, and Carmel rivers. Each river mouth has a different set of issues and various solutions are being applied or considered for each location seeking to find a balance between human need (e.g., flood mitigation) and natural resource protection (e.g., preventing fish from being released into ocean prematurely). For the San Lorenzo and Carmel rivers, protection of endangered and threatened species of fish required by the Endangered Species Act are of paramount concern. Artificially breaching the lagoon can sweep fish out to sea, instead of allowing them to thrive in the lagoon. Conversely, if left to breach naturally, lagoons can remain closed so long that water quality suffers (higher water temperature, low oxygen levels) and this impacts endangered fish species such as steelhead. Separately, rising water levels through the lower rivers can cause flooding problems for residential areas, storm water drains, and businesses near the river. MBNMS staff coordinates with other agencies on a management plan for each river mouth and determines if breaching activities will occur in sanctuary jurisdiction (below mean high water).

Strategy CESM-1: Support progress on Coastal Regional Sediment Management Plans (CRSMPs) for MBNMS

MBNMS currently has two CRSMPs. Each plan includes a series of management strategies that provide options for site-specific measures. For example, one location could have a variety of options to choose from, including but not limited to: no action, beach nourishment, retention structures, or bluff stabilization. A collaborative community approach will help flesh out these options and develop a path forward to restore, preserve, and maintain coastal beaches.

Activity 1.1: Continue to support implementation of the [Southern Monterey Bay Coastal Regional Sediment Management Plan](#).

Activity 1.2: Continue to support implementation of the [Santa Cruz Littoral Cell Coastal Sediment Management Plan](#).

Activity 1.3: Support research monitoring coastal climate changes related to coastal erosion and sediment movement.

Activity 1.4: Coordinate with local municipalities to ensure the best available science is used for local coastal planning processes.

Strategy CESM-2: Collaborate on land management plan for CEMEX site

Use the best available science regarding the unique biodiversity, ecological function, coastal processes and threats to help inform the future acquisition, ownership, restoration and management of the CEMEX property for public benefit. California American Water's proposed desalination project, Monterey Peninsula Water Supply Project, has a settlement agreement with CEMEX for use of an easement on the disturbed mining site. MBNMS will work with all parties to find a solution that balances commercial use with public access and use.

Activity 2.1: Participate in the public process guiding the restoration and management of the CEMEX sand mining property in Marina, California.

Activity 2.2: Clarify policies related to mining, for example, salt extraction.

Strategy CESM-3: Reduce the loss of Elkhorn Slough habitat

There has been a net loss of 1,000 acres of salt marsh in the slough over the last century due to the following anthropogenic impacts: (1) reclamation of tidal marsh for pasture and agriculture; (2) decreased input of freshwater and sediment input from the diversion of the Salinas River; (3) an increased tidal prism with increased flow in and out of the slough with the creation of the harbor; and (4) extremely high levels of nitrates have caused eutrophication, ultimately reducing the health of existing the salt marsh and its ability to hold marsh soils in place.

Activity 3.1: Participate in Elkhorn Slough National Estuarine Research Reserve's (ESNERR) Tidal Wetland Project strategic planning team and advisory panel to help reduce erosion in the slough.

Activity 3.2: Participate in biennial bank erosion monitoring in partnership with ESNERR staff.

Activity 3.3: Participate in ESNERR science advisory committee, providing input to the monitoring process.

Strategy CESM-4: Implement site-specific beach nourishment programs

MBNMS regulations prohibit disposal of dredged material in the sanctuary (below mean high water) except at disposal sites authorized by EPA prior to designation. The four harbors within MBNMS have identified and executed dredging projects that resulted in disposal of material at the preapproved sites, as well as reuse of clean sand placed above mean high water to nourish adjacent beaches. These beach nourishment projects were approved by the regulatory agencies, including MBNMS. MBNMS is concurrently proposing a regulatory change to clarify that the beneficial use of clean and suitable dredged material from the four harbors adjacent to the sanctuary is not disposal of dredged material, and, therefore, such beneficial use is not subject to the prohibition on permitting disposal of dredged material in the sanctuary.

Activity 4.1: Continue to coordinate with local harbors and cities on use of clean sand for beach nourishment as opportunities arise.

Activity 4.2: Continue to improve and participate in coordinated permit review with the Coastal Commission, USACE, and EPA to review permits and authorizations on beach nourishment activities.

Activity 4.3: Support research and monitoring on beach nourishment and identify sites above mean high water with potential to benefit from nourishment.

Strategy CESM-5: Coordinate with regulatory agencies to determine appropriate disposal of dredge material

EPA will continue oversight on dredge sediment monitoring in coordination with permitting agencies and MBNMS.

Activity 5.1: The harbors may require sanctuary permits or authorizations for their dredge disposal activities. Continue working collaboratively with the harbors and federal, state, and local agencies on the permitting processes for dredge disposal activities.

Activity 5.2: MBNMS will continue to review and comment on sediment sampling plans and contaminant testing and analysis overseen by EPA, as appropriate.

Strategy CESH-6: Track and reduce coastal armoring

Coastal armoring has historically occurred along the coast in response to rising sea levels and coastal erosion. Armoring is no longer the first option, as soft engineering alternatives have been developed and are replacing hard engineering options.

Activity 6.1: Track compliance of permit conditions (e.g., removing temporary revetments or appropriate maintenance of existing armoring projects) and conduct permit compliance inspections, as needed.

Activity 6.2: Conduct general shoreline surveillance patrols to detect non-permitted coastal development activities and review GIS data identifying armoring locations.

Activity 6.3: Coordinate with other permitting agencies where armoring alternatives could be implemented. Alternatives can be addressed through land use planning (e.g., rolling easements), soft engineering approaches (e.g., beach nourishment) or hard engineering approaches (e.g., groins or revetments).

Strategy CESH-7: Reduce impacts to sanctuary resources due to landslides and subsequent emergency responses

Massive landslides such as the Mud Creek landslide in 2017 have resulted in emergency consultations in order to quickly develop strategies to restore the highway and protect sanctuary resources.

Activity 7.1: Formulate special terms and conditions to diminish potential impacts from side-casting and other response activities through permitting program.

Activity 7.2: Coordinate with other federal and state agencies to manage emergency landslide disposal activities.

Activity 7.3: Conduct and support monitoring and research by staff and partners to determine how intertidal and subtidal species, community structure and function, habitat, and ecosystem processes are impacted by landslide materials, which includes the initial natural deposition, subsequent natural redistribution, and any material mobilized as part of the emergency response.

Strategy CESH-8: Reduce impacts to sanctuary resources due to anthropogenic coastal changes to river mouths

Rivers are sometimes breached mechanically to alleviate upland flooding. MBNMS staff coordinates with other agencies on a management plan for river mouths and determines if breaching activities will occur in sanctuary jurisdiction (below mean high water)

Activity 8.1: Coordinate with other permitting agencies to develop special terms and conditions to manage MBNMS resources through permitting program.

Activity 8.2: Provide public outreach on a broad array of human impact issues.

Relevant strategies/activities located elsewhere within this management plan:

Activity CESM-2.2 → Emerging Issues Strategy EI-2
Activity CESM-6.2 → Resource Protection Strategy RP-5
Activity CESM-7.3 → Research & Monitoring Strategy RM-3,
Activity CESM-7.3 → Resource Protection Strategy RP-4
Activity CESM-8.2 → Education, Outreach, and Communications Strategy EOC-2

Potential Partners

Caltrans, Bureau of Land Management, United States Environmental Protection Agency, California Coastal Commission, California State Lands Commission, Coastal Sediment Management Workgroup, Moss Landing Harbor District, Monterey Harbor District, Santa Cruz Harbor District, San Mateo Harbor District, United States Army Corps of Engineers, United States Geological Survey, California Department of Fish and Wildlife, United States Fish and Wildlife Service, Save Our Shores, California Coastal National Monument, National Marine Fisheries Service, California State Parks, Naval Postgraduate School, California State University Monterey Bay, University of California Santa Cruz, University of California Santa Barbara.

Coastal Erosion & Sediment Management Action Plan Goal: Reduce human-caused coastal erosion and collaborate with local, state, and federal agencies to address and restore sediment balance in nearshore habitats throughout MBNMS.

Performance Measures Table

Strategy Title	Desired Outcome (Objective)	Output Measure	Who Measures	Timeline
Strategy CESM-1: Track progress on coastal sediment management plans for MBNMS	Implementation of the Southern Monterey Bay Coastal Regional Sediment Management Plan	Beach erosion reduced at one location	Research Coordinator	Year 3
	Implementation of the Santa Cruz Littoral Cell Coastal Sediment Management Plan	Hard armoring reduced at one location	Resource Protection Coordinator	Year 4
Strategy CESM-3: Reduce factors affecting the loss of Elkhorn Slough habitat	MBNMS staff provide input into strategic planning related to erosion in ESNERR and greater Elkhorn Slough	Participation in ESNERR science advisory committee	Research Coordinator	Ongoing
		Participation in ESNERR's Tidal Wetland Project strategic planning team and advisory panel	Research Coordinator	Ongoing
		Reduced erosion measures developed	Research Coordinator	Year 2
		Erosion monitoring implemented	Research Coordinator	Year 3
Strategy CESM-4: Implement site-specific beach nourishment programs	Continued coordination with local harbors and cities on dredge disposal options for use of clean sand for beach nourishment	Pilot project implemented	Resource Protection Coordinator	Year 2
	Coordinated permit review process with California Coastal Commission, USACE, and EPA	Authorizations issued	Permit Coordinator	Ongoing

Davidson Seamount Management Zone and Sur Ridge Action Plan

Goal: Increase understanding of the Davidson Seamount Management Zone (DSMZ) and Sur Ridge through characterization and ecological process studies and develop education programs for the seamount, the ridge, and similar geologic features throughout the nation.

Introduction

Davidson Seamount Management Zone (was added to MBNMS as part of the adoption of the 2008 final MBNMS management plan. This area encompasses 775 square miles (2,007.4 square kilometers) of ocean waters and the submerged lands thereunder. The boundary resembles a square box centered on the summit of Davidson Seamount.

Davidson Seamount itself is located 80 miles (207.2 square kilometers) to the southwest of Monterey, due west of San Simeon, and is one of the largest known seamounts in U.S. waters. From base to crest, Davidson Seamount is 7,480 feet (2,280 meters) tall; yet, it is still 4,101 feet (1,250 meters) below the sea surface at its highest point. It has an atypical seamount shape, having northeast-trending ridges created by a type of volcanism only recently described and it last erupted about 9.8 million years ago. This large geographic feature was the first underwater formation to be characterized as a “seamount” and was named after the U.S. Coast and Geodetic Survey (forerunner to the National Ocean Service) scientist George Davidson. [Standard MBNMS regulations](#) apply within the DSMZ (without the exemptions for seabed alteration). Taking, disturbing, injuring, or possessing any sanctuary resource below 3,000 feet (914.4 meters) within the DSMZ is prohibited. In addition, NMFS regulations (first effective June 2006) prohibit fishing with bottom contact gear, or any other gear deployed deeper than 3,000 feet (914.4 meters), to protect Essential Fish Habitat.

In the designation process, Davidson Seamount was recognized to have special national significance relative to conservation, ecological, scientific, education, aesthetic, and historical qualities. The area is pristine and dominated by large, fragile, slow-growing organisms that would have long recovery time if impacted. Some corals on Davidson Seamount may be over 1,000 years old and species new to science continue to be described from the area. Since added to MBNMS, it has become one of the best studied seamounts in the world. Nevertheless, the MBNMS condition report determined a deficiency in water quality data from this area of the sanctuary and need for continued characterization and ecological studies.

Sur Ridge is a rocky feature located 28 miles (45.1 kilometers) offshore of Point Sur. It is 11 miles (17.7 kilometers) long and 3 miles (4.8 kilometers) wide, extending 2,680 to 5,148 feet (817 to 1,569 meters) beneath the sea surface. Exploration to Sur Ridge began in December 2013. Since it is more accessible than Davidson Seamount, with similar geologic features and similar species, Sur Ridge has become an important deep-sea research site.

Both Sur Ridge and Davidson Seamount are [sanctuary ecologically significant areas](#). New scientific information will be used to support management decisions related to these areas and general deep-sea biology, for resource protection and education needs.

Strategy DS-1: Conduct site characterization

Complete a number of already initiated studies on the DSMZ and Sur Ridge, ranging from geological and biological characterization to zoological and oceanographic surveys, while also developing a socioeconomic survey. Sur Ridge is also considered in this action plan as it has similar species and habitats as Davidson Seamount and there are ongoing studies at this more easily accessible location.

Activity 1.1: Continue geologic and biological characterization of Davidson Seamount and Sur Ridge. In addition to initiated studies, complete analysis of existing video transects of species and habitat types from past NOAA and Monterey Bay Aquarium Research Institute (MBARI) research expeditions will be completed.

Activity 1.2: Conduct zoological survey of surface areas above Davidson Seamount. Research cruises are necessary to fully describe surface and mid-water species, sea turtles, birds, and mammals, especially seasonal differences. This will require both extractive surveys (e.g., net tows) and non-extractive surveys (e.g., ROV sampling). As time becomes available on the NOAA Ship *Bell M. Shimada* and the Ocean Exploration Trust Exploration Vessel *Nautilus* (or other vessels of opportunity), these basic surveys will continue. Additionally, the Sanctuary Aerial Monitoring and Spatial Analysis Program (SAMSAP), using local NOAA aircraft when available, will be continued. The SAMSAP program is designed to monitor the locations of different kinds of commercial and recreational vessels as well as distributions of some species of interest, including cetaceans (whales and dolphins), and some physical conditions, such as spilled oil.

Activity 1.3: Conduct oceanographic surveys of seamount and Sur Ridge regions. Oceanographic and water quality surveys will be conducted using NOAA ships, MBARI research vessels, and satellite imagery. The data from surveys will be linked with national coastal observatories (e.g., Central and Northern California Ocean Observing System), resulting in a better understanding of ocean current patterns on and around Davidson Seamount and Sur Ridge. The condition report determined a dire need for water quality data for Davidson Seamount, and ocean current measurements at Sur Ridge are particularly important for understanding environmental conditions necessary for optimal coral growth.

Activity 1.4: Complete socioeconomic (commercial, recreational, research uses) analysis. Work with the ONMS socioeconomic team to learn more about human uses in the seamount region, which is also critical information for effective education and protection. In comparison to the rest of MBNMS, there are relatively few user groups in the Davidson Seamount region. However, a comprehensive understanding of key users of the seamount region is required for the next condition report.

Activity 1.5: Provide periodic scientific information and review for proposals to protect California offshore banks, seamounts, and ridges. Periodically, there are national and international efforts to include seamounts into marine protected areas and proposals for

new multiple uses. Because MBNMS staff have unique experience gained at Davidson Seamount and Sur Ridge, they are often contacted for advice and will share all available information as needed.

Strategy DS-2: Conduct ecological processes investigations

Ecological process studies are used to determine the causes of distribution and abundance of species. General hypotheses on the role of seamounts around the world include if they act as either: (1) islands, where seamounts serve as a sink for larval recruits originating in adjacent habitats; or (2) oases, where seamounts serve as a source of larvae integral to the surrounding areas. Marked and transplanted corals are helping us understand the physical conditions necessary for growth, predator-prey relations, and associations with other fauna. The age of corals and how they will be impacted by ocean acidification are also of broad interest.

Activity 2.1: Conduct regular benthic surveys. Repeat characterization studies through time help determine trends needed for sanctuary condition reports and to assess the health of the areas we manage. Based on information from early site characterization and preliminary studies, a benthic monitoring plan will be developed for Davidson Seamount and Sur Ridge. Data from these monitoring programs will be made available through the SIMoN website.

Activity 2.2: Conduct deep-water coral age determination and restoration studies in concert with Sur Ridge research activities. Cold-water corals are receiving increased attention in terms of scientific studies and conservation. The relatively pristine nature of Davidson Seamount and Sur Ridge and their diverse coral populations provides for a number of opportunities for age determination and restoration efforts. A research plan for deep-water coral studies will be developed, then implemented in concert with the Benthic Biology and Ecology Group at MBARI.

Activity 2.3: Conduct research to understand the distribution and abundance of species. Designation of Davidson Seamount as a managed area and Sur Ridge as a [SESA](#) provides 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. Research results will be presented at the International Deep-Sea Symposium, published in science journals and condition reports, and used in educational videos.

Activity 2.4: Compile existing faunal inventories of Davidson Seamount. Taxonomic guides for Sur Ridge and Davidson Seamount will be completed and maintained and published in the Office of National Marine Sanctuaries Conservation Science Series technical reports.

Activity 2.5: Incorporate monitoring data into MBNMS condition reports. A literature review, expert interview process, and information from the above activities will be compiled to assess sanctuary seamount and Sur Ridge health in the next condition report.

Strategy DS-3: Conduct seamount education and outreach initiatives

Davidson Seamount has captivated the public through numerous media reports (e.g., CBS Nightly News, National Geographic, and American Airlines in-flight news) and through [NOAA's Ocean Explorer website](#). A survey of the public related to developing a visitor center for MBNMS found that one of their top interests was in “seafloor topography,” of which seamounts and ridges are dramatic examples (Horner 2005). Proximity to the Monterey Bay Aquarium and other education institutions provides excellent education opportunities (e.g., interpretive 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 sanctuary research efforts have generated significant interest in the Cambria and San Simeon area and has been prominently featured in the Coastal Discovery Center and Santa Cruz Exploration Center.

Activity 3.1: Develop and implement Davidson Seamount education and outreach program. Information on the DSMZ and Sur Ridge will be incorporated into volunteer training, public seminars, and exhibits at interpretive centers. Building on the opportunity that Davidson Seamount is the best studied seamount in the National Marine Sanctuary System, educational information on technology needed for deep-sea research, seamount biological diversity, habitats, ocean acidification, and species of related interest, such as cold-water corals and sponges, will be provided to all relevant NOAA programs. A better-informed public on this topic will enhance a conservation ethic and support wise use of this unique deep-sea habitats.

Activity 3.2: Involve the education and outreach mechanisms within MBNMS and broader NOAA to promote existing and new research on Davidson Seamount. Past missions to the seamount, in conjunction with NOAA's Office of Exploration and Research and the British Broadcasting Corporation, were successful due to the combined efforts of education and research disciplines. This model should be considered when new cruises and campaigns are considered, particularly for upcoming expeditions with the Ocean Exploration Trust on the Exploration Vessel *Nautilus*.

Relevant strategies/activities located elsewhere within this management plan:

Strategy DS-3 → Education, Outreach, and Communication Strategies 1, 2, 4, 6

Potential Partners

Monterey Bay Aquarium Research Institute; Monterey Bay Aquarium; California State University, Monterey Bay; NOAA's Office of Marine and Aviation Operations; National Marine Fisheries Service; University of California at Santa Cruz; Lawrence Livermore National Laboratory; Moss Landing Marine Laboratories; Stanford University; Ocean Exploration Trust; Applied Marine Sciences; Naval Postgraduate School.

Davidson Seamount Management Zone and Sur Ridge Action Plan Goal: Increase understanding of the Davidson Seamount Management Zone and Sur Ridge through characterization and ecological process studies and develop education programs for the seamount and similar geologic features throughout the nation.

Performance Measures Table

Strategy Title	Desired Outcome (Objective)	Output Measure	Who Measures	Timeline
Strategy DS-1: Conduct site characterization	Geologic and biological characterization of Davidson Seamount	Biennial airplane or ship cruise	Research Specialist	Years 2, 4, 6
		Project updates to SIMoN Project Pages	Research Specialist	Ongoing
Strategy DS-2: Conduct ecological processes investigations	Deep-water coral restoration studies conducted in the Sur Ridge Sanctuary Ecologically Significant Area	Deep-sea coral restoration manual	Research Coordinator	Year 2
	Compile existing faunal inventories of Davidson Seamount and Sur Ridge	Online inventories, building on existing ONMS taxonomic guides for Sur Ridge and Davidson Seamount	Research Specialist	Years 1-5
	Davidson Seamount monitoring data incorporated into MBNMS condition report	New water quality data in MBNMS condition report	Research Specialist	Year 5
Strategy DS-3: Conduct seamount education and outreach initiatives	Public awareness of sanctuary deep-sea and seamount research	News media and social media campaigns developed for research cruises to Davidson Seamount and Sur Ridge	Research Specialist Education Coordinator	Years 1-5

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Emerging Issues Action Plan

Goal: Develop a system to identify, track, and appropriately respond to emerging issues representing high public interest and/or potential threats to MBNMS resources.

Introduction

The goals and objectives set forth by the NMSA direct NOAA to take an ecosystem-based approach to managing national marine sanctuaries. The ecosystems include habitat structure, species assemblages, and ecological processes, as well as the many interactions with humans and their activities. MBNMS staff need to develop a system to identify emerging issues that should be addressed to meet the priority goal of resource protection.

Although a wide range of issues have been included in the existing management plan, other issues are not addressed. This plan focuses on developing a framework to identify and address future resource protection issues.

The following constitutes a partial list of issues potentially emerging more fully in future years. There are undoubtedly many other issues, either partly known or wholly unforeseen, not listed here. Examples of recent or potential issues for future consideration include:

- A. Coastal and offshore energy development
- B. Commercial/private activities
- C. Recreational activities
- D. Military/U.S. Coast Guard/NASA activities
- E. Research activities
- F. Coastal development and access
- G. Water quality
- H. Threats from beyond MBNMS boundaries (with potential to affect sanctuary resources)

Strategy EI-1: Identify and track emerging issues

MBNMS staff will identify and track emerging issues as they arise. The following activities provide a framework to understand and track emerging coastal and marine management issues in order to prevent harm to sanctuary resources.

Activity 1.1: Work with staff, SAC, working groups, and nongovernment organizations drawing on existing knowledge to develop and characterize a list of potential emerging issues.

Activity 1.2: Prioritize the emerging issues list to identify those issues warranting some level of additional tracking.

Activity 1.3: Identify how to best obtain information on new and unforeseen issues.

Strategy EI-2: Develop process to address emerging issues

MBNMS staff must develop and use a process to determine the importance and priority of issues as they arise. This management plan is based on addressing the top priority resources issues as identified in a public process of scoping, prioritization, and selection with the Sanctuary Advisory Council. However, MBNMS staff recognize certain unforeseen issues may pose a threat and must be understood and addressed in a timely manner.

Activity 2.1: Identify and define criteria for assessing the importance of emerging issues, including consideration of:

- A. Intensity, duration, and geographic extent of threat to MBNMS resources or qualities;
- B. Whether the issue falls within ONMS's mandate;
- C. Rate at which the issue or threat is growing or emerging;
- D. Degree of public or SAC interest in MBNMS involvement in issue; and
- E. Priority ranking relative to other MBNMS initiatives.

Activity 2.2: Outline alternative categories and processes to address emerging issues, including:

- A. New, relatively small issues which staff address internally;
- B. Large or significant issues where adequate information is lacking and additional research is required;
- C. Issues initially appearing to be large, but determined to be relatively small after analysis, should be addressed by an effective communication plan;
- D. Large issues deferred due to lack of time and resources to address;
- E. Large, short term issues requiring no formal action plan; and
- F. Large, complex, long-term issues with multiple interested parties requiring action plan development by either staff or a multi-stakeholder working group of the SAC.

Activity 2.3: Identify process for bringing emerging issues forward to the Sanctuary Advisory Council where necessary.

Activity 2.4: Elevate issues within NOAA's Office of National Marine Sanctuaries on issues with regional or national scope, or refer to other agencies for action.

Relevant strategies/activities located elsewhere within this management plan:

Strategy EI-2 → Coastal Erosion and Sediment Management Activity CES 2.2

Emerging Issues Action Plan Goal: Develop a system to identify, track, and appropriately respond to emerging issues presenting potential threats to MBNMS resources.

Performance Measures Table

Strategy Title	Desired Outcome (Objective)	Output Measure	Who Measures	Timeline
Strategy EI-1: Identify and track emerging issues	Identification of potential emerging threats to sanctuary resources.	Emerging issues list	Superintendent	Annually
	Prioritization process for emerging issues list	Prioritized issue list	MBNMS Staff MBNMS Advisory Council	As needed
Strategy EI-2: Develop process to address emerging issues	Defined process addressing issues	Flow chart with criteria explained	Deputy Superintendent	Year 2

Introduced Species Action Plan

Goal: Prevent the introduction, spread, and establishment of introduced species and control and/or eradicate populations of introduced species already established in MBNMS.

Introduction

Introduced species pose threats to our prosperity, security, and quality of life. They have negative impacts on agriculture and food production systems, water quality and availability, human, animal and plant health, the environment, infrastructure, the economy, energy, cultural resources, and military readiness. Implementation of this action plan will support native biological communities, ecological processes, and cultural resources in MBNMS and protect them from the potentially adverse impacts of introduced species by preventing new introduced species from establishing in MBNMS and through early detection, control, and, when feasible, eradication of introduced species that are found within MBNMS.

Introduced species are an increasingly common global threat and the rate of invasions continues to accelerate at a rapid pace. Although the open coast is relatively resistant to invasions, estuaries are particularly vulnerable to invasion (Preisler 2009). Large ports, such as San Francisco Bay, can support hundreds of introduced species, many of which significantly impact native ecosystems (Cohen 1998). Harbors and marinas are also susceptible to introduced species and these areas can be hot spots for invasions. Recent research demonstrates that subtidal marine communities in ports, harbors, and marinas are highly invaded, more so than the adjacent open coast.

Numerous terms are used to describe species not native to a particular ecosystem. For clarity in this action plan, the following definitions are applied to these terms:

- A. “Introduced species” means any non-human organism, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to a particular ecosystem. A synonym used in this action plan is “non-native species.”
- B. “Introduction” means the intentional or unintentional escape, release, dissemination, or placement of an organism into an ecosystem to which it is not native.
- C. “Invasive species” means with regard to a particular ecosystem, an introduced species, including those that are parasites, vectors, reservoirs and causative agents of disease, whose introduction, as a result of human activity, causes harm or is likely to cause harm to the environment, economy, cultural or historical resources, animal or plant health, or public health and safety.
- D. “Pathway” means the vectors, mechanisms, and processes by which introduced species are moved, intentionally or unintentionally, into a new ecosystem where they are currently absent.
- E. “Prevention” means the action of stopping introduced species from spreading within an invaded ecosystem or being added to a new ecosystem where they are currently absent.
- F. “Established” means a population of an introduced species is self-sustaining within an invaded ecosystem.

G. “Spread” means an introduced species increases its spatial extent within an invaded ecosystem through movement of individuals or dispersal of propagules, which may be natural or anthropogenic.

H. “Control” means containing, suppressing, or reducing populations of introduced species within an invaded ecosystem.

I. “Eradication” means the removal or destruction of an entire population of introduced species from an invaded ecosystem.

In 2015, MBNMS promulgated regulations against introduced species due to the threats posed to endangered species, native species diversity, and the composition and resilience of natural biological communities and hydrological processes. In this regulation, introduced species referred to “any species (including but not limited to any of its biological matter capable of propagation) that is non-native to the ecosystems of the sanctuary; or any organism into which altered genetic matter, or genetic matter from another species, has been transferred in order that the host organism acquires the genetic traits of the transferred genes.” Following is the MBNMS regulatory language:

Section 922.132 Prohibited or otherwise regulated activities (MBNMS 1992).

Except as specified in paragraphs (b) through (e) of this section, the following activities are prohibited and thus are unlawful for any [person](#) to conduct or to cause to be conducted:

- Introducing or otherwise releasing from within or into the sanctuary an [introduced species](#), except striped bass (*Morone saxatilis*) released during catch and release fishing activity.

The regulations were developed with considerable public review, as well as input from the sanctuary advisory councils and an introduced species working group of the sanctuary advisory councils for Monterey Bay and Greater Farallones national marine sanctuaries. These regulations are consistent in all four of the national marine sanctuaries in California (Channel Islands, Cordell Bank, Greater Farallones, and Monterey Bay). NOAA crafted the regulations to also be consistent with other state restrictions on introduced species, including California State Lands Commission rules limiting ballast water exchange. Furthermore, the sanctuary definition of an introduced species mirrors that of the California Department of Fish & Wildlife. Consistent regulations avoid a conflict where release of introduced species would be allowed in state waters of some sanctuaries but entirely prohibited throughout other sanctuaries.

In 2016 a memorandum of agreement was signed between the Office of National Marine Sanctuaries and the state of California to collaborate and cooperate on the review of commercial shellfish aquaculture leases or permit applications. The agreement defined “non-native introduced species” as an introduced species whose introduction will not cause significant adverse effects to sanctuary resources or qualities. The definition was intended to apply to a proposed project for a species already under cultivation in Tomales Bay within Greater Farallones National Marine Sanctuary or in MBNMS.

This action plan is not intended to address gradual or episodic changes in species composition caused by climate change (e.g., range expansions linked to increasing sea surface temperatures). In general, introduced species in the marine and estuarine

environment alter species composition, threaten the abundance and/or diversity of native marine species, especially threatened and endangered species, interfere with ecosystem function, and disrupt commercial and recreational activities. Introduced species may cause local extinction of native species either by preying upon them directly or by competing for prey or space.

Introduced species may cause changes to the structure of physical and biogenic habitat (Crooks 1999). Introduced species in MBNMS pose a significant threat to native biological communities and ecological processes and may significantly impact threatened and endangered species. Introduced species also pose significant economic costs to industries such as water and power utilities, commercial and recreational fishing, and agriculture.

On December 5, 2016, President Obama issued an [executive order](#) entitled “Safeguarding the Nation from the Impacts of Invasive Species” This executive order serves as a template for the following three items. Because actions taken by staff may affect the introduction, establishment, or spread of introduced species, staff shall, to the extent practicable and permitted by law:

- A. Identify such actions;
- B. Subject to the availability of appropriations and within administrative, budgetary, and jurisdictional limits, use relevant agency programs and authorities to:
 1. Prevent species introductions and the spread;
 2. Detect and respond rapidly to eradicate or control populations of introduced species in a manner that is cost-effective and minimizes human health risks;
 3. Monitor introduced species populations accurately and reliably;
 4. Provide for the restoration of native species, ecosystems, and other assets that have been impacted by introduced species or their eradication and control;
 5. Conduct research on introduced species and develop and apply technologies to prevent their introduction and spread and provide for environmentally sound methods of eradication and control of introduced species; and
 6. Coordinate with and complement similar efforts, including education and outreach, of states, territories, federally-recognized First Nation peoples, local governments, non-government organizations, and the private sector; and
- C. Refrain from authorizing, funding, or implementing actions that are likely to cause or promote the introduction or spread of introduced species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, NOAA has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by the introduced species; and all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

Species have been introduced to the sanctuary in the past and this will continue into the future. Staff have worked on a variety of projects related to introduced species, including management of *Undaria pinnatifida* in Monterey Harbor, monitoring the spread of

Watersipora subtorquata in Monterey and Carmel bays and via surveys in Elkhorn Slough, and monitoring for the presence of *Sargassum horneri*. Staff work with local researchers on a variety of issues related to introduced species and will continue to take advantage of future opportunities.

Strategy IS-1: Manage pathways and promote prevention

Introduced species can become established very quickly and once established are costly and difficult, if not impossible, to eradicate. Therefore, it is critical for resource managers to focus efforts on the prevention of new introductions by addressing known pathways of introduction and prohibiting the release of introduced species into the sanctuary. Multiple pathways can lead to introductions of species within MBNMS: aquaculture; aquarium trade wholesale importers, culture facilities, and retail pet stores; ballast water, hull fouling, and vessel discharge; biological control; fisheries enhancement; intentional introductions (both legal and illegal); live bait; restaurants, seafood retail, seafood wholesaling and processing, and packing materials (e.g., seaweed); and scientific research institutions, schools, and public aquariums. MBNMS staff uses authorization of aquaculture facilities to manage the prevention of introduced species. In addition, numerous prevention programs are also in place due to the jurisdiction of other agencies and institutions.

Activity 1.1: Continue to coordinate and implement the prohibition of introduced species through review and issuance of authorizations for National Pollutant Discharge Elimination System (NPDES) applications issued by the Regional Water Quality Control Board to ensure all dischargers adequately address introduced species prevention. This also includes other permit applications to MBNMS as well as authorizations of permits from other agencies.

Activity 1.2: Apply best management practices focused on pathways and vectors of transmission, including discharges, as needed. These best management practices have already been developed by other agencies and institutions and are applicable to sanctuary management. As the need arises in case-specific responses, staff will follow these practices, possibly with guidance from other entities already implementing them. For example, this could arise during permitting, consultation with other agencies, or in the planning phase of a new activity in the sanctuary.

Activity 1.3: Integrate existing prevention strategies (e.g., Hazard Analysis and Critical Control Points) when planning field operations, during permit review, and in any other activities that could lead to introductions (i.e., implement best management practices related to prevention). Consider how a planned activity could serve as a pathway for introduction or spread and to implement controls preventing of a species introduction. MBNMS staff will coordinate with agency partners and support state and federal efforts to prevent introductions through regulatory promulgation, permitting, and interpretive and regulatory enforcement.

Strategy IS-2: Promote early detection and rapid response

It is important to be able to quickly assess the threat posed by a newly introduced or newly identified species when new introductions do occur. Ideally, resource protection

agencies would be able to quickly identify a newly introduced species and respond with effective control or eradication efforts.

Activity 2.1: Continue support for existing early detection and monitoring programs. Work with Elkhorn Slough National Estuarine Research Reserve, Partnership for Interdisciplinary Studies of Coastal Oceans, and Smithsonian Environmental Research Center to detect new introductions and monitor the spread of introduced species.

Activity 2.2: Develop a rapid response plan. Work with appropriate partner agencies and institutions as needed to adapt existing decision-making frameworks to help guide sanctuary-specific responses to detecting a new introduced species. Use the existing network of NOAA and academic experts to identify potential introduced species.

Strategy IS-3: Implement eradication or control

Once a nascent or established population of an introduced species has been found, the next step is to determine whether eradication is feasible, or if control and long-term management are the only course of action. Plans to control or eradicate will be species-specific and which plan of action to pursue generally depends on the spatial extent and duration of the introduction and whether the population is (1) well established, (2) serves as a sink with a stable source, or (3) is vulnerable to local extinction. Established populations are self-sustaining, but eradication may still be possible depending on the species and its life history characteristics. Sink populations are sustained only through the arrival of new individuals from a distant source population. While it may be possible to eradicate the sink populations, unless the pathway from the source is addressed, new individuals will soon arrive and replace those eradicated.

Activity 3.1: Assess feasibility of eradication compared to control or no action strategies. Assess the probability of eradication based on logistical and financial constraints, which will contribute to determining overall feasibility and likelihood of success. Determination to eradicate, control, or do nothing will be made in consultation with other relevant resource protection agencies.

Activity 3.2: Develop and implement eradication plan(s). Staff will develop eradication plan(s) with partners on a case-by-case basis. Staff will implement eradication plan(s) with partnering agencies, academia, and nongovernmental organizations.

Activity 3.3: Develop and implement control plans. Develop control plans with partners if eradication is not feasible, or fails. Staff will implement control plans with partnering agencies, academia, and nongovernmental organizations.

Strategy IS-4: Sustain research and monitoring

This strategy attempts to improve the knowledge of existing introduced species in MBNMS, population changes by introduced species, and introduced species' ecological effects.

Some studies have attempted to determine the extent of established introductions in portions of MBNMS. To date, these studies have focused largely on Elkhorn Slough, which is part of MBNMS, and to a lesser degree on harbors adjacent to MBNMS.

Activity 4.1: Maintain and periodically update a list of known non-native introduced species on the SIMoN website using MBNMS research staff and collaborating scientists.

Activity 4.2: Publish the latest results generated by research and monitoring projects focused on introduced species on the SIMoN website.

Strategy IS-5: Implement restoration

To the extent practicable and with assistance from partners, implement restoration of habitats and communities altered by introduced species or the effects of their eradication and control.

Activity 5.1: Assess ability to restore native community structure and function. Collaborate with other relevant resource trust agencies to determine whether habitats and local ecological communities can be restored given the current extent of invasion.

Activity 5.2: Develop restoration plans with collaborators if assessment of restoration is deemed feasible and warranted, then work with partners to implement the restoration plan(s) to both reduce introduced species and either enhance or restore native diversity.

Strategy IS-6: Implementation in Elkhorn Slough

The section on Elkhorn Slough in the 2015 condition report used the most recent available data, published studies, and expert opinions to assess the status and trends of the slough. The 2015 assessment reinforced the 2009 condition report's assessment that Elkhorn Slough is an area of concern within the sanctuary. Invasive species to the slough are common and require extensive mitigation.

Activity 6.1: Participate in long-term monitoring of non-native species with ESNERR staff.

Activity 6.2: Participate in the process to eradicate or control introduced species to eliminate discharges into the slough.

Activity 6.3: Reduce negative impacts of introduced species.

Activity 6.4: Investigate types of activities with potential to increase or introduce non-native species.

Partners

Scientific institutions, Regional Water Quality Control Board, California Department of Boating and Waterways, University of California Sea Grant, California Department of Fish and Game (Marine Region - Office of Spill Prevention and Response), Marine Pollution Control Studies Lab, Office of Spill Prevention and Response, Elkhorn Slough National Estuarine Research Reserve, Smithsonian Environmental Research Center (SERC), California State Lands Commission, local researchers, divers, boaters, municipalities, harbor masters.

Introduced Species Action Plan Goal: Prevent the introduction, spread, and establishment of introduced species and control and eradicate populations of introduced species already established in MBNMS.

Performance Measures Table

Strategy Title	Desired Outcome	Output Measure	Who Measures	Timeline
Strategy IS-1: Manage pathways and promote prevention	Authorizations for NPDES are reviewed and issued	Permits reviewed, authorized	Resource Protection	Annually
	Existing prevention strategies are integrated when planning field operations, during permit review, and in any other activities that could lead to introductions	Permits reviewed, authorized	Research Team	Annually
Strategy IS-2: Promote early detection and rapid response	Continued detection and response to invasive species	Monitoring programs developed	Research Team	Annually
		Number of plans developed	Research Team	Annually
Strategy IS-4: Sustain research and monitoring	Maintain and periodically update a list of known non-native introduced species on the SIMoN website using MBNMS research staff and collaborating scientists	List of non-native introduced species on web	Research Team	Annually
	Publish the latest results generated by introduced species projects on the SIMoN website	Publications on website	Research Team	Annually
Strategy IS-6: Implementation in Elkhorn Slough	Long-term monitoring of non-native species with ESNERR staff is conducted	Monitoring data on SIMoN	Research Team in partnership w/ ESNERR	Annually

Marine Debris Action Plan

Goal: Assess and reduce the amount of marine debris in or entering Monterey Bay National Marine Sanctuary

Introduction

Marine debris is defined as “any persistent solid material manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment” (33 CFR 151.3000 - Definition of marine debris for the purposes of the Marine Debris Research, Prevention and Reduction Act). Marine debris can enter MBNMS from land- and ocean-based sources. Marine debris found in MBNMS includes food wrappers, bottles, plastic bags, construction materials, agricultural waste, lost shipping containers, derelict fishing gear, and abandoned vessels. Marine debris can impact living resources, human health, the structure of natural habitats, and navigation.

In the past, MBNMS has focused on a variety of marine debris control efforts. For example, staff respond to about a dozen vessel groundings and sinkings annually to ensure the response is conducted in an environmentally sound manner. Staff have studied and reported on the impacts of lost shipping containers, have hosted public science presentations on marine debris, and have distributed project descriptions dealing with marine debris on the SIMoN website to raise awareness. Staff have also conducted lost fishing gear removal efforts using a specialized ROV to remove nets and traps and participated in outreach efforts to reduce the amount of marine debris entering MBNMS. In 2016, the Sanctuary Advisory Council reaffirmed their 2011 support for federal and statewide legislative efforts and local ordinances to ban the use and distribution of single-use plastic bags. These resolutions included supporting efforts to remove plastic bag litter from the shores, rivers, and waters of the sanctuary.

Source reduction is the most effective strategy to limit the amount of debris entering the ocean. Reducing the amount of plastic marine debris is especially imperative since plastics never fully degrade but rather break down into progressively smaller particles, releasing chemical additives, while also absorbing chemicals from the ambient water. Microplastics, plastics smaller than 5 mm, are an especially growing concern as studies have found microplastics in deep-sea sediments and organisms, and they can potentially get passed along in the food chain. Scoping comments received in 2016 identified a few ways to focus on source reduction, including educating inland populations about marine debris and working with local restaurants. The Sanctuary Advisory Council’s Conservation Working Group identified marine debris priorities and made recommendations considered in this action plan.

Future efforts to address marine debris will include focused field measurements to better understand distribution and abundance of different types of marine debris; removal and mitigation efforts such as beach cleanups; and targeted education and outreach programs to highlight the importance of source reduction, community involvement, and personal actions. None of these efforts is considered a comprehensive solution, but each represents an effective step to mitigate impacts. MBNMS has developed partnerships with local, state, and federal agencies, such as the [NOAA Marine](#)

[Debris Program](#), to leverage resources to contribute to addressing marine debris impacts.

We need a better understanding of types of marine debris impacting MBNMS resources and how those impacts can be reduced or eliminated.

Strategy MD-1: Assess scope and scale of marine debris

MBNMS staff and partners will evaluate the types of marine debris impacting sanctuary resources. The evaluation will concentrate on identifying the level of persistence of plastic pollution, how plastic pollution enters the sanctuary, and the distribution of plastic pollution in the sanctuary. The assessments will focus on pelagic and coastal environments and will also specifically consider plastic inputs from agricultural activity within sanctuary watersheds. Results will be publicly available on MBNMS's website and will be used to inform future policy development.

Activity 1.1: Complete an assessment of ongoing current marine debris data collection efforts within MBNMS. Determine if data collected by the numerous groups in the sanctuary region and the state of California can be standardized for data collection and reporting and if historical or existing data can be integrated with new data. Past work includes microplastic work conducted by San Francisco Estuary Institute, plastic pollution analysis by the Conservation Working Group, and analysis by Monterey Bay Aquarium Research Institute of mega debris.

Activity 1.2: Support monthly citizen science led surveys of marine debris on shorelines.

Work with partners to explore potential modification of Beach COMBERS (Coastal Ocean Mammal and Bird Education and Research Surveys) program or other existing citizen science programs to include monthly assessments of marine debris at each assigned beach segment, using protocols from NOAA's [Marine Debris Monitoring and Assessment Project](#). Ensure that coordination and post-survey analytical resources are available before implementing such program modifications.

Activity 1.3: Conduct monitoring of microplastics debris in offshore waters and rivers within MBNMS watersheds. Systematically collect microplastic samples at sea to determine the spatial extent of the occurrence of microplastics. Collect microplastic samples in streams to assess the influx of plastic pollution from agricultural activities within watersheds flowing to MBNMS.

Strategy MD-2: Foster public participation and support policies leading to reduced marine debris (focus on plastic pollution)

Incorporate plastic pollution information, including impacts on sanctuary, into existing education and outreach programs and work with business and tourism partners to reduce plastic pollution, focusing on single-use plastics such as straws and drink containers. Work in tandem with communities' efforts to comply with storm drain runoff regulations and structural controls.

Activity 2.1: Develop and conduct general and targeted outreach programs about reducing plastic marine debris, in concert with partners and stakeholders. Some potential outreach tools include: beach and waterway cleanup events, event booths, signage, media stories, social media, videos, brochures, public presentations, visitor center displays, and interpretative programs. MBNMS will lead by example by reducing single-use plastic items, e.g., straws and water bottles, at MBNMS-hosted events, and will strive for zero-waste events.

Activity 2.2: Support existing school programs to educate about the impacts of marine debris and work to monitor and reduce the amount of plastic debris entering the sanctuary. Engage with local K-12 students through education programs to conduct shoreline monitoring using NOAA's Marine Debris Monitoring and Assessment Project protocols. This activity will lead to increasing awareness of the negative impacts of marine debris while generating solutions that help communities become more sustainable.

Activity 2.3: Collaborate with partners to reduce plastic pollution from on-the-water businesses. Focus outreach efforts on on-the-water businesses who can in turn share strategies with their customers through orientations or incorporation into rental guidelines. Support partner efforts to develop outreach products on reducing plastic pollution to coastal businesses, such as hotels and tourist services. Work with partners to develop best practices for reducing marine pollution, focusing on plastics. Work with the Sanctuary Advisory Council to write letters of support for local advocacy efforts.

Strategy MD-3: Reduce marine debris threats by removing the debris and preventing point source inputs

MBNMS staff will focus on reducing marine debris inputs as noted in strategies MD-1 and MD-2, and have identified activities to remove debris from within the sanctuary known to have adverse effects on marine life.

Activity 3.1: Respond to marine vessel incidents and other discharge incidents. Use regulatory and other authorities to effect removal of debris from discharge incidents, including from cargo ships and other vessels, aircrafts, vehicles, and incidental shoreline discharges.

Activity 3.2: Continue inland watershed protection efforts. Collaborate with partners to prevent or reduce discharge of marine debris into waterways leading to MBNMS.

Activity 3.3: Work with entities and individuals who work and live on the ocean to reduce debris released while at sea. Discourage specific unlawful discharge activities such as shipping containers lost at sea.

Activity 3.4: Coordinate with state and local partners on lost fishing gear removal program, on an as needed basis. Determine if MBNMS can provide any support that would materially increase recovery of lost fishing gear within the sanctuary. Lost gear can change the physical structure of the benthos, entangle wildlife, and pose a threat to personnel and equipment, such as autonomous underwater vehicles (AUVs) and ROVs. Research MBNMS policy barriers to lost fishing gear removal and ocean-based marine

debris cleanup and share results with agencies working on California's Ocean Litter Strategy.

Activity 3.5: Use MBNMS permit authority to prevent or reduce potential marine debris. Identify any debris that could be released into the sanctuary as a result of planned human activities and require removal within permit terms and conditions. Work with discharge permit holders.

Relevant strategies/activities located elsewhere within this management plan:

Activity MD-1.3 → Water Quality Activity 2.2

Activity MD-2.2 → Education, Outreach, & Communication Strategies EOC-2, EOC-3

Activity MD-3.2 → Water Quality Strategy WQ-4

Activity MD-3.5 → Wildlife Disturbance Strategy WD-8

Strategy MD-3 → Marine Spatial Planning MSP-9

Potential Partners

NOAA Marine Debris Program, California Whale Rescue, United States Coast Guard, Save Our Shores, Surfrider Foundation, SeaDoc Society, Association of Monterey Bay Area Governments, California Coastal Commission, California Marine Sanctuary Foundation, California State University Monterey Bay, California State Water Resources Control Board, Central Coast Regional Water Quality Control Board, Central Coast Wetlands Group, Elkhorn Slough Foundation, Elkhorn Slough National Estuarine Research Reserve, Central Coast Integrated Regional Water Management Programs, MBNMS Research Activities Panel, Monterey County Farm Bureau, Monterey Regional Storm Water Management Program, Natural Resources Conservation Service (NRCS), Ocean Protection Council (OPC), Resource Conservation District (RCD) of Monterey County, RCD of Santa Cruz County, RCD of San Mateo County, The Nature Conservancy, United States Environmental Protection Agency, Department of the Interior, U.S. Fish and Wildlife Service.

Resources

[NOAA Marine Debris Program](#)

Marine Debris Action Plan Goal: Assess and reduce the amount of marine debris in or entering Monterey Bay National Marine Sanctuary.

Performance Measures Table

Strategy Title	Desired Outcome (Objective)	Output Measure	Who Measures	Timeline
Strategy MD-1: Assess scope and scale of marine debris	Assessment of the types and sources of persistent marine debris in pelagic and coastal environments	Database created	Resource Protection & Research Teams	Year 1
		Produce reports	Resource Protection & Research Teams	As needed
Strategy MD-2: Foster public participation and support policies leading to reduced marine debris focused on plastic pollution	Increase public participation in marine debris reduction activities	Marine debris outreach programming	Education Coordinator	Year 2
	Reduction of plastic pollution from on-the-water businesses	Best practices developed	Resource Protection Coordinator	Year 4
Strategy MD-3: Reduce marine debris threats by removing the debris and preventing point source inputs	Marine vessel and other discharge incidents are responded to and tracked	Emergency response efforts	Enforcement Coordinator	As needed
		Updated database	Enforcement Coordinator	As needed
	Use MBNMS permit authority to prevent or reduce potential marine debris	Updated permit terms and conditions	Permit Coordinator	Annually

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Water Quality Protection Program Action Plan

Goal: Raise awareness of water quality issues in the watersheds and to improve the quality of water entering and within Monterey Bay National Marine Sanctuary.

Introduction

MBNMS encompasses a shoreline length of 276 miles (444.2 kilometers) from Marin County in the north to San Luis Obispo County in the south and 6,094 square miles (15,783.4 square kilometers) of ocean. This proximity to the coastline makes the sanctuary vulnerable to pollution originating from approximately 7,000 square miles (18,129.9 square kilometers) of watershed areas draining to it, including contaminants such as sediments, nutrients, bacteria, pesticides, metals, detergents, and others (Figure WQ-1).

The quality of surface waters in the region is greatly influenced by land use practices. Primary causes of pollutants include urban runoff, agricultural runoff, erosion and sedimentation, and septic systems.

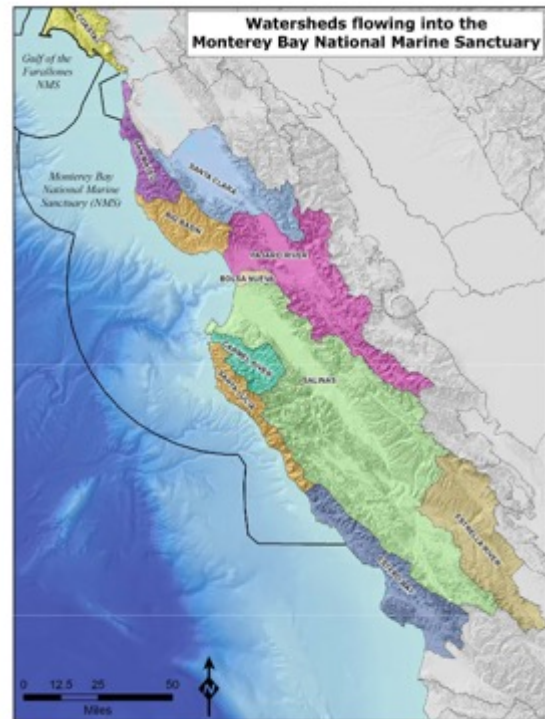


Figure WQ-1. Image shows watersheds flowing into MBNMS. Image: NOAA

Erosion is a widespread problem in MBNMS watersheds, due in part to the erosive nature of local soils as well as to land use practices (including farming on steep slopes, unmaintained or improperly designed dirt roads, altered water channels increasing water velocities and altering the natural sediment balance, and areas denuded of vegetation by fire, overgrazing, or clearing).

The coastal rivers of the Big Sur region and San Mateo coast, where urban and agricultural land uses are minimal, are generally considered to be of good water quality. Primary land-based loading of nutrients to Monterey Bay comes from the Pajaro and Salinas river watersheds. Annual loads from the rivers are highly variable and highly influenced by precipitation. Because of relatively high flows and concentrations, the Pajaro River contributes the largest loads of nutrients to the sanctuary. San Lorenzo River and Carmel River typically contribute nutrient loads an order of magnitude lower.

Within MBNMS watersheds, water bodies have been [determined](#) by the Central Coast Regional Water Quality Control Board to be impaired under Sections 303(d) and 305(b) of the Clean Water Act. In the 2014 Integrated Report¹ there are 55 waterbodies listed that do not attain their designated beneficial uses because of frequently high concentrations of specific contaminants. These water bodies flow to MBNMS and many of the persistent pollutants are then detected in sediment, mussels and other animals' tissues (Figure WQ-2) (California Water Boards (2018)).

2014 303(d) Pollutant Breakdown of 55 Water Bodies on the Central Coast

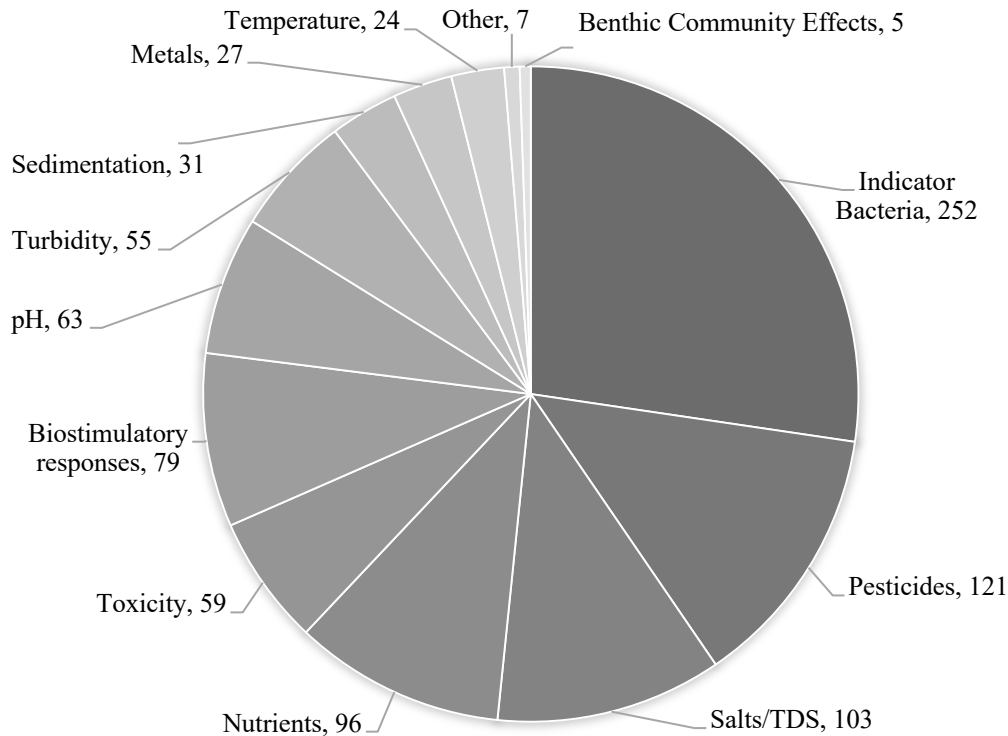


Figure WQ-2. Chart representing the number of listings by pollutant classification. Image: Central Coast Regional Water Quality Control Board

The Water Quality Protection Program (WQPP) began in 1993 with the establishment of a committee to oversee program development and implementation. An MOA was signed by eight federal, state, and local water quality agencies during the sanctuary designation process and has been updated twice since the creation of the original document. The broader WQPP Committee has met quarterly for many years to carry the mission forward. The committee is made up of 20 organizations, including the MOA signatories, which represent federal, state, and local government, NGOs, agriculture industry, municipalities, research, and academia.

The purpose of the WQPP is to provide a framework for regional coordination, communication, planning, and strategy implementation among local, state, and federal agencies and public and private groups addressing water quality in the sanctuary and its watersheds. The group has addressed regional monitoring and data sharing, urban and agricultural runoff, marinas and boating activities, wetland/riparian issues, and point sources of pollution. Water quality issues addressed include erosion and sedimentation, persistent pesticides, nutrients, oil and grease, metals, and coliform bacteria, as well as degradation of wetland and riparian areas, which can reduce their natural filtering capabilities. A main focus of the program is to more efficiently leverage and encourage collaboration between the large number of existing programs and projects related to these issues.

Since the original water quality action plans were developed, much has been accomplished by sanctuary staff and partners. On March 8, 2017, the Central Coast Regional Water Quality Control Board (CCRWQCB) adopted a [third agricultural order](#) (No. R3-2017-0002) applying to owners and operators of irrigated land used for commercial crop production. The CCRWQCB regulates discharges from irrigated agricultural lands to protect surface water and groundwater. Many of the regulatory requirements identified in the agricultural order directly correspond with strategies identified in MBNMS's Agriculture and Rural Lands Action Plan.

The CCRWQCB also oversees a stormwater program to prevent runoff from transporting urban pollutants to surface waterbodies and ultimately MBNMS. The [Stormwater Program](#) is an NPDES Program implemented in two phases based on the size of the jurisdiction (Phase I and Phase II). The city of Salinas (population greater than 155,000 in 2013) holds the only individual Phase I municipal stormwater permit in the central coast region. On March 10, 2003, coastal cities meeting the definition of Phase II Regulated Small Municipal Separate Storm Sewer Systems (MS4s) were required to obtain permits. Finally, on February 5, 2013, a proposed final draft of the Phase II Small MS4 General Permit was adopted and became effective on July 1, 2013 (Order No. 2013-0001). Similar to the agriculture regulations, the local municipalities are now implementing many of the strategies identified in MBNMS's Solutions to Urban Runoff Action Plan.

Boat marinas are also doing their part to reduce pollution from vessels. Most marinas adjacent to MBNMS have installed bilge pumpouts to remove oily water from vessels. They also have sewage pumpouts used by boaters to pump sewage from vessel holding tanks to the wastewater treatment plant, thereby reducing the amount of nutrients, pathogens, and chemicals entering the sanctuary from boats.

Because so many of the original strategies are now being implemented, this version of the Water Quality Action Plan has combined all of the issue-based original action plan strategies into one Water Quality Action Plan focusing specifically on activities in which MBNMS WQPP staff are directly involved. The primary strategies WQPP staff will focus on include coordinating regional efforts to improve water quality, better understanding the land-sea connection, quantifying effectiveness of management practices in improving water quality, monitoring and reducing pollutant loads of contaminants entering MBNMS, promoting public engagement and stewardship, and better communicating the findings of projects and monitoring conducted by WQPP staff. We want to better understand the fate and magnitude of contaminants entering MBNMS so we can more effectively prioritize efforts to minimize the threats to MBNMS resources.

Strategy WQ-1: Facilitate and coordinate regional efforts to improve water quality through the Water Quality Protection Program Committee (and MOA), Agriculture Water Quality Alliance (AWQA), stormwater programs, and Integrated Regional Water Management programs

MBNMS's WQPP has a regional perspective on water quality issues crossing jurisdictional and watershed boundaries. The emphasis is on bringing people together to share information, promote success, and leverage resources to improve water quality. Regardless of the source, it is important to create a collaborative environment where the goal is to improve the quality of water flowing into MBNMS. The following activities include efforts within the Elkhorn Slough watersheds.

Activity 1.1: Promote examples of successful, innovative, and effective practices, technologies, and systematic approaches to reduce pollutant loads. There are many practices and innovative technologies implemented by NGOs, researchers, growers, and local cities to improve water quality. WQPP staff will promote these efforts through AWQA meetings, WQPP Committee meetings, grant proposals, sharing monitoring results, presenting at workshops, and the AWQA website.

Activity 1.2: Review, evaluate, and comment on ordinances, regulations, and permits with potential effects on MBNMS resources. MBNMS staff will review and provide comments on any NPDES permits discharging directly into the sanctuary and review any MBNMS permit requests that might affect water quality. As resources permit, other coastal permits, projects, or ordinances affecting water quality may be evaluated.

Activity 1.3: Participate in and support urban and agricultural sustainability efforts. MBNMS staff support and encourage efforts to promote sustainable use of resources, e.g., reducing water usage and promoting healthy soils through best practices.

Activity 1.4: Assist in the development and implementation of storm water resource plans (SWRP). Staff will aid in the promotion of a SWRP for the Greater Monterey County region to help better understand and identify opportunities for water retention, groundwater recharge, and improved water quality. Several other SWRPs are in development for Santa Cruz County and the Monterey Peninsula. MBNMS will help share information and promote regional cooperation and strategies.

Activity 1.5: Assist in establishing watershed working groups or focus groups. As resources permit, the agriculture water quality coordinator will assist partners in identifying watersheds where the agriculture community might be interested in working together to demonstrate collective solutions to reducing pollutant loads, leveraging resources, and meeting regulatory requirements.

Activity 1.6: Coordinate and facilitate WQPP Committee, Agriculture Water Quality Alliance, and Citizen Watershed Monitoring Network meetings. On a quarterly basis, the WQPP Committee will meet to strengthen collaboration and reinforce mutual efforts related to improving water quality. AWQA and the Citizen Watershed Monitoring

Network will meet as needed to coordinate and support regional water quality enhancement.

Activity 1.7: Ensure MBNMS Water Quality MOA remains current. The WQPP MOA is an agreement between NOAA and eight federal, state, and local agencies with some regulatory authority over water. The MOA is valid for five years and will expire on September 1, 2020. It can either be extended or re-issued. One follow-up action item is to describe the contact information and steps for coordination of enforcement activities between agencies related to water quality violations.

Activity 1.8: Develop new partnerships and strive to maintain and improve existing relationships. It is important to remain connected with a diverse stakeholder group that is inclusive and continues to expand with new ideas and opportunities. WQPP staff will attend meetings, trainings, and networking events looking for new partners and projects to improve water quality.

Strategy WQ-2: Understand the land-sea connection

The WQPP is focused on collaborative efforts to improve water quality in the watersheds draining to MBNMS. This strategy emphasizes the importance of understanding how runoff from land affects sanctuary resources. This will help prioritize work by knowing where sanctuary resources are at risk and where there is opportunity for corrective action. The following activities include efforts within the Elkhorn Slough watersheds.

Activity 2.1: Promote investigation into the effects of pollutants on marine ecosystems. A list of research questions will be developed where insufficient knowledge exists (data gaps) or new emerging issues are identified. This list will be maintained and provided to local researchers and students as opportunities arise for special studies or student projects.

Activity 2.2: Facilitate discussion and coordinate efforts to develop an integrated regional water quality monitoring program. For many years, WQPP staff and partners have been working toward an integrated regional water quality monitoring framework. This is important to leverage resources and provide a long-term, robust data set to inform management decisions. Efforts to date include identifying existing programs, monitoring sites, and design. Regional questions were developed and a framework designed. All pertinent data is uploaded into a statewide database called the California Environmental Data Exchange Network (CEDEN). At a minimum, funding is needed to analyze existing data from multiple programs to answer the regional questions and/or identify data gaps and where additional monitoring or modeling is needed. WQPP staff will work with funding agencies to integrate this effort into regional monitoring programs and other statewide initiatives. (See Research and Monitoring Action Plan.)

Activity 2.3: Collect and assimilate pertinent data to better respond to MBNMS condition report questions. The MBNMS condition report is updated approximately every five years and includes six questions in each of four environments (estuarine, nearshore, offshore, and Davidson Seamount) specific to water quality condition and human effects. New research publications will be collected for reference in the condition report. Local experts will be solicited for input and will assist staff in updating the

condition report with new status, trends, confidence, and narrative related to any new information used in the report.

Activity 2.4: Pursue opportunities for incorporating or expanding monitoring programs to measure plastic debris and other pollutants of concern in surface waters and the waters below. An effort is underway to identify the quantity and fate of plastic used in agriculture operations. When funding is available, microplastics will be measured in freshwater systems to determine presence and abundance. Other monitoring programs are beginning to look at human specific pollutants such as trash, bacteria, and caffeine. Monitoring results will be provided to local municipalities to inform potential sources and mitigations to reduce or eliminate the pollutant.

Activity 2.5: Contribute to HAB research. By collaborating with local researchers/resource agencies, staff will provide water samples to researchers at the University of California at Santa Cruz, collected during the Dry Run and First Flush volunteer monitoring programs, for analysis of urea, microcystin, and possibly other contaminants of interest, thus adding to the pool of knowledge to better understand cause and effects of HABs.

Strategy WQ-3: Quantify effectiveness of management practices

With limited resources, it is more important than ever to measure and report effectiveness of both management practices and implementation projects for reducing contaminants flowing into surface waters and ultimately MBNMS. This is difficult to quantify, but the information is important to justify costs and encourage implementation of projects reducing pollutant loads to MBNMS. The following activities include efforts within the Elkhorn Slough watersheds.

Activity 3.1: Promote innovative projects to better understand effectiveness of water quality improvement. Grant proposals will be developed with partners to construct pilot projects and measure their effectiveness at reducing pollutant loads. Successful projects will be highlighted at AWQA meetings, at workshops, and on the AWQA and Central Coast Action Tracker (CCAT) websites.

Activity 3.2: Manage and encourage use of the CCAT online portal. This online tool tracks practices being constructed or implemented in watersheds to improve water quality. Maps identify where practices are installed and pollutant loads are estimated. This tool is not widely used but has the potential to provide valuable information. Updates will be made to enhance the performance and align with stormwater projects.

Activity 3.3: Measure and identify most effective management practices. Monitoring of municipal infrastructure repairs in local cities will be conducted and data analyzed and reported. Analysis of agriculture best practices (reported annually to the Central Coast Water Board) are being evaluated through reporting and mapping to better understand level of implementation, challenges, and successes.

Strategy WQ-4: Monitor and reduce pollutant loads flowing into MBNMS

For over 15 years, WQPP staff, partners, and volunteers have been collecting water samples in surface waters and storm drains along the Central Coast. The majority of these were grab samples and the concentration of specific contaminants in each were compared to regulatory water quality objectives or action levels established by the EPA and the Central Coast Water Quality Control Board. If funding is available, MBNMS will strive to incorporate flow measurements to better calculate contaminant loading, informative for prioritizing true pollution problems.

Activity 4.1: Reduce pollutant discharges to storm drains and surface waters through source tracking. Through our dry weather monitoring program, Urban Watch, potential sources of pollutants are tracked upstream when there is flowing water or pollutants are detected using field kits and meters for real time analysis. Staff will also assist municipalities with illicit discharge detection required by stormwater permits on an annual basis.

Activity 4.2: Promote and increase use of “human source” and “rapid” indicators. New analytes such as caffeine and quantitative polymerase chain reaction (qPCR) analysis are being incorporated into monitoring programs when funding is available to identify human pollutant sources and devise solutions to eliminate them from the runoff. Urban Watch programs will continue to expand and adapt to the needs of municipalities to meet stormwater permit requirements.

Activity 4.3: Increase availability of online tools and resource materials. The AWQA website will continue to be used as a resource for the latest research publications. New print materials, informational resources, and web tools will be added that aid in the reduction of pollutant loads from agriculture operations. In addition, the AWQA calendar is updated twice a month to inform partners of upcoming events and educational opportunities.

Activity 4.4: Respond to any unusual discharges threatening MBNMS resources. Investigate any reports of discharges to MBNMS reported to the 24-hour emergency response number, the MBNMS website, or from any other reporting party. This might include overflows to the sanitary sewer system or illicit discharges to a storm drain that flows to MBNMS. All available information will be communicated to the MBNMS regulatory coordinator and superintendent for potential enforcement or follow-up actions.

Strategy WQ-5: Promote public engagement and stewardship through citizen science monitoring programs and other WQPP efforts

Since 2000, the WQPP team has coordinated several volunteer water quality monitoring programs promoting public involvement while educating individuals about water quality conditions and other human related activities affecting our natural environment. Snapshot Day, First Flush, and Urban Watch programs empower community stewardship. Other opportunities to inform and educate the public about water quality

conditions will be used. The following activities include efforts within the Elkhorn Slough watersheds.

Activity 5.1: Coordinate volunteer citizen science programs. Annual programs such as Snapshot Day and First Flush will be conducted, offering opportunities for public engagement and stewardship through scientific data gathering that is important to MBNMS, state, and regional water boards and municipalities.

Activity 5.2: Participate in events such as watershed festivals, expert panels, planning/working groups, and trainings. Opportunities will arise to support partners and broaden the reach and knowledge of MBNMS and more specifically water quality issues by participating in these types of events. Examples include Snapshot Day trainings in San Mateo and Santa Cruz and Santa Rita Creek Watershed Festival.

Activity 5.3: Highlight successful efforts of individuals, cities, and agriculture operations. Recognize partner organizations and individuals that have shown exemplary commitment and dedication to improving water quality through the MBNMS Volunteer of the Year Award, Star of the Sea awards given to long-time partners, and recognition of individuals at AWQA events or at an annual water quality symposium.

Activity 5.4: Provide relevant MBNMS water quality messaging. Current monitoring summary data or relevant water quality facts and messages will be provided for use in print and digital/media materials.

Strategy WQ-6: Communicate findings of projects and monitoring conducted by the WQPP

Information is only meaningful if it is shared. This strategy is intended to better communicate WQPP projects and results. Water quality data, summary reports, and activities related to improving water quality need to be communicated to a broad audience. Reports, events, and monitoring opportunities will be promoted through multiple channels.

Activity 6.1: Increase the public's understanding of effects of pollutants on marine ecosystems. Use MBNMS visitor centers, volunteers, social media, TV, and other opportunities to communicate how humans affect marine resources (e.g., pollution) as well as issues that affect humans directly such as contaminated seafood or harmful algae.

Activity 6.2: Convey and promote water quality results and reports for sanctuary-led programs such as Snapshot Day and First Flush for resource managers and the public. Ensure timely completion of water quality reports. For reports that can be made public, send the final report out to appropriate listservs and volunteers and post on MBNMS "What's New" webpage.

Activity 6.3: Regularly update the SIMoN portal with MBNMS water quality monitoring results.

Activity 6.4: Upload MBNMS water quality data to the CEDEN. In order to make data available to the public, water quality results will be uploaded on a quarterly basis to

CEDEN, pending available State Water Board resources and assistance to maintain CEDEN.

Activity 6.5: Coordinate a water quality forum every two years. Work with the WQPP Committee to plan and implement water quality forums with the main intent to share information and further WQPP strategies and activities listed in this action plan.

Activity 6.6: Highlight water quality issues and research needs at MBNMS Research Activity Panel meetings.

Relevant strategies/activities located elsewhere within this management plan:

Activity WQ-1.3 → Marine Debris Strategy MD-1
Activity WQ 2.2 → Marine Debris Strategy MD-1
Activity WQ 2.2 → Marine Debris Activity MD-1.3
Activity WQ-4.1 → Marine Debris Strategy MD-4
Activity WQ-5.1 → Marine Debris Strategy MD-5
Activity WQ-5.2 → Marine Debris Strategy MD-5

Potential Partners

Agriculture Water Quality Alliance (AWQA), Association of Monterey Bay Area Governments, California Coastal Commission, California Marine Sanctuary Foundation, California State University Monterey Bay, California State Water Resources Control Board, Central Coast Ambient Monitoring Program (CCAMP), Central Coast Long-term Environmental Assessment Network (CCLEAN), Central Coast Water Quality Preservation, Inc., Central Coast Regional Water Quality Control Board, Central Coast Wetlands Group, Coastal Conservation and Research, Inc., Coastal Watershed Council, Elkhorn Slough Foundation, Elkhorn Slough National Estuarine Research Reserve, Central Coast Integrated Regional Water Management Programs, MBNMS Research Activities Panel, Monterey County Farm Bureau, Monterey Regional Storm Water Management Program, Natural Resources Conservation Service (NRCS), RCD of Monterey County, RCD of Santa Cruz County, RCD of San Mateo County, Surfrider, The Nature Conservancy, University of California Cooperative Extension, US EPA Region 9.

Water Quality Protection Program Action Plan Goal: Raise awareness of water quality issues in the watersheds and improve the quality of water entering and within Monterey Bay National Marine Sanctuary.

Performance Measures Table

Strategy Title	Desired Outcome (Objective)	Output Measure	Who Measures	Timeline
Strategy WQ-1: Facilitate and coordinate regional efforts to improve water quality	Leverage cross-jurisdictional resources to improve sanctuary water quality	Best practices promoted at meetings and on AWQA website.	WQPP Team	Annually
		NPDES permits reviewed for potential WQ impacts.	WQPP Director	Annually
		Agriculture watershed focus group established.	Ag WQ Coordinator	Annually
		Quarterly WQPP meeting held	WQ Team	Annually
		WQPP MOA extension	WQPP Director	Year 1
Strategy WQ-2: Understand the land-sea connection	Develop an understanding how runoff from land effects the sanctuary.	List of water quality research questions developed	WQPP Team	Year 1
		Funding sources for analysis of data identified.	WQPP Director	Ongoing
		Collect and assimilate pertinent data to update condition report.	WQPP Director	Year 3
	Contribute to HAB research	HAB analysis conducted	WQPP Team	Annually

Section 2: Issue Based Action Plans

Strategy WQ-3: Quantify effectiveness of management practices	Management practices are developed, piloted, tracked, and assessed.	One partner project per year measured effectiveness of water quality improvement.	WQPP Team	Annually
		Projects added to Central Coast Action Tracker.	WQPP Team	Annually
Strategy WQ-4: Monitor and reduce pollutant loads flowing into MBNMS	Reduced pollutant discharges to storm drains and surface waters through source tracking	Urban Watch dry weather monitoring program	Vol. Monitoring Coordinator	Annually
	Unusual discharges threatening MBNMS resources are immediately responded to	Incidents investigated	WQPP Director	Annually
Strategy WQ-5: Promote public engagement and stewardship through citizen science monitoring programs and other WQPP efforts	Volunteer citizen science programs (Snapshot Day, First Flush) increase community stewardship related to sanctuary watersheds	Two events implemented annually	WQPP Team	Annually
Strategy WQ-6: Communicate findings of projects and monitoring conducted by the WQPP.	Increase the public's understanding of WQ data results and the effects of pollutants on marine ecosystems	Pollutant reports for at least two programs	WQPP Team	Annually
		SIMoN website has current MBNMS water quality monitoring results	Vol. Monitoring Coordinator	Annually
		Water quality data is uploaded to California Environmental Data Exchange Network	WQPP Team	Annually
		MBNMS water quality forum	WQPP Team	Years 2, 4, 6, 8

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Wildlife Disturbance Action Plan

Goal: Maintain and improve protection of wildlife within the sanctuary by evaluating and remediating adverse impacts from human activities.

Introduction

Disturbance of marine wildlife is increasing in frequency and severity as an expanding urbanized society increasingly interacts with wild animals, which are often falsely portrayed by media and social media as receptive to human physical contact. Elevated wildlife stress levels from repeated close approach by humans can have chronic negative effects on wildlife health and survival. When an animal enters an alert posture (such as a raised head or nervous movement) due to human encroachment, physiological changes occur that drain the animal's energy and interrupt critical resting and feeding patterns. Most marine animals, unlike pets, live on a fine margin of survival and must feed and rest often. Repeated human encroachment throughout the day and/or night can weaken an animal, leading to weight loss and higher susceptibility to exposure, illness, and disease. In addition, the threat of entanglement from fishing gear or other marine debris can lead to injury or loss of life. High-intensity sound emissions in the marine environment can interrupt wildlife communication, feeding, and navigation and induce harmful physiological stress responses in animals. Persistent cumulative disturbance of wildlife can lead to death.

As human activities have increased at the coastline and technological advances facilitate human access into previously isolated and remote ocean areas, the stress upon marine wildlife has intensified. Highly maneuverable and efficient water and aerial craft can now access any rocky point or distant pocket cove with relative ease. The reduced risk to human operators enables them to boldly intrude into previously inaccessible areas with enhanced confidence and frequency. Thus, previous safe havens for wildlife resting and breeding are no longer impervious to human disturbance. A motorized personal watercraft (MPWC) or unmanned aircraft system (UAS) can appear without warning, creating a startle effect and initiating a full-scale flight response from a colonial seabird rookery or a marine mammal pupping site. Such abrupt, chaotic evacuations often result in broken and exposed eggs, crushed juveniles, and separated mothers and young.

The proliferation of quality wildlife media programs and publications with high-definition close-up images of wildlife in natural settings has spurred a public fascination and desire for intimate contact with animals in the wild. California tourism continues to rise, resulting in increased coastal and nearshore activities, such as paddle sports, boating, sightseeing, wildlife viewing, tide pooling, diving, surfing, hiking, kite and sail sports, general aviation, videography, and photography. The rapid proliferation of hobby aerial drones (also known as unmanned aircraft systems) presents a significant threat of frequent cumulative disturbance of wildlife in all areas of the marine sanctuary. Tourists now carry and deploy compact drones to capture unique vacation photos from aerial vantage points, sometimes flying within a few feet of individual animals or wildlife groups. Commercial tour operators have begun using aerial drones to search for, observe, and film marine birds and mammals at close range as part of their daily operations.

Social media has created the ability to instantly post imagery of episodic marine events, such as a nearshore whale feeding and provide detailed real-time information about location and access points. Consequently, events previously viewed by a few fortunate bystanders now become public events, luring large numbers of people to a specific site within an hour or two. A social dynamic then develops on-site that can lead to multiple wildlife disturbance events as individual people or groups actively pursue marine animals, drawing closer and closer, even to the point of physical contact. As one person draws close, the next person draws even closer, and so on. The short focal length of mobile phone cameras (the most commonly used camera today) exacerbates this problem since phone cameras require close proximity to the subject for any detailed photo. Due to social media, remote coves or lookouts that were known only to a few people for decades are now revealed to the broader public, along with detailed access instructions. This has resulted in trampling of sensitive habitats and increased disturbance of wildlife during vulnerable stages of their development. Residents of Big Sur have reported increased foot and aerial drone traffic into formerly secluded areas, changing the very character of a community renowned for quiet coastal vistas and solitude.

Greater human use of MBNMS has increased the levels of sound in both air and water within the sanctuary. Shipping, boating, and operation of more powerful sonar systems flood the ocean with mechanical and electronic sound 24 hours a day, impacting marine animals that use sound for navigation, feeding, communicating, and mating courtship. In addition, low-altitude flight operations, coastal construction activity, marine fireworks displays, and large-scale public shoreline events can elevate atmospheric sound levels, negatively affecting marine wildlife at the water's surface. At the same time, low-intensity sound can be an effective tool for conducting valuable marine research and surveys that aid protection of marine ecosystems. Therefore, managing levels and intensity of underwater sound is a present natural resource management challenge.

In addition to chronic audible and visual sources of disturbance, marine wildlife can be acutely impaired by entanglement hazards stemming from human activities in the ocean. Marine mammals and seabirds are routinely entangled in both active and lost fishing gear, as well as other sources of ocean debris. Wildlife entanglement is a loss for all involved. Wildlife endure injury or die, and fishermen lose valuable equipment, time, and effort. Understanding sources and patterns of marine debris relative to wildlife movement patterns is crucial for determining how to reduce entanglements. Developing and supporting response programs for disentangling marine wildlife at-sea is necessary to rescue federally protected animals, such as whales, from mortal injury.

MBNMS staff strive to identify and reduce impacts to wildlife and other protected resources through collaborative management efforts with local stakeholders. Staff will use interpretive education and outreach, permitting, and regulatory enforcement methods to implement the following series of strategies and activities to reduce wildlife disturbance threats.

Strategy WD-1: Mitigate wildlife disturbance from marine vessels and shore-based activities

Wildlife disturbance is best addressed by measures that prevent disturbance before it occurs. The activities below focus on creating consistent, effective messaging and outdoor programs/projects persuading ocean users to reduce chronic wildlife disturbance through improved personal knowledge and practices (proper wildlife viewing practices).

Activity 1.1: Collaborate with partner agencies and stakeholders to develop quantitative, standardized wildlife approach distances and approach/viewing protocols within MBNMS followed by an effective outreach campaign to advertise the standards. The guidelines should be applicable to all motorized and non-motorized vessels operating in the sanctuary.

Activity 1.2: Develop and implement sanctuary-wide outreach programs on wildlife viewing guidelines and approach distances to wildlife, in coordination with partners and stakeholders. Examples of outreach tools include signage, media articles, media releases, social media, videos, brochures, public presentations, event booths, visitor center displays, and docent programs.

Activity 1.3: Expand the Bay Net and Team OCEAN (Ocean Conservation Education Action Network) docent programs to the maximum extent possible to establish regular field presence at existing and additional sites for a minimum of four days per week (including holidays), year-round. Provide a docent coordinator to train, equip, and coordinate volunteer docents.

Activity 1.4: Explore the plausibility and potential for non-profit environmental education/outreach organizations to provide regular trainings for staff at water sport rental shops regarding wildlife approach rules and techniques. Equipping water sport rental staff with quality information and standardized messaging enables those staff to provide enhanced orientations to customers about appropriate marine wildlife viewing guidelines.

Activity 1.5: Reduce disturbance to marine wildlife from rented paddle craft (e.g., kayaks, stand-up paddleboards) by promoting enhanced customer accountability through improved customer orientation messaging and techniques, standardized marking protocol for rental craft and enhanced vendor policies, rental agreements, liability notices/clauses, and management controls.

Activity 1.6: Continue MPWC regulatory zone management and zone awareness outreach to the MPWC community to keep MPWC confined to areas with minimal risk of wildlife disturbance.

Activity 1.7: Develop and implement a management strategy for addressing seabird attraction activities by commercial seabird tour operators.

Activity 1.8: Develop and conduct (for a minimum of one year) a science-based assessment of boater compliance with quantitative, standardized regional whale approach distances. Then assess effectiveness of the voluntary compliance program and pursue appropriate regulatory controls if willful violations remain problematic.

Activity 1.9: Assist local governments and nonprofit environmental education/outreach organizations to develop tailored strategies for protecting sensitive marine mammal and seabird sites from human disturbance (e.g., Pacific Grove harbor seal protection initiative and San Simeon elephant seal protection plan).

Strategy WD-2: Mitigate wildlife disturbance from aircraft

Wildlife disturbance is best addressed by measures that prevent disturbance before it occurs. The activities below focus on creating consistent, effective messaging and use of technological and regulatory methods to reduce chronic wildlife disturbance from traditional and non-crewed flight systems (e.g., planes, helicopters, aerial drones). Several activities specifically address growing encroachment upon wildlife by recreational aerial drone operations within MBNMS.

Activity 2.1: Continue collaboration with the Seabird Protection Network (managed by staff at Greater Farallones National Marine Sanctuary) to provide broad outreach to the general aviation community about best flight practices to prevent aircraft disturbance of marine wildlife.

Activity 2.2: Develop outreach programs about responsible operation of UAS, or aerial drones, within MBNMS. Some possible outreach tools include signage, targeted outreach to wildlife tour operators, media articles, media releases, social media, videos, brochures, public presentations, event booths (e.g., at air shows and fly-ins), visitor center displays, and docent programs.

Activity 2.3: Continue regulated overflight zone monitoring and zone awareness outreach to the general aviation community (including unmanned aircraft system operators) to protect the most sensitive seabird and marine mammal sites along the coast of the sanctuary.

Activity 2.4: Immediately participate in the Federal Aviation Administration's (FAA) process to revise airspace designations for the San Francisco area and advocate moving the current Class B airspace away from Point San Pedro to facilitate safe pilot avoidance of seabird colonies at Devil's Slide Rock.

Activity 2.5: Verify that FAA and third-party paper and digital aeronautical charts include FAA graphics and notices regarding NOAA regulated overflight zones and rectify as necessary. This is critical to pilot awareness of and compliance with NOAA-regulated overflight zones.

Activity 2.6: Coordinate with the Seabird Protection Network and the U.S. Fish & Wildlife Service to evaluate the effectiveness of Activity 2.4 in reducing aircraft disturbance of seabirds at Devil's Slide Rock. If outreach efforts fall short of seabird

protection objectives, assess whether creation of a NOAA regulated overflight zone is warranted at that location.

Activity 2.7: Coordinate with California Department of Parks and Recreation (CDPR) and California Department of Fish and Wildlife (CDFW) to determine current or pending state regulatory policies regarding UAS operations within state marine protected areas. Work with CDPR and CDFW to coordinate management, messaging, and enforcement concerning UAS disturbance.

Activity 2.8: Coordinate with government and non-government organizations (e.g., Seabird Protection Network, U.S. Fish & Wildlife Service, MPA Watch, and Oikonos Ecosystem Knowledge) to collect data and statistics on disturbance of wildlife by traditional aircraft and UAS within MBNMS.

Activity 2.9: Promote public use of the Seabird Protection Network [online incident report](#) to record observed disturbance of wildlife by traditional aircraft and UAS. This will help refine the known scope and scale of this issue.

Strategy WD-3: Develop acoustic baseline profiles within MBNMS

This strategy recognizes a need for systematic assessment of the soundscape within MBNMS to characterize potential threats to marine habitats and wildlife. It initiates a process for defining essential elements for investigation and developing findings and potential recommendations for management action.

Activity 3.1: Develop goals and objectives for characterizing and measuring the underwater soundscape within MBNMS. Collaborate with ONMS staff on national priorities, protocols and issue identification.

Activity 3.2: Foster research efforts to monitor sound as a core variable tracked over time. Promote and aid acquisition of equipment required to better quantify the acoustic landscape and identify experts who can precisely locate, measure, and analyze sonic activity.

Strategy WD-4: Reduce underwater low-frequency mechanical sound emissions

Activities within this strategy focus on direct reduction of underwater sound source emissions that pose a threat to marine wildlife and habitats, but also acknowledge the value of non-harmful sound emissions that advance sanctuary research and stewardship goals. Methods of sound reduction include development of best management practices, acoustics education/outreach to the public, upgrades of marine propulsion systems, permit administration, and legal controls.

Activity 4.1: Assess monitoring results from WD-3 specific to use of seal bombs and take appropriate action based on findings.

Activity 4.2: Include best management practices for minimizing acoustic interference with marine wildlife from motorized tour boat operations in sanctuary wildlife etiquette guidelines (see Activity 1.2) and disseminate to tour operators.

Activity 4.3: Improve public understanding of the importance of underwater acoustics in the marine environment through visitor center exhibits, special events, and other outreach methods that highlight how marine wildlife use acoustics for survival and how low-intensity sound can be employed for marine research and other natural resource management activities. This will help people make personal and societal decisions about reducing noise in the sea.

Activity 4.4: Support programs expediting replacement of old marine propulsion plants with modern systems designed for reduced noise emissions.

Strategy WD-5: Use administrative methods to reduce wildlife disturbance

The activities under this strategy promote public compliance with wildlife protection regulations and guidelines without action by the NOAA Office of Law Enforcement (OLE).

Activity 5.1: Explore and implement (as practicable) innovative, collaborative solutions for enhancing compliance with MBNMS wildlife protection regulations and policies (e.g., expanded docent programs, enhanced enforcement of partner agency natural resource ordinances and regulations, camera surveillance, and community service options).

Activity 5.2: Use permit authority to prevent and reduce negative impacts from proposed activities presenting a risk of wildlife disturbance (e.g., marine fireworks displays and coastal construction).

Strategy WD-6: Use law enforcement resources to reduce wildlife disturbance

The activities below are designed to optimize NOAA and partner law enforcement capabilities to ensure public compliance with MBNMS wildlife protection regulations and detection/prosecution of violation activity.

Activity 6.1: Work with NOAA OLE and federal/state partner agencies to increase uniform and investigative OLE presence within MBNMS for enhanced prevention of, immediate response to, and reduction of wildlife disturbance.

Activity 6.2: Work with NOAA OLE to optimize the joint enforcement agreement with California Department of Fish & Wildlife to address wildlife disturbance issues within MBNMS.

Activity 6.3: Coordinate with NOAA OLE and NOAA General Counsel to develop enforcement response protocols for addressing social media posts containing evidence of sanctuary regulatory violations related to wildlife disturbance.

Activity 6.4: Standardize notification protocols from the U.S. Coast Guard to MBNMS regarding lost shipping containers at sea to enhance MBNMS response to such incidents and mitigate potential marine debris impacts to wildlife.

Strategy WD-7: Reduce the risk of wildlife entanglement in fishing gear

This strategy implements collaborative efforts between the fishing industry, fisheries management, NGOs, scientists, and other stakeholders to better understand patterns of marine mammal entanglement with fishing gear and develop programs for reducing entanglements (e.g., lost fishing gear removal and best fishing practices guide).

Activity 7.1: Collaborate with federal and state fisheries managers, scientists, NGOs, fishermen, and other stakeholders to address an increase in large whale entanglements in Dungeness crab fishing gear. MBNMS staff will continue to participate in the State Dungeness Crab Fishing Gear Working Group, which may evolve to include additional fisheries such as sablefish and spot prawn that involve incidental whale entanglements. The working group has developed a Risk Assessment and Mitigation Program which will determine whether any management measures need to be taken to reduce entanglement risk during the fishing season. Management measures may be employed during medium- to high-risk scenarios and could include reducing the number of pots in an area or temporary area restrictions based on best available data on the co-occurrence of whales and gear.

Activity 7.2: Collaborate with fisheries managers and multiple stakeholders to provide input on data gaps such as whale and crab gear distribution surveys (e.g., Applied California Current Ecosystem Studies [ACCESS] surveys) and whale forage distribution research. MBNMS will collaborate with researchers to provide synthesized information on whale densities that can be used during a whale entanglement risk assessment for a particular fishery.

Activity 7.3: Coordinate with multiple agencies on lost fishing gear removal programs in coastal ports on an as needed basis. A number of ports in MBNMS have established a lost fishing gear program for pots and traps and MBNMS will continue to coordinate with the program leads on any recovered gear in the sanctuary.

Activity 7.4: Promote the use of outreach tools, such as the best fishing practices guide that provides guidance on deployment and recovery for trap and pot related fisheries. As needed, MBNMS staff will assist on promoting the [best practices guide](#) to minimize whale entanglement risk and any updated revisions and other outreach tools developed in the future.

Strategy WD- 8: Respond to wildlife entangled in fishing gear

This strategy includes activities that improve direct, rapid, and coordinated notification to response team members upon detection of entangled whales and other marine mammals. It also includes activities that provide direct logistical support for entanglement response efforts.

Activity 8.1: In close coordination with the NMFS Marine Mammal Stranding Network, continue providing logistical support (e.g., vessel assets, trained staff) for whale entanglement incidents in MBNMS. ONMS staff participate in whale disentanglement trainings (levels are I to IV), maintain gear such as buoys and satellite tags for deployment during rescues, and are on call for vessel support for the R/V *Fulmar*.

Activity 8.2: Continue rapid notifications of reported wildlife entanglements to the appropriate agencies and consortiums equipped and trained to remove lines and nets from marine wildlife. Many types of wildlife are entrapped or entangled in fishing gear, including leatherback sea turtle, seals, sea lions, and seabirds. MBNMS staff refers calls from the public to the appropriate agencies and follows up to ensure appropriate action is taken for serious cases.

Activity 8.3: Maintain updated contact information on MBNMS website for public communication with appropriate entangled wildlife responders, according to wildlife category and county. The current listings for reporting of wildlife emergencies can be found [on the MBNMS website](#).

Relevant strategies/activities located elsewhere within this management plan

Activity WD-1.3 → Resource Protection Activity RP 7.2

Strategy WD-8 → Marine Debris Activity MD-3.5

Potential Partners

Monterey Bay National Marine Sanctuary Foundation, Seabird Protection Network, Monterey Bay Aquarium, water sport rental vendors, environmental education/outreach organizations, universities and research community, Pacific Fisheries Management Council, fishing organizations, shipping organizations, wildlife tour vendors, unmanned aircraft system manufacturers, coastal county and city authorities, harbor authorities, California Department of Fish & Wildlife, California Department of Parks & Recreation, California Division of Boating & Waterways, National Marine Fisheries Service, NOAA Office of Law Enforcement, NOAA General Counsel, U.S. Coast Guard, U.S. Bureau of Land Management, U.S. Fish & Wildlife Service, U.S. Forest Service, and Federal Aviation Administration.

Wildlife Disturbance Action Plan Goal: Maintain and improve protection of wildlife within the sanctuary by evaluating and remediating adverse impacts from human activities.

Performance Measures Table

Strategy Title	Desired Outcome (Objective)	Output Measure	Who Measures	Timeline
Strategy WD-1: Mitigate wildlife disturbance from marine vessels and shore-based activities	Prevention of wildlife disturbance before it becomes an issue	Approach distance guidance & protocols developed for whales	Resource Protection Team & stakeholders	Years 1-2
		Guidance distributed to user groups	Resource Protection & Education Teams	Years 2-3
		Compliance assessment conducted	Resource Protection Team	Year 4
		Expanded Team OCEAN and Bay Net	Resource Protection Specialist	Year 4
Strategy WD-3: Develop acoustic baseline profiles within MBNMS	Characterize the underwater soundscape within MBNMS	Characterization goals and objectives finalized	Research Team	Year 1
Strategy WD-4: Reduce underwater low-frequency mechanical sound emissions	Reduction of underwater sound-source emissions posing a threat to marine wildlife and habitat	Assessment of monitoring data.	Resource Protection Team	Year 2

Section 2: Issue Based Action Plans

	Best management practices for minimizing acoustic interference with marine wildlife developed for motorized tour boat operations in sanctuary	Coordination with whale watch operators and whale experts conducted	Resource Protection Team	Year 1
		Distribution of best management practices	Resource Protection Team	Year 2
	Improved public understanding of the importance of underwater acoustics in the marine environment	Visitor center exhibits installed at Sanctuary Exploration Center and Coastal Discovery Center revealing how marine organisms use acoustics	Education Team	Year 4
Strategy WD-8: Respond to wildlife entangled in fishing gear	Improve rapid and coordinated response for entangled wildlife	Participation in whale disentanglement trainings, maintained rescue gear and on-call vessel support	Resource Protection Team and West Coast Region staff	Annually
	Provide public information on who to contact for wildlife issues	Updated MBNMS webpage and phone tree directing public to appropriate regional marine wildlife response organizations	Resource Protection Team	Annually