California Marine Life Protection Act Initiative

Regional Profile of the North Central Coast Study Region

(Alder Creek/ Point Arena to Pigeon Point, California)

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This *Regional Profile of the North Central Coast Study Region (Alder Creek at Point Arena to Pigeon Point, CA)* provides information to support implementation of the Marine Life Protection Act in the MLPA North Central Coast Study Region. The purpose of the profile is to assist the MLPA North Central Coast Regional Stakeholder Group (NCCRSG) and other participants in the MLPA planning process to develop an understanding of the ecological and socioeconomic context of the region. Members of the NCCRSG and MLPA Master Plan Science Advisory Team (SAT) have reviewed and commented on the draft version of this document; these groups have provided additional information based on their local knowledge.

The MLPA Initiative and California Department of Fish and Game (CDFG) staff have compiled and developed spatial data layers and have conducted geographic information system (GIS) analyses to support the planning process. This regional profile includes maps of only selected spatial data layers; when a map is referenced within this document, a hyperlink to that map is provided. Most of the spatial data layers available for the study region are posted on the publicly-accessible MLPA Internet Map Service site at (http://www.marinemap.org/mlpa).

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Contents

Tables

Figures

Maps

Appendices

Acronyms and Abbreviations

ASBS	Areas of special biological significance
BLM	(U.S.) Bureau of Land Management
BNA	California Boating Facilities Needs Assessment
BRTF	(MLPA) Blue Ribbon Task Force
ESA	Endangered Species Act
CCA	Critical coastal area
CBNMS	Cordell Bank National Marine Sanctuary
CDFG	California Department of Fish and Game
CENCOOS	Central and Northern California Ocean Observing System
CFIS	Commercial Fishery Information System
COSEE	California Center for Ocean Sciences Education Excellence
CPFV	Commercial Passenger Fishing Vessel
CRFS	California Recreational Fisheries Survey
ESI	Environmental Sensitivity Index
ESU	Evolutionarily significant unit
ft	Feet
fm	Fathoms
GIS	Geographic information system
GFNMS	Gulf of the Farallones National Marine Sanctuary
LCP	Local coastal plan
m	Meters
MBNMS	Monterey Bay National Marine Sanctuary
mi	Statute miles
MLPA	Marine Life Protection Act
MPA	Marine protected area
NCCOS	National Centers for Coastal Ocean Science
NCCSR	(MLPA) North Central Coast Study Region
NCCRSG	(MLPA) North Central Coast Regional Stakeholder Group
NERR	National estuarine research reserve
nmi	Nautical miles
NMFS	National Marine Fisheries Service
NMS	National marine sanctuary
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NPSP	Nonpoint source pollution
PISCO	Partnership for Interdisciplinary Studies of Coastal Oceans
PRBO	PRBO Conservation Science
RCA	Rockfish conservation area
RWQCB	Regional water quality control board
SAT	Science Advisory Team
SMCA	State marine conservation area
SMP	State marine park
SMR	State marine reserve
SWRCB	State Water Resources Control Board
SWQPA	State Water Quality Protection Area
TMDL	Total maximum daily load
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Service

Executive Summary

The Marine Life Protection Act Initiative is a public-private partnership designed to help the State of California implement the Marine Life Protection Act (MLPA) using the best readily available science, as well as the advice and assistance of scientists, resource managers, experts, stakeholders and members of the public. The MLPA directs the state to redesign California's system of marine protected areas to increase its coherence and effectiveness in protecting the state's marine life and habitats, marine ecosystems, and marine natural heritage, as well as to improve recreational, educational and study opportunities provided by marine ecosystems.

Redesigning the system of marine protected areas (MPAs) in state waters along California's 1,100 mile coastline is such a large task that it was decided to take a regional approach and implement the MLPA in phases. In the first phase of the initiative, a master plan framework was created to help guide the planning process within individual geographic areas, called study regions. After the framework was created, the first effort to redesign a group of MPAs in a region took place along the central coast, from Pigeon Point in San Mateo County to Point Conception in Santa Barbara County. The north central coast, from Alder Creek in Mendocino County to Pigeon Point in San Mateo County, represents the second study region to be evaluated.

In December 2006, the California Resources Agency announced that MPAs within the MLPA north central coast study region would be evaluated and redesigned with input from a regional stakeholder group, a science advisory team, a blue ribbon task force, the California Department of Fish and Game, and other interested parties. This document, the *Marine Life Protection Act (MLPA) Regional Profile for the North Central Coast*, is intended to assist that process by providing background information and data on the biological, oceanographic, socioeconomic and governance characteristics of the north central coast study region. The regional profile was reviewed and revised based on input from regional stakeholders. This profile will assist stakeholders and decision-makers in evaluating existing MPAs in the study region and developing alternative proposals for arrays of MPAs that meet the goals of the MLPA and that form a component of the statewide MPA network.

Regional Overview: The MLPA north central coast study region spans a straightline distance of about 146 miles of the California coastline (with 363 miles of actual shoreline) from Alder Creek, about five miles north of Point Arena in Mendocino County, to Pigeon Point in San Mateo County. Encompassing approximately 763.5 square miles of coastal waters, the study region extends from the shoreline (mean high tide) to a maximum depth of approximately 382 feet (63.7 fathoms, 116 meters) off the Farallon Islands. The study region does not include San Francisco Bay, but does include state waters around the Farallon Islands. The broad diversity of marine habitats and oceanographic conditions in the study region have made this area one of the most biologically productive in the world. Some of the north central coast's unique features are:

- globally rare and significant upwelling-driven ecosystem that supports high marine biodiversity in open waters (plankton, invertebrates, fish, marine mammals, seabirds, and sea turtles);
- miles of rocky coasts and sandy beaches, numerous rocky headlands;
- a broad continental shelf with rocky reefs and expansive sand bottom habitats, all less than 200 meters (656 feet, 33 fathoms) in depth;
- kelp forests dominated by bull kelp and associated fish assemblages (such as many species of rockfish);
- rare and regionally important estuaries (Bolinas Lagoon, Drakes Estero, Tomales Bay, and others);
- the Farallon Islands, an important biological hotspot 28 miles west of San Francisco, that provides nesting sites for 12 species of seabirds (the largest concentration of nesting seabirds in the contiguous United States) and serves as a migratory stopover site for many others;
- waters around the Farallon Islands, which host at least 36 species of marine mammals and serve as an important feeding ground for marine mammals, seabirds, and white sharks;
- rich and productive fisheries that support coastal communities and provide fresh seafood to the region and world;
- recognition as a renowned diving, kayaking, fishing, and whale-watching destination where marine recreational activities help support coastal tourism and coastal communities; and
- state waters that include part of the Monterey Bay National Marine Sanctuary and the Gulf of the Farallones National Marine Sanctuary, and are adjacent to the Cordell Bank National Marine Sanctuary, and also abut the Point Reyes National Seashore, Farallon National Wildlife Refuge, California Coastal National Monument, and several California State Parks on land.

San Francisco Bay, the largest estuary on the West Coast, is not part of the north central coast study region. However, the mouth of the bay, and the large tidal plume of brackish-fresh water that extends outside the Golden Gate Bridge on ebb tides, is a unique feature included in the study region. The mouth of San Francisco Bay is also an important migratory corridor for salmon, sturgeon, Dungeness crab, California halibut and many other species of fish and invertebrates that use the bay as a migration route or nursery ground.

Ecological Setting: The MLPA north central coast study region is characterized by high productivity, high biodiversity, and large concentrations of top predators (seabirds, marine mammals, sharks). The biodiversity of this study region was one of the driving factors in the designation of the Monterey Bay National Marine Sanctuary, the Gulf of the Farallones National Marine Sanctuary, and the adjacent Cordell Bank National Marine Sanctuary.

All of the habitats listed in the MLPA or recommended by the science advisory team for representation in MPAs, with the exception of seamounts, submarine canyons, and soft and hard bottom seafloor greater than 200 meters, are found within the study region. For most of these habitats, there are some mapped data available for use in the planning process.

- Most of the study region is relatively shallow, ranging in depth from 0 to 116 meters (382 feet, 63.7 fathoms) and the continental shelf is quite broad.
- Intertidal zones include sandy beaches, rocky shores, coastal marsh and tidal flats.
- Estuaries, with their associated tidal mud flats, coastal marsh, eelgrass, soft bottom, and open water habitats, are relatively rare in the study region, although there are several large examples (Tomales Bay, Drakes Estero, and Bolinas Lagoon). Estuaries and lagoons in the region are generally of two types: low inflow estuaries and bar-built estuaries. There are numerous small estuaries where coastal streams meet the ocean; some of these streams are populated by coho and Chinook salmon and steelhead trout which use them as migratory corridors.
- Eelgrass (*Zostera* sp.) beds are found in Drakes/Limantour Estero, Estero de San Antonio, Estero Americano, Tomales Bay, and have been historically found in Bolinas Lagoon. While they cover a relatively small area, eelgrass beds provide critical nursery habitats for fish and invertebrates and are foraging areas for migratory shorebirds and waterfowl in the region. Surfgrass (*Phyllospadix* sp*.)*, which fringes the open coast, is found along the shallow subtidal zone.
- Bull kelp (*Nereocystis* sp*.*) is the dominant canopy-forming kelp in the study region in areas where rocky substrata make it possible for kelp to attach. Kelp beds have been mapped at a fine-scale resolution in six annual surveys (1989, 1999, 2002, 2003, 2004 and 2005). Kelp beds are more persistent in some areas than others due to changes in climatic and environmental conditions over time. Kelp beds are more abundant in the northern half of the study region (Mendocino and Sonoma coasts) than the southern half (San Francisco and San Mateo coasts).
- Hard bottom habitats (rocky reefs) are much less common than soft bottom habitats in the region in all depth zones (11.2% of the region is hard substrata versus 74.2% for soft substrata, with 14.6% of the study region unclassified, based on fine-scale data). Fine-scale data for substrata type (largely gathered using multi-bean side scan sonar) is available for the most, but not all of the study region. A significant near-shore portion of the study region and much of the area around the Farallon Islands, totaling approximately 14.6% of the total study region area, has not been mapped at a fine-scale. The presence of mapped kelp forests has been used as a proxy for rocky bottoms and estuaries have been classified as soft bottoms, in the absence of other data on substrata.
- Underwater pinnacles are submerged rocky cones or outcrops that can be important areas where fish and other species aggregate. Underwater pinnacles exist in the study region, but have not been mapped. On substrata maps, these features will not be identified separately from rocky reefs.

- Submarine canyons do not occur in state waters in the study region; however, there are large submarine canyons offshore in federal waters, including Bodega Canyon and Pioneer Canyon.
- The large upwelling center at Point Arena influences the regional oceanography as cold nutrient-rich waters are brought to the surface and carried south along the Sonoma coast, deflected offshore at Point Reyes, and carried many miles out into the ocean and into the Gulf of the Farallones. In the upwelling shadow or lee of headlands such as Point Reyes, nutrient and larval retention areas can develop. Upwelling centers and retention areas are dynamic features and are not easily represented on static maps, but temperature and other data can be used to identify general spatial patterns for these oceanographic features.
- The large, brackish-fresh water tidal plume that extends outward from San Francisco provides a unique habitat that is an important seasonal foraging area for seabirds and other species. This large plume is carried north and alongshore in the winter and south and further offshore in the summer. Freshwater plumes, which are not mapped, are likely found near the mouths of larger rivers in the study region such as the Garcia, Gualala, and Russian rivers.

The diverse habitats of the study region host a wide diversity of species that may benefit from MPAs. This document describes some of the species that have special relevance to the MPA planning process, including:

- regionally important species that are likely to benefit from MPAs were identified by the SAT (Appendix II(a));
- depleted or over-fished species (described in Section 3.2.2), which include bocaccio, canary rockfish, cowcod, darkblotched rockfish, widow rockfish, and yelloweye rockfish.
- special status species such as coho and Chinook salmon, steelhead trout, green sturgeon, sea otters, pinnipeds (including elephant seals and fur seals), cetaceans and seabirds found in the study region (listed in Appendix II(b)).

Land – Sea Interaction: Ecological linkages between the marine and terrestrial environments. include:

- anadromous fish, including coho and Chinook salmon, steelhead trout, and white and green sturgeon which migrate up major rivers in the study region and through the mouth of San Francisco Bay;
- shorebirds and waterfowl that inhabit coastal lagoons, estuaries, and salt marshes. (estuaries and bays of the study region form part of the Pacific Flyway, one of the four principal bird migration routes in North America);
- marine mammals, including the federally protected Steller and California sea lions, elephant seals, harbor seals, and fur seals, that use coastal rocks, offshore islands, beaches, and marshes as haul-out and rookery sites; and

- estuaries and their associated intertidal habitats, which provide shelter, food, and nursery grounds for many organisms from both the open ocean and coastal environments.

Terrestrial activities can have significant impacts on coastal water quality and habitat condition. Nearly 4,200 square miles of land in 6 major watersheds drain directly to the study region and an additional 59,000 square miles of land drain to San Francisco Bay, which empties into the study region under the Golden Gate Bridge. Some of the most important water quality issues include:

- impaired rivers and waterbodies that have been identified under Section 303(d) of the federal Clean Water Act;
- recognized water quality management areas including state water quality protection areas (SWQPAs), areas of special biological significance (ASBSs), and California critical coastal areas (CCAs);
- beach closures that have occurred throughout the study region, mostly due to high bacteria levels;
- nonpoint sources of pollution, such as agriculture, forestry, urban areas, marinas and recreational boating, and hydromodification, that are found throughout the study region; and
- point sources of pollution, such as wastewater treatment plants, that empty into the coastal environment and may cause localized impacts.

Socioeconomic Setting: The MLPA North Central Coast Study Region supports many industries and economic sectors that depend on marine resources. Recreational and commercial fishing and non-consumptive activities make significant contributions to coastal community economies in the five counties adjacent to the study region. Several types of socioeconomic information are included in this regional profile:

- Brief descriptions of the five coastal counties in the study region (Mendocino, Sonoma, Marin, San Francisco, and San Mateo counties), including ocean-based economies wages and population statistics.
- Commercial fishing statistics. Major commercial fisheries within the study region include Dungeness crab, market squid, salmon, red urchin, dover sole/thornyheads/sablefish, California halibut, and others. Over the past 14 years, average annual landings in the study region totaled nearly 17 million pounds at a value of nearly $18 million. The commercial fishing ports in and adjacent to the study region include Point Arena/Anchor Bay, Bodega Bay, San Francisco, and Princeton/Half Moon Bay. Over the past 14 years, the number of commercial fishing vessels in the study region has dropped from approximately 1750 to 750 and landings have dropped from approximately 30 million pounds to 10 million pounds.
- Locations of aquaculture leases in the study region. Though all kelp beds within the north central coast are closed to leasing, mariculture operations for oysters, clams, and mussels occur in Tomales Bay and Drakes Estero and include 14 active submerged land

leases, covering a total of 1,573 acres. An abalone aquaculture operation also exists in Pillar Point Harbor.

- Recreational fishing statistics. Major recreational fisheries within the study region include nearshore rockfish and associated species, salmon, albacore, abalone, sanddabs, surfperch, clams, Dungeness crab, and California halibut. Common fishing modes include Commercial Passenger Fishing Vessels (CPFVs), private/rental vessels, beach and bank fishing, and fishing from manmade structures, as well as kayak angling, spearfishing, clamming, and abalone shore-picking and free-diving. Fishing from manmade structures accounted for 47% of recorded angler days (over 280,000 angler days) while private/rental, beach and bank, and CPFVs accounted for 25%, 17%, and 11% respectively in 2006. In addition, over 100,000 abalone trips have been estimated annually.
- Information on scientific collecting, for which approximately 65 permits have been issued recently by CDFG. Most of these permits are issued in the vicinity of Bodega Head and are for hand take of marine fish, invertebrates, and plants.
- Information on coastal tourism, including coastal park visitation rates. Sonoma Coast State Beach is the most visited coastal state park (3 million visitors annually) and Half Moon Bay State Beach generates the most revenue ($600,000 annually).
- Descriptions of non-consumptive activities, including beachgoing, surfing, boating, scuba diving, kayaking, tidepooling, and wildlife viewing.
- Shipping information. San Francisco Bay is the busiest port in the vicinity of the study region, with more than 6,000 commercial vessels annually that cross the study region under the Golden Gate Bridge.

Academic Institutions, Research, Public Outreach, and Education: There are over 22 institutions with marine research or educational objectives in the region. The locations of major research institutions, scientific collecting sites, educational sites, and monitoring stations from research programs (Partnership for Interdisciplinary Studies of Coastal Oceans, Longterm Monitoring Program and Experiential Training for Students, Multi-agency Rocky Intertidal Network, Cooperative Research and Assessment of Nearshore Ecosystems, and others) have been compiled in this regional profile and represent potential opportunities for future research and education associated with MPAs.

Jurisdiction and Management: Numerous federal, state and local government bodies have jurisdiction in the study region. In addition, 15 federally recognized Native American groups, as well as numerous federally unrecognized groups are located within coastal areas along the study region.

Existing MPAs, Marine Managed Areas, and Coastal Protected Areas: Existing state MPAs, marine managed areas, fishery closures, and other coastal protected areas are described for the region, including:

- descriptions of the 13 existing state MPAs within the study region, which cover 3.5% of the total study region area;

- information on other marine managed areas within the study region (such as national marine sanctuaries) and fishery closures (such as the rockfish conservation areas and Groundfish Essential Fish Habitat no-trawl or no-bottom contact zones);
- recognition that there are currently no military or power plant closures in the study region that may function as *de facto* MPAs; and
- information on terrestrial protected areas, such as national monuments, national seashores, wildlife refuges and state parks, that may have relevance to MPAs for public access and management purposes.

Subregional Summary: The MLPA North Central Coast Study Region has been divided into six subregions for ease of data display and to facilitate identification of important local issues. This regional profile summarizes the main ecological, socioeconomic, and management attributes of each subregion. The six subregions, from north to south, are:

- Alder Creek to Horseshoe Point (subregion 1)
- Horseshoe Point to Bodega Head (subregion 2)
- Bodega Head to Double Point (subregion 3)
- Double Point to Point San Pedro (subregion 4)
- Point San Pedro to Pigeon Point (subregion 5)
- The Farallon Islands (subregion 6).

Conclusion: The MLPA North Central Coast Study Region is a biologically productive region that is globally significant for its concentration of top predators and breeding seabirds and marine mammals. The study region has many unique features such as the Farallon Islands, the mouth of San Francisco Bay, Point Reyes, Tomales Bay and Bolinas Lagoon. Parts of the Monterey Bay National Marine Sanctuary, Gulf of the Farallones National Marine Sanctuary, Golden Gate National Recreation Area, and Point Reyes National Seashore overlap with the study region. California's marine and coastal environments form part of the state's identity and support important economies that depend on healthy ocean resources, such as fisheries and coastal tourism.