

## **Appendix O. Regional MPA Management Plans**

### **1. North Coast Region (California/Oregon border to Alder Creek near Point Arena)**

Timeline to be Determined

## **2. North Central Coast Region (Alder Creek near Point Arena to Pigeon Point)**

### **Proposed Timeline**

Convene Stakeholder Working Group, April 2007

Complete Working Group Process, March 2008

Blue Ribbon Task Force Provides Recommendations to Commission, April 2008

Commission Consideration of Recommended Alternatives, May - December 2008

Completion of Regulatory and Environmental Review Processes, January 2009

**3. San Francisco Bay Region (waters within the San Francisco Bay, from the Golden Gate Bridge northeast to Carquinez Bridge)**

Timeline to be Determined

## **4. Central Coast Region (Pigeon Point to Point Conception)**

### **4.1 Introduction**

#### **Description of region**

The Central Coast study region is one of the most biologically productive regions in the world. Furthermore, 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. A detailed description of the Central Coast region is found in the California Marine Life Protection Act Initiative Regional Profile of the Central Coast Study Region (Pigeon Point to Point Conception, CA) (MLPA Initiative, 2005). The following management plan for Central Coast MPAs is intended to summarize this description and key features and considerations for design and implementation of MPAs.

The Central Coast study region encompasses approximately 860 square nautical miles and extends from the shoreline (mean high tide) to a maximum depth of approximately 1,475 meters (806 fm) in Monterey Submarine Canyon. Within Monterey Bay the state waters boundary extends more than the usual 3 nautical miles from shore to a distance of more than 15 miles from shore. The study region includes a broad array of habitats from intertidal to continental shelf and slope and submarine canyons that bisect the continental margin.

The Central Coast study region has many unique features that all played a role in both its selection as the first region for MLPA implementation and in responding to MLPA goals. These features include:

- Globally rare and significant upwelling-driven system that supports high marine biodiversity in open waters (plankton, invertebrates, fish, marine mammals, seabirds).
- Globally unique giant kelp forests and associated fish assemblages (such as many species of rockfish).
- Unusual abundance of large submarine canyons within state waters and high bathymetric complexity in the northern part of the region, which bring deep sea and near-shore assemblages in close proximity.
- Rare and regionally important estuaries (Elkhorn Slough and Morro Bay).
- Rich and productive fisheries that have supported coastal communities and provided fresh seafood to the region and the world.
- Renown as a diving, kayaking, fishing, and whale-watching destination; marine recreational activities help to support coastal tourism and coastal communities.
- An unusual abundance of marine research and educational institutions whose staff have explored and studied the region and helped to raise public awareness about marine biology.

The region is characterized as having high biodiversity, with 26 species of marine mammals, 94 species of seabirds, more than 300 species of fish, 4 species of sea turtles, 31 phyla (thousands of species) of invertebrates and more than 450 species of marine algae. The biodiversity of this marine region was one of the driving factors in the designation of the Monterey Bay National Marine Sanctuary in 1992, and for the founding of the Monterey Bay Aquarium in 1978.

Depleted or over-fished species found in the region include red and black abalone, seven species of groundfish. Special status species such as coho salmon, steelhead trout, sea otters, pinnipeds, cetaceans, and seabirds are also found in the region.

All of the habitats listed in the MLPA (except seamounts) or recommended by the SAT for inclusion in MPA siting are found in the study region. Notably, there are two larger estuaries in the region: Morro Bay, which is a National Estuary Program site, and Elkhorn Slough, which includes a National Estuarine Research Reserve. There are numerous small estuaries where coastal streams meet the sea; some of these are still populated by threatened coho salmon and steelhead trout. The region is unique in California with an abundance of submarine canyons with their heads reaching near the coast in both Monterey and Carmel Bays and off the Big Sur Coast. Hard substrata (e.g., rocky reefs) are much less common than soft bottom habitats in the region in all depth zones. Underwater pinnacles (rocky cones or outcrops) that can be important as areas where fish and other species aggregate are found throughout the region and are abundant in certain locations.

Biogenic habitats such as kelp forests, seagrass beds, and cold water corals and sponges provide important structure and habitat for many other species. Eelgrass beds are found in Morro Bay and Elkhorn Slough and cover a relatively small area; however, eelgrass beds are very important as nursery grounds for fish and invertebrates and foraging areas for migratory shorebirds and waterfowl in the region. Surfgrass, which fringes the open coast, is found along more than a third of the study region in the shallow subtidal zone. Two types of kelp forests, dominated by giant kelp or bull kelp, are found in the Central Coast region in areas where rocky substrata allow them to attach; each type of kelp forest has different assemblages of species associated with it. Giant kelp forests dominate south of Davenport (Santa Cruz County), while bull kelp is more dominant in the far northern portion of the study region.

Five coastal counties comprise the study region (San Mateo, Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara).

There are over 40 institutions with marine research or educational objectives in the region. Several existing research and monitoring programs such as the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO), Long-term Monitoring Program & Experiential Training for Students (LiMPETS), Multi-Agency Rocky Intertidal Network (MARINE), and the Cooperative Research and Assessment of Nearshore Ecosystems (CRANE) represent potential opportunities for future research and education associated with MPAs.

In 2007 there were 12 existing state MPAs in the region, and a special invertebrate closure at Año Nuevo (San Mateo County). These MPAs existing prior to the implementation of the MLPA varied in size and comprised 3.8% of the study region in their total area. More than half of these allowed the take of most recreationally or commercially important species. Certain existing areas such as the Point Lobos State Marine Reserve were considered key areas which provided full protection of marine resources.

## **Regional design and implementation considerations**

Design and implementation considerations are additional factors that may help fulfill provisions of the MLPA related to facilitating enforcement, encouraging public involvement, and incorporating socio-economic considerations, while meeting the act's goals and guidelines. Design considerations were applied as the location, category (reserve, park or conservation area), size and other characteristics of potential MPAs were developed. Design and implementation considerations are cross cutting (they apply to all MPAs) and are not necessarily measurable. In developing regional goals and objectives for the central coast, the CCRSG identified several issues that should be considered in the design of marine protected areas:

1. In evaluating the siting of MPAs, considerations shall include the needs and interests of all users.
2. Recognize relevant portions of existing state and federal fishery management areas and regulations, to the extent possible, when designing new MPAs or modifying existing ones.
3. To the extent possible, site MPAs to prevent fishing effort shifts that would result in serial depletion.
4. When crafting MPA proposals, include considerations for design found in the Nearshore Fishery Management Plan<sup>13</sup> and the Abalone Recovery and Management Plan<sup>14</sup>.
5. In developing MPA proposals, consider how existing state and federal programs address the goals and objectives of the MLPA and the central coast region as well as how these proposals may coordinate with other programs.
6. To the extent possible, site MPAs adjacent to terrestrial federal, state, county, or city parks, marine laboratories, or other "eyes on the water" to facilitate management, enforcement, and monitoring.

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<sup>13</sup> Design considerations from Nearshore Fishery Management Plan:

1. Restrict take in any MPA [intended to meet the NFMP goals] so that the directed fishing or significant bycatch of the 19 NFMP species is prohibited.
2. Include some areas that have been productive fishing grounds for the 19 NFMP species in the past but are no longer heavily used by the fishery.
3. Include some areas known to enhance distribution or retain larvae of NFMP species
4. Consist of an area large enough to address biological characteristics such as movement patterns and home range. There is an expectation that some portion of NFMP stocks will spend the majority of their life cycle within the boundaries of the MPA.
5. Consist of areas that replicate various habitat types within each region including areas that exhibit representative productivity.

<sup>14</sup> Design considerations from draft Abalone and Recovery and Management Plan:

Proposed MPA sites should satisfy at least four of the following criteria.

1. Include within MPAs suitable rocky habitat containing abundant kelp and/or foliose algae
2. Insure presence of sufficient populations to facilitate reproduction.
3. Include within MPAs suitable nursery areas, in particular crustose coralline rock habitats in shallow waters that include microhabitats of moveable rock, rock crevices, urchin spine canopy, and kelp holdfasts.
4. Include within MPAs the protected lee of major headlands that may act as collection points for water and larvae.
5. Include MPAs large enough to include large numbers of abalone and for research regarding population dynamics.
6. Include MPAs that are accessible to researchers, enforcement personnel, and others with a legitimate interest in resource protection.

7. To the extent possible, site MPAs to facilitate use of volunteers to assist in monitoring and management.
8. To the extent possible, site MPAs to take advantage of existing long-term monitoring studies.
9. To the extent possible, design MPA boundaries that facilitate ease of public recognition and ease of enforcement.

Implementation considerations arise after the design of MPAs as the Department and any other responsible agencies implement decisions of the Commission. The CCRSG developed the following implementation considerations:

1. Improve public outreach related to MPAs through the use of docents, improved signage, and production of an educational brochure for central coast MPAs.
2. When appropriate, phase the implementation of central coast MPAs to ensure their effective management, monitoring, and enforcement.
3. Ensure adequate funding for monitoring, management, and enforcement is available for implementing new MPAs. [In addition to approving this language, the BRTF also adopted three statements related to funding]
4. Develop regional management and enforcement measures, including cooperative enforcement agreements, adaptive management, and jurisdictional maps, which can be effectively used, adopted statewide, and periodically reviewed.

### **Regional goals, and objectives**

The members of the CCRSG agreed that regional goals, objectives, and design and implementation considerations are all very important in the development of an effective system of marine protected areas (MPAs) that have stakeholder support. Regional goals are statements of what the regional MPAs are ultimately trying to achieve (Pomeroy et al., 2004). The Regional goals are largely taken directly from the MLPA itself. Regional objectives are more specific measurable statements of what must be accomplished to attain a related goal (Pomeroy et al., 2004).

*Goal 1. To protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.*

1. Protect areas of high species diversity and maintain species diversity and abundance, consistent with natural fluctuations, of populations in representative habitats.
2. Protect marine life communities associated with areas of diverse habitat types in close proximity to each other.
3. Protect natural size and age structure and genetic diversity of populations in representative habitats.
4. Protect natural trophic structure and food webs in representative habitats.
5. Protect ecosystem structure, function, integrity and ecological processes to facilitate recovery of natural communities from disturbances both natural and human induced.

*Goal 2. To help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted.*

1. Help protect or rebuild populations of rare, threatened, endangered, depleted, or overfished species, where identified, and the habitats and ecosystem functions upon which they rely.

2. Protect larval sources and enhance reproductive capacity of species most likely to benefit from MPAs through retention of large, mature individuals.
3. Protect selected species and the habitats on which they depend while allowing the harvest of migratory, highly mobile, or other species where appropriate through the use of state marine conservation areas and state marine parks.

*Goal 3. To improve recreational, educational, and study opportunities provided by marine ecosystems that are subject to minimal human disturbances, and to manage these uses in a manner consistent with protecting biodiversity.*

1. Ensure some MPAs are close to population centers and research and education institutions and include areas of traditional non-consumptive recreational use and are accessible for recreational, educational, and study opportunities.
2. To enhance the likelihood of scientifically valid studies, replicate appropriate MPA designations, habitats or control areas (including areas open to fishing) to the extent possible.
3. Develop collaborative scientific monitoring and research projects evaluating MPAs that link with classroom science curricula, volunteer dive programs, and fishermen of all ages, and identify participants.
4. Protect or enhance recreational experience by ensuring natural size and age structure of marine populations.

*Goal 4. To protect marine natural heritage, including protection of representative and unique marine life habitats in central California waters, for their intrinsic value.*

1. Include within MPAs the following habitat types: estuaries, heads of submarine canyons, and pinnacles.
2. Protect species associated with, and replicate to the extent possible, representatives of all marine habitats identified in the MLPA or the Master Plan Framework across a range of depths.

*Goal 5. To ensure that central California's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines.*

1. Minimize negative socio-economic impacts and optimize positive socio-economic impacts for all users, to the extent possible, and if consistent with the Marine Life Protection Act and its goals and guidelines.
2. For all MPAs in the region, develop objectives, a long-term monitoring plan that includes standardized biological and socioeconomic monitoring protocols, and a strategy for MPA evaluation, and ensure that each MPA objective is linked to one or more regional objectives.
3. To the extent possible, effectively use scientific guidelines in the Master Plan Framework.

*Goal 6. To ensure that the central coast's MPAs are designed and managed, to the extent possible, as a component of a statewide network.*

1. Develop a process for regional review and evaluation of implementation effectiveness that includes stakeholder involvement to determine if regional MPAs are an effective component of a statewide network.



2. Develop a mechanism to coordinate with future MLPA regional stakeholder groups in other regions to ensure that the statewide MPA network meets the goals of the MLPA.

### **Description of individual MPA and MMA boundaries, regulations, and objectives**

#### *Explanation of Descriptive Parameters:*

**MPA or MMA:** The name and classification of the marine protected area or marine managed area, using the classification system established by the Marine Managed Areas Improvement Act.

**Area (square miles):** The approximate surface area of the MPA or MMA measured using a geographical information system program.

**Along-shore span (miles):** The approximate straight line distance parallel to shore of the MPA or MMA or, if not adjacent to shore, the straight line distance of the greatest dimension parallel or perpendicular to shore. This distance is not the length of the shoreline within the MPA, but rather an “as-the-fish-swims” measure.

**Depth range (feet):** The approximate range of depth within the MPA or MMA, with 0 feet being equivalent to the shoreward boundary of mean high tide if applicable measured using a geographical information system program.

**Primary habitat types:** The types of benthic substrate and/or attached marine plant or macroalgal species which comprise the majority of the proposed MPA or MMA.

**Regulations:** The specific fishing or other use regulations within the MPA or MMA which are in addition to those of the general area.

**Boundaries:** Waypoints expressed in latitude and longitude defining the corners of the MPA or MMA (including the intersection with the shoreline at mean high tide if applicable), with straight lines, unless otherwise specified, connecting the waypoints in the order listed to form the seaward boundaries.

**Examples of species likely to benefit:** A subset of the marine fish, invertebrate, plant, bird, and mammal species likely to directly or indirectly benefit from the MPA or MMA. This includes marine fish, invertebrate, and plant species which are generally either sessile, sedentary, or have relatively small home ranges and for which take is prohibited, but also includes marine bird and mammal species which, although already fully protected through other regulations or statutes, may benefit further from protection of their primary prey or forage species.

**Summary of Objectives:** A brief summary of the objectives for the MPA or MMA and how these objectives are related to the overall goals of the MLPA.

**Detailed Objectives (with reference to regional goal and objective):** a list of all the individual objectives for the MPA or MMA, with reference to the applicable Regional Goal number and Regional Objective number.

**MPA:** Año Nuevo State Marine Conservation Area

**Area (sq. mi.):** 11.07

**Along-shore span (mi):** 8.4

**Depth range (ft):** 0-175

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom.

**Regulations:** Commercial take of giant kelp by hand only.

**Boundaries:** This area is bounded in the north by the mean high tide line and a distance of 200 feet seaward of mean low tide between the following two points (Figure 6):

37° 10.00' N. lat. 122° 21.90' W. long.; and

37° 08.70' N. lat. 122° 21.00' W. long.

The area then continues southward bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 6):

37° 08.70' N. lat. 122° 21.00' W. long.;

37° 04.70' N. lat. 122° 21.00' W. long.; and

37° 04.70' N. lat. 122° 16.20' W. long.

**Examples of species likely to benefit:** nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, sardine, mackerel, anchovy, California halibut, sanddabs, Dungeness crab, littleneck clams, squid, murre, shearwaters.

**Summary of Objectives:** Provide protection to shallow soft and hard substrates and associated species in an area characterized by low-relief shale and a mixture of giant kelp and bull kelp. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

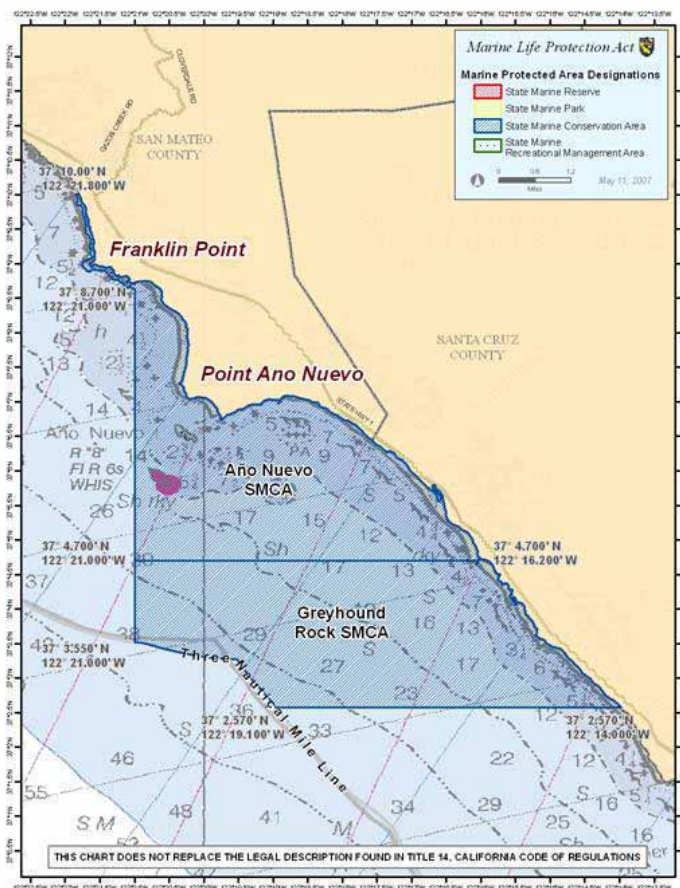
**Detailed Objectives (with reference to regional goal and objective):**

- Protect area of high species diversity characteristic of the central coast region north of Monterey Bay and maintain species diversity and abundance as demonstrated by monitoring appropriate indicator species, with focus on Nearshore Fishery Management Plan species. (Goal 1, Objective 1)
- Protect communities associated with diverse intertidal habitats including wave-cut rocky platforms, sand and gravel beaches, offshore island, shallow rocky reef, shallow soft bottom, and mixed giant/bull kelp beds, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural size and age structure and genetic diversity of populations of nearshore rockfish species and invertebrates including appropriate indicator species. (Goal 1, Objective 3)
- Protect natural trophic structure and food web including forage base (including crabs, squid and coastal pelagic finfish) for listed marine birds and marine mammals as well as higher trophic level fish. (Goal 1, Objective 4)
- Protect range of ecosystem functions associated with lee of headland in productive upwelling zone. (Goal 1, Objective 5)
- Protect important forage area for nearby breeding colonies of listed marine birds and marine mammals, including sea otters. Reduce disturbance to breeding colonies of

listed marine birds, in particular marbled murrelets, and marine mammal rookeries from activities associated with vessels fishing (lights, noise, etc). (Goal 2, Objective 1)

- Protect larval source and enhance reproductive capacity of invertebrate species such as Dungeness crab, limpets, mussels, turban snails, red abalone, black abalone, and finfish species including nearshore rockfishes and California halibut. (Goal 2, Objective 2)
- Site a marine protected area adjacent to a terrestrial state park with high number of annual visitors that has traditionally served as an important marine education site through visitor center and docent program. (Goal 3, Objective 1)
- Include sandy and gravel beaches, and shallow hard and soft bottom habitat in a state marine reserve. (Goal 4, Objective 2)

Figure 6. Año Nuevo State Marine Conservation Area and Greyhound Rock State Marine Conservation Area



**MPA:** Greyhound Rock State Marine Conservation Area

**Area (sq. mi.):** 11.81

**Along-shore span (mi):** 3.1

**Depth range (ft):** 0-216

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

**Regulations:** Take of all living marine resources is prohibited except commercial and recreational hand harvest of giant kelp (*Macrocystis* sp.); commercial and recreational take of squid (*Loligo opalescens*) and salmon (*Oncorhynchus* spp.); and the recreational harvest of finfish by hook-and-line from shore.

**Boundaries:** This area is bounded by the mean high tide line, the state water boundary and straight lines connecting the following points in the order listed except where stated as following the state water boundary (Figure 6):

37° 04.70' N. lat. 122° 16.20' W. long.;

37° 04.70' N. lat. 122° 21.00' W. long.;

37° 03.55' N. lat. 122° 21.00' W. long.; thence southward along the state water line to

37° 02.57' N. lat. 122° 19.10' W. long.; and

37° 02.57' N. lat. 122° 14.00' W. long.

**Examples of species likely to benefit:** nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, sardine, mackerel, anchovy, California halibut, sanddabs, Dungeness crab, littleneck clams, murre, shearwaters.

**Summary of Objectives:** Provide increased protection to shallow soft and hard substrates and associated species in the northern portion of the study region characterized by low-relief shale and a mixture of giant kelp and bull kelp. This area is intended to protect the subtidal fish and invertebrate and intertidal invertebrate communities while allowing for uses that have little on those communities to continue. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect area of high benthic species diversity characteristic of the central coast region north of Monterey Bay and maintain benthic species diversity and abundance as demonstrated by monitoring appropriate indicator species, with focus on Nearshore Fishery Management Plan species. (Goal 1, Objective 1)
- Protect natural size and age structure and genetic diversity of populations of nearshore rockfish species and invertebrates including appropriate indicator species. (Goal 1, Objective 3)
- Protect important forage area for nearby breeding colonies of listed marine birds by prohibiting the harvest of pelagic finfish other than salmon. (Goal 2, Objective 1)
- Protect larval source and enhance reproductive capacity of invertebrate species such as Dungeness crab, limpets, mussels, turban snails, red abalone, black abalone, and finfish species including nearshore rockfishes and California halibut. (Goal 2, Objective 2)

**MPA:** Natural Bridges State Marine Reserve

**Area (sq. mi.):** 0.58

**Along-shore span (mi):** 4.1

**Depth range (ft):** 0-21

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass.

**Regulations:** No take.

**Boundaries:** This area is bounded by the mean high tide line and a distance of 200 feet seaward of the mean low tide line between the following two points (Figure 7):

36° 57.90' N. lat. 122° 07.65' W. long.; and

36° 57.00' N. lat. 122° 03.50' W. long.

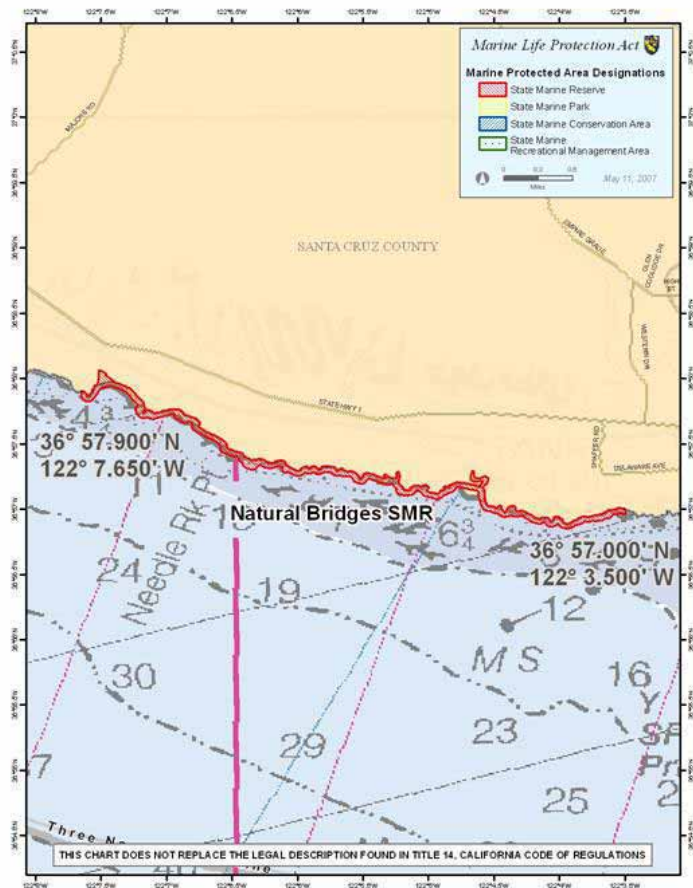
**Examples of species likely to benefit:** limpets, mussels, clams, snails, algae.

**Rationale:** Provide complete protection to a rocky and soft bottom intertidal area in close proximity to a research institution and provide an opportunity for comparative studies here and in an adjacent non-MPA areas. This area would provide protection for intertidal species while allowing take of species outside the intertidal zone.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect species associated with high-diversity intertidal habitat and intertidal regions north of Monterey Bay. (Goal 1, Objective 1)
- Include areas with sand and gravel beaches, rocky intertidal, wave-cut platforms, exposed rocky cliffs, and salt marsh, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural size and age structure and genetic diversity of populations of intertidal invertebrates, including owl limpets. (Goal 1, Objective 3)
- Protect natural trophic structure and food web of rocky intertidal communities, including mussel and surfgrass beds. (Goal 1, Objective 4)
- Protect larval source and enhance reproductive capacity of intertidal invertebrate species such as limpets, mussels, and turban snails. (Goal 2, Objective 2)
- Enhance educational/research use of accessible intertidal area by establishing a state marine reserve in a prime educational area, adjacent to two terrestrial state parks and the University of California, Santa Cruz. (Goal 3, Objective 1)
- Replicate intertidal habitat found at Año Nuevo State Marine Reserve and at a monitoring site, not within a marine protected area, at nearby Sand Hill Bluff. (Goal 3, Objective 2)
- Encourage continuation of research at a site historically monitored by high school students as part of the Long-term Monitoring Program and Experiential Training for Students (LiMPETS). (Goal 3, Objective 3)
- Provide the opportunity to study differences in relative abundance and size frequency of intertidal algal and invertebrate species within a state marine reserve compared with an adjacent non-MPA area with similar habitat. (Goal 3, Objective 3)
- Include, and replicate within marine protected areas, surfgrass and mussel beds found within Año Nuevo State Marine Reserve. (Goal 4, Objective 2)

Figure 7. Natural Bridges State Marine Reserve



**MPA:** Elkhorn Slough State Marine Reserve

**Area (sq. mi.):** 1.48

**Along-shore span (mi):** 4.4

**Depth range (ft):** 0-10

**Primary habitat types:** estuary, coastal marsh, tidal flats, shallow soft bottom.

**Regulations:** No take.

**Boundaries:** This area includes the area below mean high tide within Elkhorn Slough and between longitude 121° 46.40' W. and latitude 36° 50.50' N (Figure 8).

**Examples of species likely to benefit:** leopard shark, surf perches, bat ray, starry flounder, crabs, gaper clams, ghost shrimp, mud shrimp, worms, eelgrass.

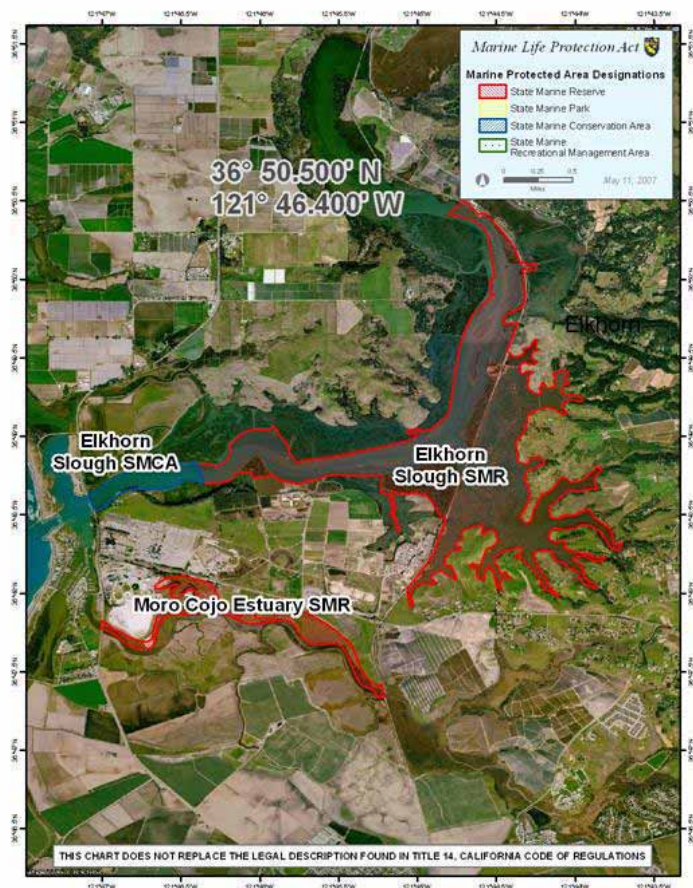
**Summary of Objectives:** Continue to provide complete protection for one of the few estuarine areas of the central coast and expand this protection to include the entire slough channel as opposed to one half of the channel as is presently included.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect estuarine area with high bird diversity. (Goal 1, Objective 1)
- Protect communities associated with area with diversity of estuarine habitats, including open channels, mud flats, and eelgrass beds, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age, size structure, and genetic diversity of fish and invertebrate species characteristic of one of largest estuarine systems within the central coast, in particular elasmobranchs, flatfishes, gaper clams, and fat innkeeper worms. (Goal 1, Objective 3)
- Protect natural structure and food web of estuarine system, including invertebrate forage base for sea otters and marine birds. (Goal 1, Objective 4)
- Help protect listed marine birds and southern sea otter by protecting feeding, roosting, and nesting habitat. (Goal 2, Objective 1)
- Enhance reproductive capacity of both invertebrate and fish species by prohibiting take in important nursery area. (Goal 2, Objective 2)
- Provide increased research and education opportunities by expanding an existing state marine reserve in an area adjacent to educational and interpretive facilities of the National Estuarine Research Reserve and Moss Landing Marine Laboratories. (Goal 3, Objective 1)
- Include and replicate representative estuarine habitat in central coast region within a state marine reserve. (Goal 3, Objective 2)
- Include estuarine habitat within a state marine reserve. (Goal 4, Objective 1)



Figure 8. Elkhorn Slough State Marine Reserve, Elkhorn Slough State Marine Conservation Area, and Morro Cojo Lagoon State Marine Reserve.



**MPA:** Elkhorn Slough State Marine Conservation Area

**Area (sq. mi.):** 0.09

**Along-shore span (mi):** 1.4

**Depth range (ft):** 0-10

**Primary habitat types:** estuary, coastal marsh, tidal flats, shallow soft bottom.

**Regulations:** Take of all living marine resources is prohibited except the recreational take of finfish by hook-and-line, and the recreational take of clams in the area adjacent to the Department of Fish and Game Wildlife Area on the north shore of the slough.

**Boundaries:** This area includes the area below mean high tide within Elkhorn Slough between the Highway 1 Bridge and longitude 121° 46.40' W. (Figure 8).

**Examples of species likely to benefit:** crabs, ghost shrimp, mud shrimp, worms, eelgrass.

**Summary of Objectives:** Provide increased protection for one of the few estuarine areas of the central coast while allow for traditional uses of recreational fishing. The intent of the area is



to allow small scale recreational fishing activities to continue, while limiting any future increases in use that do not presently occur. The area will also prohibit take of clams in an area used by sea otters for foraging, potentially providing more available prey for the otters.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect estuarine area with high bird diversity. (Goal 1, Objective 1)
- Protect communities associated with area with diversity of estuarine habitats, including open channels, mud flats, and eelgrass beds, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age, size structure, and genetic diversity of some invertebrate species, such as fat innkeeper worms, characteristic of one of largest estuarine systems within the central coast. (Goal 1, Objective 3)
- Provide for traditional recreational consumptive and nonconsumptive uses while offering some protection due to the prohibition of commercial fishing. (Goal 2, Objective 3)

**MPA:** Moro Cojo Slough State Marine Reserve

**Area (sq. mi.):** 0.46

**Along-shore span (mi):** 5.0

**Depth range (ft):** 0-10

**Primary habitat types:** estuary, tidal flats, shallow soft bottom.

**Regulations:** No take.

**Boundaries:** This area includes the area within Moro Cojo Slough below mean high tide and between the Highway 1 Bridge and the crossing of the Southern Pacific Railroad tracks (Figure 8).

**Examples of species likely to benefit:** surfperches, snails, eelgrass.

**Summary of Objectives:** Provide complete protection for one of the few estuarine areas of the central coast. A recent grant to the North Monterey County Recreation and Park District will create more than three miles of nature trails and interpretive stations within the slough; the additional protection provided by the reserve will help ensure this increased access does not lead to new take of living resources.

**Detailed Objectives (with reference to regional goal and objective):**

- Help protect listed marine birds by protecting feeding, roosting, and nesting habitat. (Goal 2, Objective 1)
- Include and replicate representative estuarine habitat in central coast region within a state marine reserve. (Goal 3, Objective 2)
- Include estuarine habitat within a state marine reserve. (Goal 4, Objective 1)

**MPA:** Soquel Canyon State Marine Conservation Area

**Area (sq. mi.):** 23.41

**Along-shore span (mi):** 7.2

**Depth range (ft):** 247-2113

**Primary habitat types:** shallow hard and soft bottom, deep hard and soft bottom, deep canyon.

**Regulations:** Take of all living marine resources is prohibited except the commercial and recreational take of pelagic finfish.

**Boundaries:** This area is bounded by straight lines connecting the following points in the order listed (Figure 9):

36° 51.00' N. lat. 121° 56.00' W. long.;

36° 51.00' N. lat. 122° 03.80' W. long.;

36° 48.00' N. lat. 122° 02.88' W. long.;

36° 48.00' N. lat. 121° 56.00' W. long.; and

36° 51.00' N. lat. 121° 56.00' W. long.

**Examples of species likely to benefit:** shelf and slope rockfishes, lingcod, Dover sole, spot, shrimp, squid.

**Summary of Objectives:** Provide increased protection to shallow and deep complex submarine canyon habitat and the majority of associated benthic species. The Soquel Canyon area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

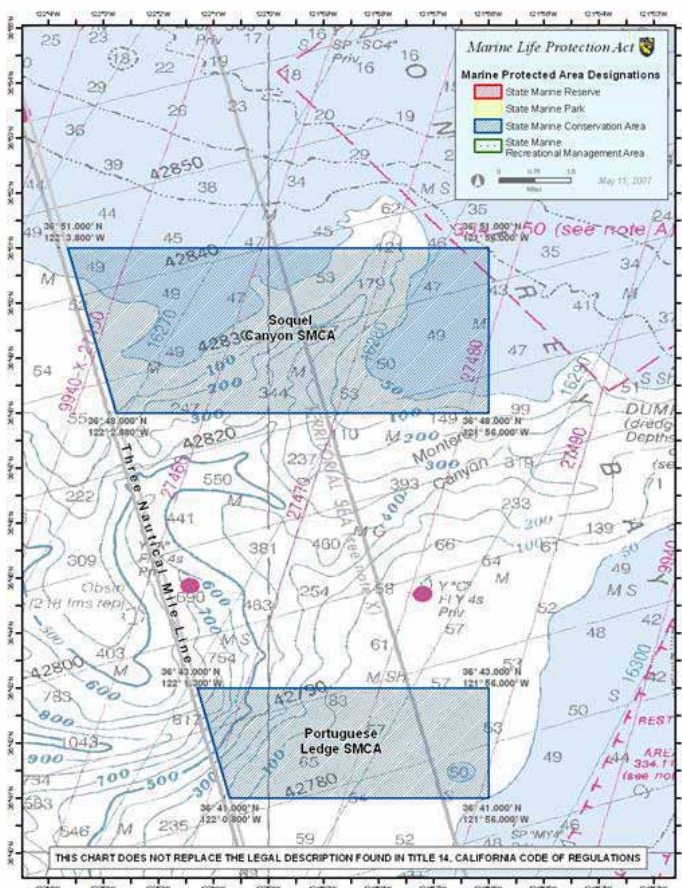
**Detailed Objectives (with reference to regional goal and objective):**

- Protect area with high species diversity associated with submarine canyon, including depth-stratified species assemblages with shelf and slope rockfishes. (Goal 1, Objective 1)
- Help protect communities associated with area of diverse habitat including shallow hard and soft bottom, deep hard and soft bottom, and submarine canyon, over a large depth range, and in close proximity to each other. (Goal 1, Objective 2)
- Help restore overfished groundfish species by maintaining large individuals of species such as bocaccio, canary, and yelloweye rockfishes in an area that serves as a natural refuge for these species due to inaccessible vertical rock outcrops in a submarine canyon. (Goal 1, Objective 3)
- Protect overfished rockfishes, including bocaccio, canary, and yelloweye. (Goal 2, Objective 1)
- Enhance reproductive capacity of benthic and deepwater fish species by prohibiting fishing for these species and allowing only fisheries with limited bycatch of these species. (Goal 2, Objective 2)
- Protect rockfishes and other components of a deep benthic community, while allowing the harvest of pelagic finfish. (Goal 2, Objective 3)
- Enhance education and study opportunities by establishing a marine protected area near the Monterey Bay Aquarium Research Institute and Moss Landing Marine

Laboratories where remotely operated vehicles, a future Monterey Accelerated Research System (MARS) cable, and other research methods have already generated baseline data. (Goal 3, Objective 1)

- Provide replicate deepwater hard bottom, soft bottom and submarine canyon habitats, in which fishing for benthic finfish species is prohibited, for Portuguese Ledge and Point Lobos State Marine Conservation Areas and Big Creek State Marine Reserve. (Goal 3, Objective 2)
- Include submarine canyon head habitat within a marine protected area. (Goal 4, Objective 1)
- Include and replicate deepwater hard and soft bottom and submarine canyon habitats across a wide range of depth. (Goal 4, Objective 2)
- Minimize negative socio-economic impacts to the pelagic finfish fisheries while protecting benthic finfishes within a marine protected area. (Goal 5, Objective 1)
- Minimize negative socio-economic impacts to rockfish fisheries by establishing a state marine conservation area in an area which encompasses part of the Rockfish Conservation Area, which is already closed to rockfish fishing. (Goal 5, Objective 1)
- Establish marine protected areas that meet Master Plan Framework scientific guidelines regarding preferred size (greater than 18 square miles). (Goal 5, Objective 3)

Figure 9. Soquel Canyon State Marine Conservation Area and Portuguese Ledge State Marine Conservation Area.



**MPA:** Portuguese Ledge State Marine Conservation Area

**Area (sq. mi.):** 10.90

**Along-shore span (mi):** 5.4

**Depth range (ft):** 302-4838

**Primary habitat types:** shallow hard and soft bottom, deep hard and soft bottom, deep submarine canyon.

**Regulations:** Take of all living marine resources is prohibited except the commercial and recreational take of pelagic finfish.

**Boundaries:** This area is bounded by straight lines connecting the following points in the order listed (Figure 9):

36° 43.00' N. lat. 121° 56.00' W. long.;

36° 43.00' N. lat. 122° 01.30' W. long.;

36° 41.00' N. lat. 122° 00.80' W. long.;

36° 41.00' N. lat. 121° 56.00' W. long.; and

36° 43.00' N. lat. 121° 56.00' W. long.

**Examples of species likely to benefit:** shelf and slope rockfishes, lingcod, Dover sole, Dungeness crab, spot prawn, squid.

**Summary of Objectives:** Provide increased protection to deep submarine canyon, other deep hard and soft habitat, and all associated benthic species. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect area with high species diversity associated with submarine canyon, including depth-stratified species assemblages with shelf and slope rockfishes. (Goal 1, Objective 1)
- Help protect communities associated with area of diverse habitat including shallow hard and soft bottom, deep hard and soft bottom, and submarine canyon, over a large depth range, and in close proximity to each other. (Goal 1, Objective 2)
- Help restore overfished groundfish species by maintaining large individuals of species such as bocaccio, canary, and yelloweye rockfishes in an area that has been fished heavily for decades and has become less productive. (Goal 1, Objective 3)
- Protect overfished rockfishes, including bocaccio, canary, and yelloweye. (Goal 2, Objective 1)
- Enhance reproductive capacity of benthic and deepwater fish and invertebrate species by prohibiting fishing for these species and allowing fisheries with limited bycatch of these species. (Goal 2, Objective 2)
- Protect rockfishes and other components of a deep benthic community, while allowing the harvest of pelagic finfish. (Goal 2, Objective 3)
- Enhance education and study opportunities by establishing a marine protected area near the Monterey Bay Aquarium Research Institute and Moss Landing Marine

Laboratories where remotely operated vehicles and other research methods have already generated baseline data. (Goal 3, Objective 1)

- Provide replicate deepwater hard bottom, soft bottom and submarine canyon habitats, in which fishing for benthic species is prohibited, for Soquel Canyon and Point Lobos State Marine Conservation Areas and Big Creek State Marine Reserve. (Goal 3, Objective 2)
- Include and replicate deepwater hard and soft bottom and submarine canyon habitats across a wide range of depth. (Goal 4, Objective 2)
- Minimize negative socio-economic impacts to the pelagic finfish fisheries while protecting benthic habitat within a marine protected area. (Goal 5, Objective 1)
- Minimize negative socio-economic impacts to rockfish fisheries by establishing a state marine conservation area in an area which encompasses the Rockfish Conservation Area, which is already closed to rockfish fishing. (Goal 5, Objective 1)
- Establish marine protected areas that meet Master Plan Framework scientific guidelines regarding preferred size (greater than 18 square miles). (Goal 5, Objective 3)

**MPA:** Edward F. Ricketts State Marine Conservation Area

**Area (sq. mi.):** 0.22

**Along-shore span (mi):** 1

**Depth range (ft):** 0-74

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

**Regulations:** Take of all living marine resources is prohibited except the recreational take of finfish by hook-and-line and, north of 36° 36.83' N. Latitude, the commercial take of kelp by hand. Any individual licensed commercial kelp harvester may take no more than 12 tons of kelp from the portion of Administrative Kelp Bed 220 within the Edward F. Ricketts State Marine Conservation Area in any calendar month.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 10):

36° 36.50' N. lat. 121° 53.37' W. long.;

36° 37.25' N. lat. 121° 53.78' W. long.; and

36° 37.10' N. lat. 121° 54.09' W. long.

**Examples of species likely to benefit:** mussels, limpets, turban snails, sea stars.

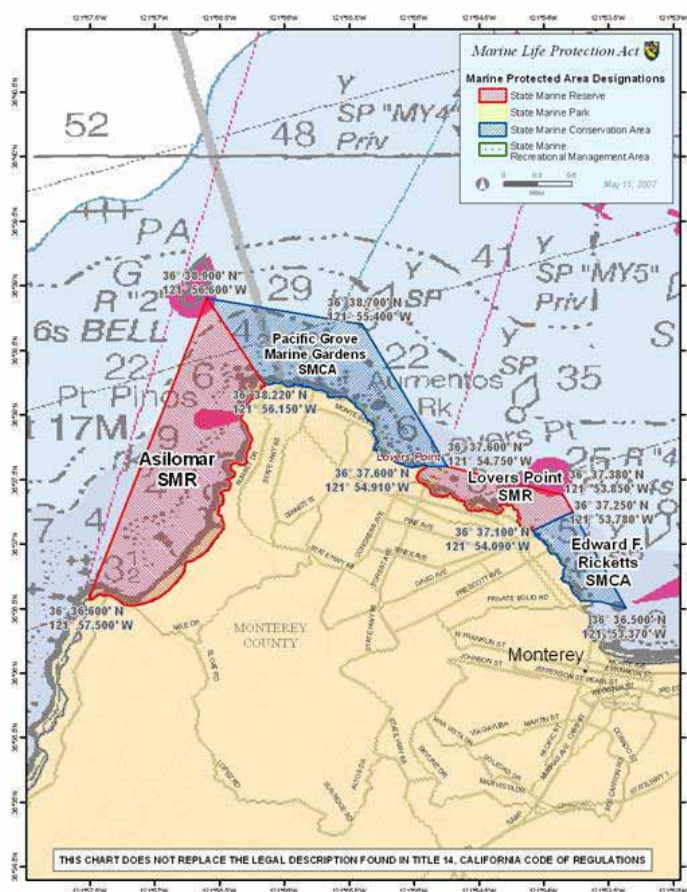
**Summary of Objectives:** Provide increased protection to a heavily-used area with shallow hard and soft bottom habitats, including kelp beds, while allowing for some traditional consumptive uses. The primary purpose of this area is to provide for recreational opportunities (both consumptive and nonconsumptive) in an area that is minimally impacted by other consumptive activities.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect invertebrates and the habitats on which they depend while allowing the harvest of finfish and kelp. (Goal 2, Objective 3)

- Enhance research and study opportunities by establishing a marine protected area which allows hook-and-line fishing and prohibits spearfishing close to Lovers Point State Marine Reserve and close to a state marine conservation area which allows spearfishing. (Goal 3, Objective 1)
- Promote opportunity for use of volunteer scuba divers in research and monitoring projects by establishing a state marine conservation area in a location heavily used by scuba divers where volunteer monitoring by REEF already takes place. (Goal 3, Objective 3)
- Minimize negative socio-economic impacts by establishing a state marine conservation area which allows recreational fishing and hand harvest of kelp by local aquaculturists, while affording protection to invertebrates and prohibiting all other commercial take. (Goal 5, Objective 1)

Figure 10. Edward F. Ricketts State Marine Conservation Area, Lovers Point State Marine Reserve, Pacific Grove Marine Gardens State Marine Conservation Area, and Asilomar State Marine Reserve.



**MPA:** Lovers Point State Marine Reserve

**Area (sq. mi.):** 0.30

**Along-shore span (mi):** 1.0

**Depth range (ft):** 0-88

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

**Regulations:** No take.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 10):

36° 37.10' N. lat. 121° 54.09' W. long.;

36° 37.25' N. lat. 121° 53.78' W. long.;

36° 37.38' N. lat. 121° 53.85' W. long.;

36° 37.60' N. lat. 121° 54.75' W. long.; and

36° 37.60' N. lat. 121° 54.91' W. long.

**Examples of species likely to benefit:** nearshore rockfishes, lingcod, cabezon, kelp greenling, surfperches, California halibut, giant kelp, mussels, limpets, sea stars, southern sea otter, cormorants.

**Summary of Objectives:** Provide for increased protection through the expansion of an existing state marine reserve in shallow hard and soft bottom habitats in an area close to population centers and used by nonconsumptive divers. The primary goal of this MPA will be to provide for recreational nonconsumptive uses in an area minimally impacted by human take. Additionally this increases the area adjacent to an existing research institution which can facilitate research and monitoring within the MPA.

**Detailed Objectives (with reference to regional goal and objective):**

- Continue to provide protection to a rich diversity of invertebrates and fish species characteristic of shallow rocky and soft bottom habitat of southern Monterey Bay, while expanding protection to a small reef in slightly deeper water. (Goal 1, Objective 1)
- Help protect southern sea otter and marine bird habitat. (Goal 2, Objective 1)
- Protect large individuals of resident nearshore fish species in known nursery area. (Goal 2, Objective 2)
- Enhance scientific research opportunities at site of traditional high research value by expanding protection in adjacent areas and extending the existing state marine reserve alongshore and into deeper water. (Goal 3, Objective 1)
- Enhance recreational non-consumptive diving experience at site of traditional high diving use by expanding protection in adjacent areas and extending the existing state marine reserve alongshore and into deeper water. (Goal 3, Objective 1)
- Benefit from site's location adjacent to Stanford University's Hopkins Marine Station and its use by students for educational and monitoring purposes. (Goal 3, Objective 3)
- Minimize socio-economic impacts by limiting the state marine reserve to a maximum depth of approximately 60 feet (except for Hopkins Deep Reef) which will allow



continued commercial and recreational fishing in deeper waters adjacent to the state marine reserve. (Goal 5, Objective 1)

**MPA:** Pacific Grove Marine Gardens State Marine Conservation Area

**Area (sq. mi.):** 0.93

**Along-shore span (mi):** 3.8

**Depth range (ft):** 0-172

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

**Regulations:** Take of all living marine resources is prohibited except recreational take of finfish and the commercial take of kelp by hand. Any individual licensed commercial kelp harvester may take no more than 44 tons of kelp from the portion of Administrative Kelp Bed 220 within the Pacific Grove Marine Gardens State Marine Conservation Area in any calendar month.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 10):

36° 37.60' N. lat. 121° 54.91' W. long.;

36° 37.60' N. lat. 121° 54.75' W. long.;

36° 38.70' N. lat. 121° 55.40' W. long.;

36° 38.90' N. lat. 121° 56.60' W. long.; and

36° 38.22' N. lat. 121° 56.15' W. long.

**Examples of species likely to benefit:** invertebrates, including mussels, limpets, turban snails, sea stars, squid.

**Summary of Objectives:** Provide increased protection to a heavily-used area with shallow hard and soft bottom habitats, including kelp beds, while allowing for some traditional consumptive uses. The primary purpose of this area is to provide for recreational opportunities (both consumptive and nonconsumptive) in an area that is minimally impacted by other consumptive activities.

**Detailed Objectives (with reference to regional goal and objective):**

- Enhance non-consumptive recreational experience by prohibiting commercial finfishing and all invertebrate take in an area that includes traditional scuba diving sites accessed from the beach or boats. (Goal 3, Objective 1)
- Continue to protect, within a state marine conservation area, an area close to Monterey and adjacent to Pacific Grove that has long-standing and strong community support and high research, educational and recreational value, particularly with respect to tide pools. (Goal 3, Objective 1)
- Provide potential opportunity to study impacts of the hand harvest of kelp and spearfishing by establishing an expanded state marine reserve and a state marine conservation area (which also allows hand harvest of kelp and prohibits spearfishing) adjacent or near to this site. (Goal 3, Objective 2)



- Promote opportunity for use of volunteer scuba divers in research and monitoring projects by establishing a state marine conservation area in a location heavily used by scuba divers where volunteer monitoring by REEF already takes place. (Goal 3, Objective 3)
- Enhance recreational fishing within the state marine conservation area through a prohibition on commercial take and by providing for a natural size and age structure of resident finfish species in an adjacent state marine reserve. (Goal 3, Objective 4)
- Allow continued recreational fishing in traditional use area and hand harvest of kelp close to abalone aquaculture facilities. (Goal 5, Objective 1)

**MPA:** Asilomar State Marine Reserve

**Area (sq. mi.):** 1.51

**Along-shore span (mi):** 2.3

**Depth range (ft):** 0-172

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

**Regulations:** No take

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 10):

36° 38.22' N. lat. 121° 56.15' W. long.;

36° 38.90' N. lat. 121° 56.60' W. long.; and

36° 36.60' N. lat. 121° 57.50' W. long.;

**Examples of species likely to benefit:** nearshore rockfishes, lingcod, cabezon, kelp greenling, surfperches, California halibut, giant kelp, mussels, limpets, sea stars, southern sea otter, cormorants.

**Rationale:** Provide for complete protection in shallow hard and soft bottom habitats in an area close to population centers and used by nonconsumptive divers. The primary goals of this MPA will be to provide for recreational nonconsumptive uses in an area minimally impacted by human take, and to provide benefits to an adjacent fished area through spillover of adult fishes and increased potential for larval production.

**Detailed Objectives (with reference to regional goal and objective):**

- Provide protection to a rich diversity of invertebrates and fish species characteristic of shallow rocky and soft bottom habitat near southern Monterey Bay. (Goal 1, Objective 1)
- Help protect southern sea otter and marine bird habitat. (Goal 2, Objective 1)
- Protect large individuals of resident nearshore fish species adjacent to an area which experiences significant recreational fishing effort. (Goal 2, Objective 2)
- Enhance recreational non-consumptive diving experience at site of traditional diving use. (Goal 3, Objective 1)
- Benefit from site's location close to Stanford University's Hopkins Marine Station and its use by students for educational and monitoring purposes. (Goal 3, Objective 3)

- Minimize socio-economic impacts by limiting the state marine reserve to an area which is primarily less than 90 feet deep, which will allow continued commercial and recreational fishing in deeper waters adjacent to the state marine reserve. (Goal 5, Objective 1)

**MPA:** Carmel Pinnacles State Marine Reserve

**Area (sq. mi.):** 0.53

**Along-shore span (mi):** 1.0

**Depth range (ft):** 69-223

**Primary habitat types:** rocky pinnacles, kelp bed.

**Regulations:** No take.

**Boundaries:** This area is bounded by the straight lines connecting the following points in the order listed (Figure 11):

36° 33.65' N. lat. 121° 57.60' W. long.;

36° 33.65' N. lat. 121° 58.50' W. long.;

36° 33.10' N. lat. 121° 58.50' W. long.;

36° 33.10' N. lat. 121° 57.60' W. long.; and

36° 33.65' N. lat. 121° 57.60' W. long.;

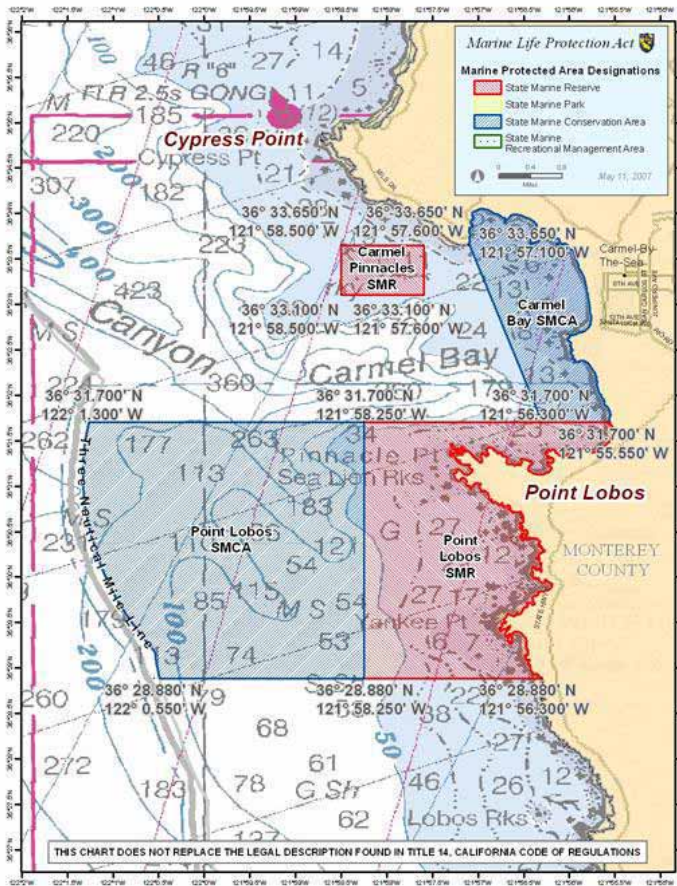
**Examples of species likely to benefit:** nearshore rockfishes, lingcod, cabezon, kelp greenling, surfperches, giant kelp, bull kelp, sponges, hydrocorals.

**Summary of Objectives:** Provide for complete protection in an area of complex hard bottom habitat, including kelp beds and pinnacles, is close to port and frequently used by nonconsumptive divers. The primary purpose of this area would be to protect a unique pinnacle area that is accessible to divers for nonconsumptive uses while maintaining similar habitats nearby as open fishing areas.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect communities associated with high-relief rocky reef habitat (including pinnacles), bull kelp and giant kelp forests, and hydrocorals, in close proximity to each other. (Goal 1, Objective 2)
- **Enhance non-consumptive recreational scuba diving experience at a traditional dive site formerly open to fishing. (Goal 3, Objective 1)**
- Replicate pinnacle habitat found within Point Lobos State Marine Reserve. (Goal 3, Objective 2)
- Include pinnacle habitat, with dense rockfish populations, sponges, and hydrocorals, within a state marine reserve. (Goal 4, Objective 1)

Figure 11. Carmel Pinnacles State Marine Conservation Area, Carmel Bay State Marine Conservation Area, Point Lobos State Marine Reserve, and Point Lobos State Marine Conservation Area.



**MPA:** Carmel Bay State Marine Conservation Area  
**Area (sq. mi.):** 2.12  
**Along-shore span (mi):** 3.5  
**Depth range (ft):** 0-471

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, submarine canyon head, kelp bed.

**Regulations:** Take of all living marine resources is prohibited except the recreational take of finfish and the commercial take of giant kelp (*Macrocystis pyrifera*) by hand. Any individual licensed commercial kelp harvester may take no more than 44 tons of kelp from the portion of Administrative Kelp Bed 219 within the Carmel Bay State Marine Conservation Area in any calendar month.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 11):  
 36° 33.65' N. lat. 121° 57.10' W. long.;

36° 31.70' N. lat. 121° 56.30' W. long.; and  
36° 31.70' N. lat. 121° 55.55' W. long.

**Examples of species likely to benefit:** invertebrates, including squid.

**Summary of Objectives:** Continue to provide existing level of protection in an area of diverse shallow habitat characterized by traditional recreational uses.

**Detailed Objectives (with reference to regional goal and objective):**

- Allow continued recreational harvest of finfish and commercial harvest of kelp by hand in an area of historic recreational use value near Monterey harbor while protecting invertebrates. (Goal 2, Objective 3)
- Maintain an existing state marine conservation area located near the population center of Monterey Peninsula that is accessible for recreational opportunities, both consumptive and non-consumptive. (Goal 3, Objective 1)
- Maintain an existing state marine conservation area that includes a Moss Landing Marine Laboratories long-term monitoring site. (Goal 3, Objective 3)
- Allow for the comparison of a recreational fishing area adjacent to a no-take area (Goal 3, Objective 3)

**MPA:** Point Lobos State Marine Reserve

**Area (sq. mi.):** 5.36

**Along-shore span (mi):** 4.7

**Depth range (ft):** 0-408

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, pinnacles, kelp bed.

**Regulations:** No take. Access restricted in some areas due to existing Point Lobos State Reserve (State Park Unit) regulations but these restrictions will not apply to areas outside the existing Pt. Lobos State Reserve (State Park Unit) boundaries.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 11):

36° 31.70' N. lat. 121° 55.55' W. long.;

36° 31.70' N. lat. 121° 58.25' W. long.;

36° 28.88' N. lat. 121° 58.25' W. long.; and

36° 28.88' N. lat. 121° 56.30' W. long.

**Examples of species likely to benefit:** nearshore rockfishes, lingcod, cabezon, kelp greenling, surfperches, giant kelp, bull kelp, squid, sponges, hydrocorals, cormorants, pelicans, southern sea otter, harbor seal.

**Summary of Objectives:** Provide for increased complete protection through the expansion of an existing state marine reserve in shallow hard and soft bottom habitats in an area close to population centers and used by nonconsumptive divers. This area is important to the formation

of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect area of high species diversity characteristic of the granitic shallow hard bottom habitat within the central coast, and maintain species diversity and abundance as demonstrated by monitoring indicator species. (Goal 1, Objective 1)
- Protect communities associated with a mosaic of sandy and rocky intertidal, kelp bed, shallow rocky reef, shallow sandy bottom, and submarine canyon head habitats in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of invertebrate and fish species associated with sandy and rocky intertidal, kelp bed, shallow rocky reef, shallow sandy bottom, and submarine canyon head habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as squid and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Protect ecosystem structure and functions associated with submarine canyon head, rocky reef, and kelp forest communities. (Goal 1, Objective 5)
- Help protect listed marine bird and marine mammal species by protecting forage base. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of invertebrates and nearshore finfish with limited movement patterns. (Goal 2, Objective 2)
- Enhance extensive educational and interpretive facilities, including visitor center and docent program, through expansion of an existing state marine reserve. (Goal 3, Objective 1)
- Enhance Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) monitoring program (which has existing replicate monitoring sites inside and outside the state marine reserve) through expansion of the existing state marine reserve. (Goal 3, Objective 2)
- Replicate pinnacles habitat found in Carmel Pinnacles State Marine Reserve. (Goal 3, Objective 2)
- Enhance existing local high school monitoring program through expansion of the state marine reserve. (Goal 3, Objective 3)
- Protect and enhance recreational diving experience by expanding protection of existing state marine reserve to better ensure protection of large fish. (Goal 3, Objective 4)
- Protect head of Carmel Submarine Canyon and pinnacle habitats within a state marine reserve. (Goal 4, Objective 1)
- Include rocky intertidal, kelp bed, shallow rocky reef, and shallow soft bottom habitats within a state marine reserve, and increase protection of pinnacle habitat. (Goal 4, Objective 2)
- Optimize positive socio-economic benefits by improving protection in area that has particularly high non-consumptive use patterns, including scuba diving and wildlife watching. (Goal 5, Objective 1)
- Establish a marine protected area complex (along with Point Lobos State Marine Conservation Area) that meets Master Plan Framework scientific guidelines for minimum shoreline extent and offshore extent. (Goal 5, Objective 3)

**MPA:** Point Lobos State Marine Conservation Area

**Area (sq. mi.):** 8.85

**Along-shore span (mi):** 3.2

**Depth range (ft):** 268-1858

**Primary habitat types:** shallow and deep hard bottom, shallow and deep soft bottom, shallow and deep submarine canyon.

**Regulations:** Take of all living marine resources is prohibited except commercial and recreational take of salmon (*Oncorhynchus spp.*), albacore (*Thunnus alalunga*), and spot prawn (*Pandalus platyceros*).

**Boundaries:** This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 11):  
36° 31.70' N. lat. 121° 58.25' W. long.;  
36° 31.70' N. lat. 122° 01.30' W. long.; thence southward along the state water line to  
36° 28.88' N. lat. 122° 00.55' W. long.;  
36° 28.88' N. lat. 121° 58.25' W. long.; and  
36° 31.70' N. lat. 121° 58.25' W. long.

**Examples of species likely to benefit:** shelf and slope rockfishes, lingcod, sponges, hydrocorals, cormorants, pelicans, southern sea otter, harbor seal.

**Summary of Objectives:** Provide for increased protection of benthic finfishes in a diverse area containing shallow and deep, and hard and soft habitats, while minimizing impact to rockfish fisheries, through the incorporation of part of the Rockfish Conservation Area into the MPA, and salmon and spot prawn fisheries. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect communities associated with area with shallow hard and soft bottom, deep hard and soft bottom, and shallow and deep submarine canyon habitats across a wide depth range and in close proximity to each other. (Goal 1, Objective 2)
- Help protect populations of overfished rockfish (including bocaccio, canary and yelloweye) and help protect forage species (including coastal pelagic finfish) for listed marine birds. (Goal 2, Objective 1)
- Enhance reproductive capacity of benthic fish species by prohibiting fishing for them in deep water. (Goal 2, Objective 2)
- Enhance reproductive capacity of benthic fish species by only allowing fishing for selected pelagic finfishes and spot prawn (by trap), where bycatch of benthic fishes is minimal. (Goal 2, Objective 2)
- Provide an opportunity for comparative studies in Soquel Canyon and Portuguese Ledge State Marine Conservation Areas which have similar habitats. (Goal 3, Objective 1)
- Minimize negative socio-economic impacts by allowing fishing for salmon, albacore and spot prawn, and by incorporating a portion of the Rockfish Conservation Area (closed to groundfish take) and Essential Fish Habitat trawl closure. (Goal 5, Objective 1)

- Establish a marine protected area complex (along with Point Lobos State Marine Reserve) that meets Master Plan Framework scientific guidelines for minimum shoreline extent and offshore extent. (Goal 5, Objective 3)

**MPA:** Point Sur State Marine Reserve

**Area (sq. mi.):** 9.72

**Along-shore span (mi):** 5.2

**Depth range (ft):** 0-178

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed, canyon head.

**Regulations:** No take.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 12):

36° 18.40' N. lat. 121° 54.10' W. long.;

36° 18.40' N. lat. 121° 56.00' W. long.;

36° 15.00' N. lat. 121° 52.50' W. long.; and

36° 15.00' N. lat. 121° 50.25' W. long.;

**Examples of species likely to benefit:** nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, giant kelp, bull kelp, squid, Dungeness crab, murre, guillemots, cormorants, petrels, auklets.

**Summary of Objectives:** Provide for complete protection of a diverse area containing shallow hard and soft habitats, kelp beds, and associated fish and invertebrate species while minimizing impact to shelf rockfish fisheries through the incorporation of part of the Rockfish Conservation Area into the MPA. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

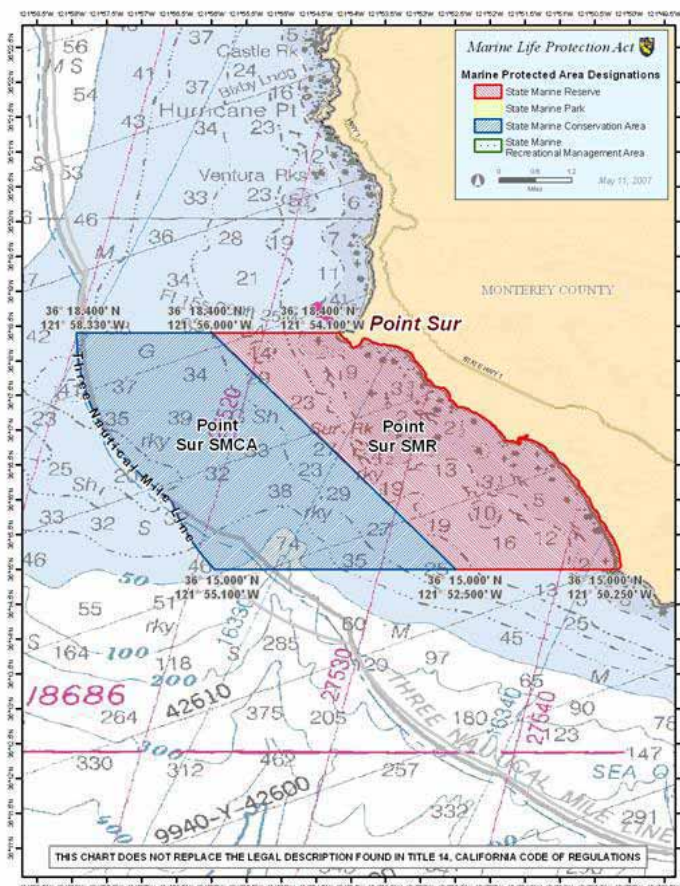
**Detailed Objectives (with reference to regional goal and objective):**

- Protect area of particularly high species diversity associated with upwelling cell in lee of headland, as well as area immediately north of a headland, and maintain species diversity and abundance as demonstrated by monitoring indicator species. (Goal 1, Objective 1, and 2)
- Protect natural age and size structure of invertebrate and fish species associated with sandy beach, rocky intertidal, kelp bed, shallow rocky reef, and shallow sandy bottom habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as juvenile rockfish, squid, and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Provide protection to an area that contains a persistent upwelling plume and generally southerly flow, well-suited to provide larval dispersal to other areas. (Goal 1, Objective 5)



- Help protect populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)
- Protect forage base for listed marine birds and marine mammals as well as overfished rockfish species. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of shelf species including rockfishes. (Goal 2, Objective 2)
- Establish a marine protected area near a terrestrial state park where an adjacent PISCO subtidal monitoring site exists. (Goal 3, Objective 1)
- Include submarine canyon head within a state marine reserve. (Goal 4, Objective 1)
- Include shallow hard and soft bottom, and shallow canyon habitat within a state marine reserve, including an area of broad continental shelf within a larger area of primarily narrow continental shelf. (Goal 4, Objective 2)
- Minimize negative socio-economic impacts by incorporating a portion of the Rockfish Conservation Area (closed to groundfish take), and considering existing squid fishing grounds. (Goal 5, Objective 1)
- Establish a marine protected area complex (along with Point Sur State Marine Conservation Area) that meets preferred Master Plan Framework scientific guidelines for size. (Goal 5, Objective 3)

Figure 12. Pt. Sur State Marine Reserve and Pt. Sur State Marine Conservation Area.





**MPA:** Point Sur State Marine Conservation Area

**Area (sq. mi.):** 9.96

**Along-shore span (mi):** 5.2

**Depth range (ft):** 134-424

**Primary habitat types:** shallow hard and soft bottom.

**Regulations:** Take of all living marine resources is prohibited except commercial and recreational take of salmon (*Oncorhynchus spp.*) and albacore (*Thunnus alalunga*).

**Boundaries:** This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 12):

36° 18.40' N. lat. 121° 56.00' W. long.;

36° 18.40' N. lat. 121° 58.33' W. long.; thence southward along the state water line to

36° 15.00' N. lat. 121° 55.10' W. long.;

36° 15.00' N. lat. 121° 52.50' W. long.; and

36° 18.40' N. lat. 121° 56.00' W. long.

**Examples of species likely to benefit:** nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, giant kelp, squid, Dungeness crab, spot prawn, murre, cormorants, southern sea otter.

**Summary of Objectives:** Provide for increased protection of a diverse area containing shallow hard and soft habitats, kelp beds, and associated fish and invertebrate species while minimizing impact to shelf rockfish fisheries, through the incorporation of part of the Rockfish Conservation Area into the MPA, and to the salmon fishery. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region. In addition, unique habitats in federal waters are adjacent to this area and may be connected if appropriate in future processes.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect area of high species diversity associated with shallow hard and soft bottom habitats where the continental shelf is relatively broad. (Goal 1, Objective 1 and 2)
- Protect natural age and size structure of invertebrate and fish species associated with shallow rocky reef and soft bottom habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as juvenile rockfish, squid, and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Provide protection to communities associated with an area that contains a persistent upwelling plume and generally southerly flow, well-suited to provide larval dispersal to other areas. (Goal 1, Objective 5)
- Help maintain populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)
- Protect forage base for listed marine birds and marine mammals as well as overfished rockfish species. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of benthic shelf species including rockfishes. (Goal 2, Objective 2)

- Minimize negative socio-economic impacts by incorporating a portion of the Rockfish Conservation Area (closed to groundfish take), and by allowing the harvest of salmon and albacore. (Goal 5, Objective 1)
- Establish a marine protected area complex (along with Point Sur State Marine Reserve) that meets preferred Master Plan Framework scientific guidelines for size. (Goal 5, Objective 3)

**MPA:** Big Creek State Marine Conservation Area

**Area (sq. mi.):** 8

**Along-shore span (mi):** 2.5

**Depth range (ft):** 0-1964

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, deep hard and soft bottom, shallow and deep submarine canyon, pinnacles, kelp bed.

**Regulations:** Take of all living marine resources is prohibited except the commercial and recreational take of salmon (*Oncorhynchus spp.*), albacore (*Thunnus alalunga*), and the commercial take of spot prawn (*Pandalus platyceros*).

**Boundaries:** This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 13):

36° 07.20' N. lat. 121° 39.00' W. long.;

36° 07.20' N. lat. 121° 42.90' W. long.; thence southward along the three nautical mile offshore boundary to

36° 05.20' N. lat. 121° 41.24' W. long.;

36° 05.20' N. lat. 121° 38.00' W. long.; and

36° 07.20' N. lat. 121° 39.00' W. long.

**Examples of species likely to benefit:** nearshore, shelf, and slope rockfishes, lingcod, cabezon, kelp greenling, surfperches, squid, giant kelp, murre, cormorants, southern sea otter.

**Summary of Objectives:** Provide for increased protection of a diverse area containing shallow and deep, and hard and soft habitats, kelp beds, submarine canyons, and associated fish and invertebrate species while minimizing impact to shelf rockfish fisheries, through the incorporation of part of the Rockfish Conservation Area into the MPA, and to the spot prawn and salmon fisheries. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

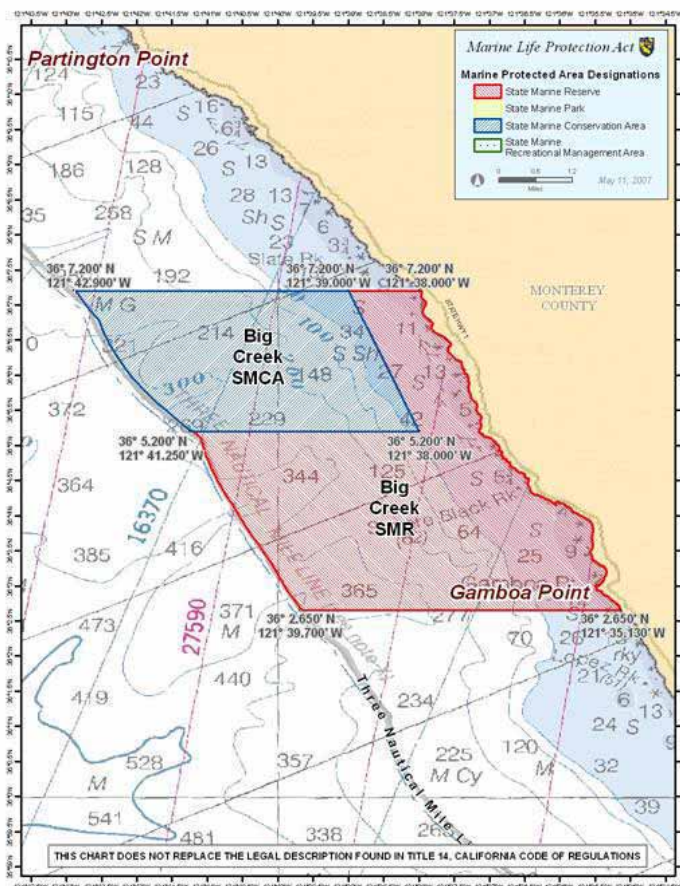
**Detailed Objectives (with reference to regional goal and objective):**

- Protect area of high species diversity associated with shallow and deep water habitats, including submarine canyon. (Goal 1, Objective 1)
- Protect communities associated with sandy beach, rocky intertidal, shallow hard and soft bottom, surfgrass and kelp beds, deep hard and soft bottom, and shallow and deep submarine canyon habitat in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of fish and most invertebrate species associated with sandy and rocky intertidal, surfgrass and kelp beds, shallow and deep rocky reef,

shallow and deep sandy bottom, and shallow and deep submarine canyon habitat. (Goal 1, Objective 3)

- Help maintain populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)
- Protect forage base for listed marine birds and marine mammals as well as overfished rockfish species. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of deepwater species including rockfishes. (Goal 2, Objective 2)
- Provide opportunities afforded by a nearby terrestrial reserve, managed by the University of California, to link classroom curricula. (Goal 3, Objective 3)
- Provide opportunities for collaborative research projects involving commercial fishermen, including a possible study on the impact of salmon fishing. (Goal 3, Objective 3)
- Minimize negative socio-economic impacts by incorporating a portion of the Rockfish Conservation Area (closed to groundfish take), and by allowing the harvest of spot prawn, salmon, and albacore. (Goal 5, Objective 1)

Figure 13. Big Creek State Marine Reserve and Big Creek State Marine Conservation Area



**MPA:** Big Creek State Marine Reserve

**Area (sq. mi.):** 14.47

**Along-shore span (mi):** 6.1

**Depth range (ft):** 0-2393

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, deep hard and soft bottom, shallow and deep submarine canyon, pinnacles, kelp bed.

**Regulations:** No take.

**Boundaries:** This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 13):

36° 07.20' N. lat. 121° 38.00' W. long.;

36° 07.20' N. lat. 121° 39.00' W. long.;

36° 05.20' N. lat. 121° 38.00' W. long.

36° 05.20' N. lat. 121° 41.25' W. long.; thence southward along the three nautical mile offshore boundary to

36° 02.65' N. lat. 121° 39.70' W. long.; and

36° 02.65' N. lat. 121° 35.13' W. long.

**Examples of species likely to benefit:** nearshore, shelf, and slope rockfishes, lingcod, cabezon, kelp greenling, surfperches, spot prawn, squid, giant kelp, murre, cormorants, southern sea otter.

**Summary of Objectives:** Provide for increased complete protection, through expansion of an existing state marine reserve, of a diverse area containing shallow and deep, and hard and soft habitats, kelp beds, submarine canyons, and associated fish and invertebrate species while minimizing impact to shelf rockfish fisheries through the incorporation of part of the Rockfish Conservation Area into the MPA. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect area of high species diversity associated with shallow and deep water habitats, including submarine canyon. (Goal 1, Objective 1)
- Protect communities associated with sandy beach, rocky intertidal, shallow hard and soft bottom, surfgrass and kelp beds, deep hard and soft bottom, and shallow and deep submarine canyon habitat in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of invertebrate and fish species associated with sandy and rocky intertidal, surfgrass and kelp beds, shallow and deep rocky reef, shallow and deep sandy bottom, and shallow and deep submarine canyon habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as juvenile rockfish, squid, and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Protect full range of ecosystem functions in an area between upwelling zones. (Goal 1, Objective 5)

- Help maintain populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)
- Protect forage base for listed marine birds and marine mammals as well as overfished rockfish species. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of deepwater species including rockfishes. (Goal 2, Objective 2)
- Expand existing state marine reserve adjacent to a terrestrial reserve run by the University of California, which provides research and educational opportunities and existing baseline data inside and outside of the state marine reserve. (Goal 3, Objective 1)
- Provide opportunities afforded by an adjacent terrestrial reserve, managed by the University of California, to link classroom curricula. (Goal 3, Objective 3)
- Provide opportunities for collaborative research projects involving commercial fishermen, including a possible study on the impact of salmon fishing. (Goal 3, Objective 3)
- Replicate within a state marine reserve the shallow habitat found in Point Lobos and Point Sur State Marine Reserves. (Goal 4, Objective 2)
- Minimize negative socio-economic impacts by incorporating a portion of the Rockfish Conservation Area (closed to groundfish take). (Goal 5, Objective 1)
- Establish a state marine reserve that meets Master Plan Framework scientific guidelines for size. (Goal 5, Objective 3)

**MPA:** Piedras Blancas State Marine Reserve

**Area (sq. mi.):** 10.4

**Along-shore span (mi):** 6.4

**Depth range (ft):** 0-157

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

**Regulations:** No take.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 14):

35° 42.85' N. lat. 121° 18.95' W. long.;

35° 42.85' N. lat. 121° 21.00' W. long.;

35° 39.15' N. lat. 121° 18.50' W. long.; and

35° 39.15' N. lat. 121° 14.45' W. long.

**Examples of species likely to benefit:** nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, spot prawn, squid, giant kelp, murre, cormorants, pelicans, guillemots, southern sea otter.

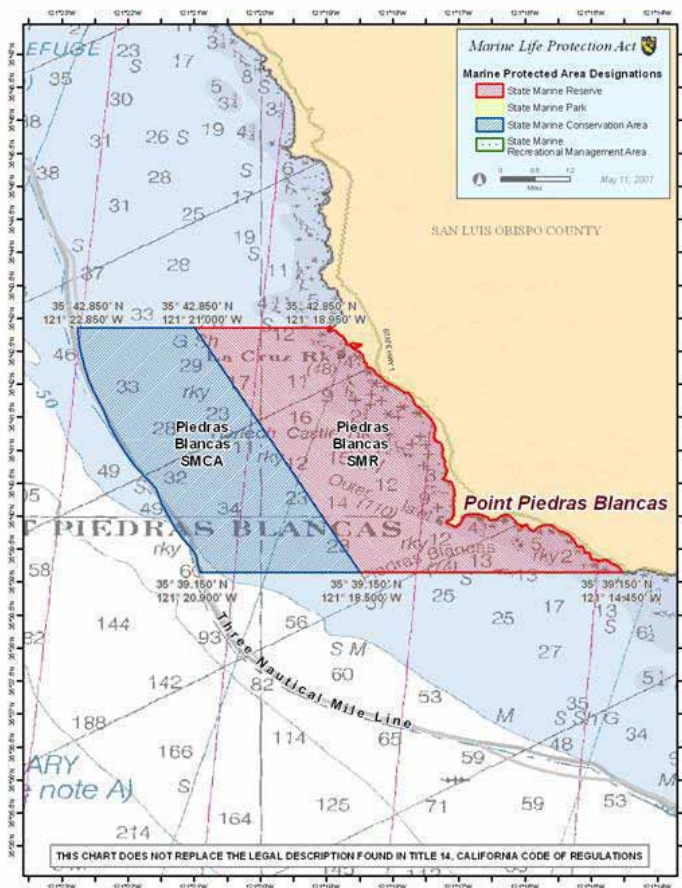
**Summary of Objectives:** Provide for complete protection of a diverse area containing shallow hard and soft habitats, kelp beds, pinnacles, and associated fish and invertebrate species in an area receiving increased public visitation due to marine mammal viewing opportunities. This

area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect area of particularly high species diversity including fish, invertebrates, kelp, marine birds, and marine mammals, including major rookeries containing California sea lion, northern elephant seal, harbor seal, Stellar sea lion, and northern fur seal. (Goal 1, Objective 1)
- Protect communities associated with extensive and high value intertidal zone which will be subject to additional visitation due to conversion from private to public ownership of land. (Goal 1, Objective 1)
- Protect communities associated with a mosaic of habitat types, including sandy beach with diverse cobble size, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of species associated with sandy beach, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as juvenile rockfish, squid, and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Protect forage base for marine birds and marine mammals and eliminate disturbances associated with fishing activities. (Goal 1, Objective 5)
- Protect communities associated with an upwelling zone where larval dispersion to other areas is likely. (Goal 1, Objective 5)
- Help protect populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of nearshore fish and invertebrate species. (Goal 2, Objective 2)
- Replicate within a state marine reserve the range of habitats found at Point Sur and Point Buchon State Marine Reserves in an area that includes a PISCO monitoring site. (Goal 3, Objective 2)
- Enhance classroom component of research and monitoring as related to the Friends of the Elephant Seal organization. (Goal 3, Objective 3)
- Include pinnacle habitat within a state marine reserve. (Goal 4, Objective 1)
- Include and replicate sandy beach, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom habitat. (Goal 4, Objective 2)
- Increase positive socio-economic benefits by protecting an area with exceptionally high natural heritage values, including education, wildlife viewing, and tourism. (Goal 5, Objective 1)
- Establish a marine protected area complex (along with Piedras Blancas State Marine Conservation Area) that meets Master Plan Framework scientific guidelines for preferred size. (Goal 5, Objective 3)

Figure 14. Piedras Blancas State Marine Reserve and Piedras Blancas State Marine Conservation Area



**MPA:** Piedras Blancas State Marine Conservation Area

**Area (sq. mi.):** 8.76

**Along-shore span (mi):** 4.9

**Depth range (ft):** 94-337

**Primary habitat types:** shallow hard and soft bottom.

**Regulations:** Take of all living marine resources is prohibited except commercial and recreational take of salmon (*Oncorhynchus spp.*) and albacore (*Thunnus alalunga*).

**Boundaries:** This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 14):  
 35° 42.85' N. lat. 121° 21.00' W. long.;  
 35° 42.85' N. lat. 121° 22.85' W. long.; thence southward along the state water line to  
 35° 39.15' N. lat. 121° 20.90' W. long.;  
 35° 39.15' N. lat. 121° 18.50' W. long.; and  
 35° 42.85' N. lat. 121° 21.00' W. long.

**Examples of species likely to benefit:** nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, giant kelp, squid, Dungeness crab, murre, cormorants, southern sea otter.

**Summary of Objectives:** Provide for increased protection of a diverse area containing shallow hard and soft habitats, kelp beds, pinnacles, and associated fish and invertebrate species in an area receiving increased public visitation due to marine mammal viewing opportunities, while minimizing impact to the salmon fishery. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect benthic areas with high species diversity and maintain benthic species diversity and abundance, consistent with natural fluctuations, of populations in shallow hard and soft bottom. (Goal 1, Objective 1)
- Protect communities associated with area with shallow hard and soft bottom in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of invertebrate and fish species associated with shallow rocky reef and soft bottom habitat. (Goal 1, Objective 3)
- Protect offshore forage base for seabird and marine mammal populations. (Goal 1, Objective 5)
- Help maintain populations of overfished rockfish species including bocaccio, yelloweye, and canary. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of benthic shelf species including rockfishes. (Goal 2, Objective 2)
- Establish a marine protected area complex (along with Piedras Blancas State Marine Reserve) that meets Master Plan Framework scientific guidelines for preferred size. (Goal 5, Objective 3)

**MPA:** Cambria State Marine Conservation Area (State Marine Park Regulations)

**Area (sq. mi.):** 6.26

**Along-shore span (mi):** 5.8

**Depth range (ft):** 0-105

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

**Regulations:** No commercial take. Recreational take is allowed.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 15).

35° 37.10' N. lat. 121° 09.20' W. long.;

35° 37.10' N. lat. 121° 10.70' W. long.;

35° 32.85' N. lat. 121° 06.70' W. long.; and

35° 32.85' N. lat. 121° 05.85' W. long.

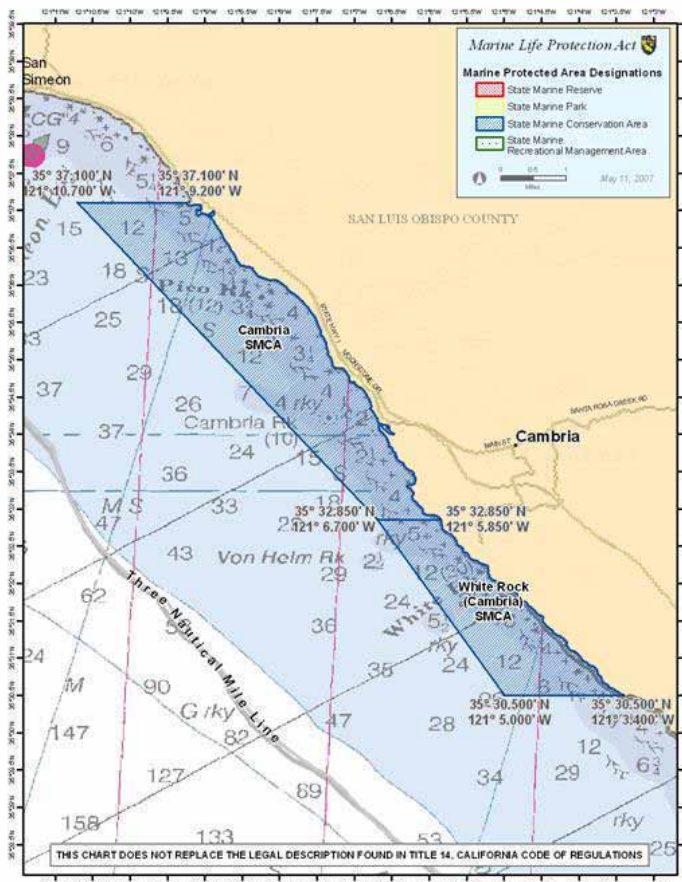


**Examples of species likely to benefit:** squid, giant kelp.

**Objectives (with reference to regional goal and objective):**

- Provide some protection to nearshore shelf rockfish species, cabezon, and kelp greenling through the prohibition of commercial fishing. (Goal 2, Objective 3)
- Enhance recreational fishing near a population center (Cambria) by prohibiting commercial take in an area traditionally accessed primarily by recreational users. (Goal 3, Objective 1)
- Replicate habitats found in adjacent Cambria State Marine Reserve to allow comparison of an area which allows recreational fishing only with an area in which all take is prohibited. (Goal 3, Objective 2)
- Provide research benefits from existing subtidal and intertidal monitoring sites in this area and in the adjacent Cambria State Marine Reserve. (Goal 3, Objective 2)
- Enhance recreational fishing experience prohibiting commercial fishing. (Goal 3, Objective 4)
- Increase positive socioeconomic impacts for recreational fishing by establishing a state marine park in an area of traditional recreational use. (Goal 5, Objective 1)

Figure 15. Cambria State Marine Conservation Area and White Rock (Cambria) State Marine Conservation Area



**MPA:** White Rock (Cambria) State Marine Conservation Area

**Area (sq. mi.):** 2.32

**Along-shore span (mi):** 3.5

**Depth range (ft):** 0-99

**Primary habitat types:** sandy beach, rocky intertidal, surfgrass, shallow hard and soft bottom, kelp bed.

**Regulations:** Take of all living marine resources is prohibited except the commercial take of kelp with limitations on total monthly harvest.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 15):

35° 32.85' N. lat. 121° 05.85' W. long.;

35° 32.85' N. lat. 121° 06.70' W. long.;

35° 30.50' N. lat. 121° 05.00' W. long.; and

35° 30.50' N. lat. 121° 03.40' W. long.

**Examples of species likely to benefit:** nearshore rockfish, squid, mussels, turban snails, limpets

**Summary of Objectives:** Provide for protection of a diverse area containing shallow hard and soft habitats, kelp beds, pinnacles, and associated fish and invertebrate species adjacent to an existing land based preserve and research facility.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect area of particularly high species diversity including fish, invertebrates, kelp, marine birds, and marine mammals, including major rookeries containing California sea lion, northern elephant seal, harbor seal, Stellar sea lion, and northern fur seal. (Goal 1, Objective 1)
- Protect communities associated with a mosaic of habitat types, including sandy beach with diverse cobble size, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of species associated with sandy beach, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs, including forage species such as juvenile rockfish, squid, and coastal pelagic finfish that serve as prey for other fish, marine birds, and marine mammals. (Goal 1, Objective 4)
- Protect larval sources and enhance reproductive capacity of nearshore fish and invertebrate species. (Goal 2, Objective 2)
- Provide protection to nearshore shelf rockfish species, cabezon, and kelp greenling through the prohibition of commercial and recreational fishing. (Goal 2, Objective 3)
- Replicate within a state marine reserve the range of shallow habitats found at Point Sur and Point Buchon State Marine Reserves. (Goal 3, Objective 2)
- Provide research benefits from existing subtidal and intertidal monitoring sites in this area and by comparison with adjacent state marine park. (Goal 3, Objective 2)

- Include and replicate sandy beach, rocky intertidal, surfgrass bed, kelp forest, pinnacles, and shallow hard and soft bottom habitat. (Goal 4, Objective 2)

**MPA:** Morro Bay State Marine Reserve

**Area (sq. mi.):** 0.3

**Along-shore span (mi):** 1.4

**Depth range (ft):** 0-10

**Primary habitat types:** coastal marsh, tidal flats, estuary.

**Regulations:** No take

**Boundaries:** This area includes the area below mean high tide line within Morro Bay east of longitude 120° 50.340' W. (Figure 16):

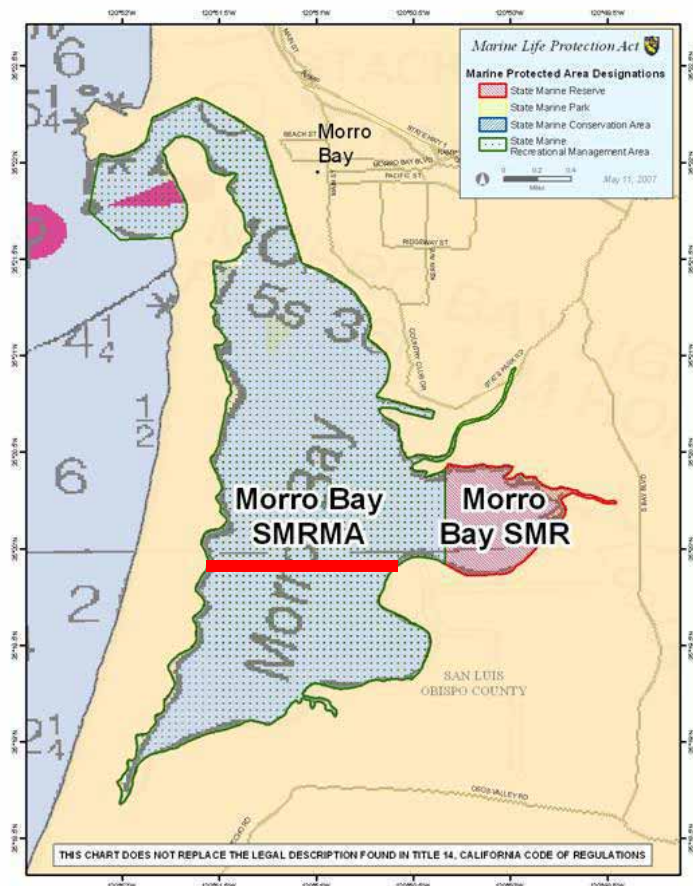
**Examples of species likely to benefit:** surfperches, leopard shark, starry flounder, worms, pelicans, scoters.

**Summary of Objectives:** Provide for complete protection in a portion of one of the few estuarine areas of the central coast. This area is within an existing State Park lease where current Park rules prohibit take of living resources.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect estuarine area with high marine bird diversity. (Goal 1, Objective 1)
- Protect communities associated with area with diversity of estuarine habitats, including open channels and mud flats, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age, size structure, and genetic diversity of fish and invertebrate species, especially elasmobranchs and flatfishes, characteristic of largest estuarine system within the central coast. (Goal 1, Objective 3)
- Protect natural structure and food web of estuarine system, including invertebrate forage base for marine birds. (Goal 1, Objective 4)
- Help protect listed marine birds and southern sea otter by protecting feeding area. (Goal 2, Objective 1)
- Enhance reproductive capacity of invertebrate and fish estuarine species by prohibiting take in important nursery area. (Goal 2, Objective 2)
- Provide educational and interpretive resources by establishing a state marine reserve adjacent to a museum, a terrestrial state park, and within the Morro Bay Estuarine Reserve. (Goal 3, Objective 1)
- Include and replicate representative central coast estuarine habitat within a state marine reserve. (Goal 3, Objective 2)
- Include estuarine habitat within a state marine reserve. (Goal 4, Objective 1)
- Minimize negative socio-economic impacts by establishing a state marine reserve in an area that is already closed to fishing, and where non-consumptive values such as wildlife viewing are likely to be enhanced. (Goal 5, Objective 1)

Figure 16. Morro Bay East State Marine Reserve and Morro Bay State Marine Recreational Management Area with no-take portion of the SMRMA indicated south of red line.



**MPA:** Morro Bay State Marine Recreational Management Area

**Area (sq. mi.):** 3.01

**Along-shore span (mi):** 9.4

**Depth range (ft):** 0-22

**Primary habitat types:** sandy beach, coastal marsh, tidal flats, eelgrass beds, estuary.

**Regulations:** Take of all living marine resources is prohibited except recreational take of finfish, permitted aquaculture of oysters, and receiving of finfish for bait purposes north of latitude  $35^{\circ} 19.700' N$ . Recreational hunting of waterfowl is permitted unless otherwise restricted by hunting regulations.

**Boundaries:** This area includes the area below mean high tide within Morro Bay east of the Morro Bay entrance breakwater and west of longitude  $120^{\circ} 50.340' W$ . (Figure 16):

**Examples of species likely to benefit:** worms, pelicans, scoters, ghost shrimp, mud shrimp.

**Summary of Objectives:** Provide increased protection for one of the few estuarine areas of the central coast while allowing for the traditional use of waterfowl hunting.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect estuarine area with high marine bird diversity. (Goal 1, Objective 1)
- Protect invertebrate communities associated with an area with a diversity of estuarine habitats, including open channels and mud flats, in close proximity to each other. (Goal 1, Objective 2)
- Protect the natural age, size structure, and genetic diversity of invertebrate species characteristic of largest estuarine system within the central coast. (Goal 1, Objective 3)
- Protect the natural structure and food web of estuarine system in a portion of the MMA, including invertebrate forage base for marine birds. (Goal 1, Objective 4)
- Help protect listed marine birds and southern sea otter by protecting feeding area. (Goal 2, Objective 1)
- Enhance reproductive capacity of invertebrate estuarine species by prohibiting take in important estuarine area. (Goal 2, Objective 2)
- Provide educational and interpretive resources by establishing a state marine recreational management area with full protection of marine invertebrate and algae species adjacent to a museum, a terrestrial state park, and within the Morro Bay Estuarine Reserve. (Goal 3, Objective 1)
- Include estuarine habitat within a state marine recreational management area. (Goal 4, Objective 1)
- Minimize negative socio-economic impacts by establishing a state marine recreational management area with a no-take component in a location that has experienced relatively little fishing effort but has been a traditional waterfowl hunting area. (Goal 5, Objective 1)

**MPA:** Point Buchon State Marine Reserve

**Area (sq. mi.):** 6.66

**Along-shore span (mi):** 2.9

**Depth range (ft):** 0-208

**Primary habitat types:** sandy beach, rocky intertidal, shallow hard and soft bottom, pinnacles, kelp bed.

**Regulations:** No take.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 17):

35° 15.25' N. lat. 120° 54.00' W. long.;

35° 15.25' N. lat. 120° 56.00' W. long.;

35° 11.00' N. lat. 120° 52.40' W. long.; and

35° 13.30' N. lat. 120° 52.40' W. long.

**Examples of species likely to benefit:** nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, California halibut, squid, shearwaters, pelicans, southern sea otter.

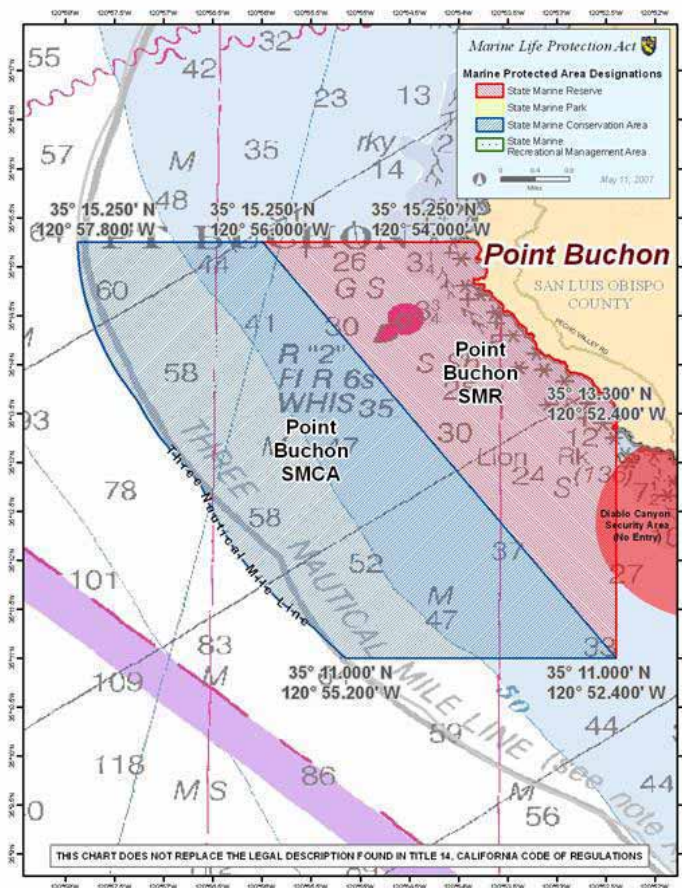
**Summary of Objectives:** Provide for complete protection of a diverse area containing shallow hard and soft habitats, kelp beds, pinnacles, and associated fish and invertebrate species, while benefiting from additional protection due to an adjacent national security closure. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect area of particularly high species diversity including fish, invertebrates, kelp, marine birds, and marine mammals. (Goal 1, Objective 1)
- Protect communities associated with diverse habitats, including sandy beach, rocky intertidal, kelp forest, and shallow hard and soft bottom habitat, in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of species associated with sandy beach, rocky intertidal, kelp forest, and shallow hard and soft bottom habitat. (Goal 1, Objective 3)
- Protect natural trophic structure and food webs in area representative of shallow hard and soft bottom habitats south of Morro Bay. (Goal 1, Objective 4)
- Protect full range of ecosystem functions in an area between two upwelling zones. (Goal 1, Objective 5)
- Help protect populations of nearshore rockfish in an area that has traditionally received relatively high fishing effort. (Goal 2, Objective 1).
- Protect larval sources and enhance reproductive capacity of nearshore fish and invertebrate species. (Goal 2, Objective 2)
- Establish a state marine reserve which encompasses an existing Cooperative Research and Assessment of Nearshore Ecosystems (CRANE) monitoring site, and which includes baseline data collected for power plant impact monitoring. (Goal 3, Objective 1)
- Establish a state marine reserve adjacent to a newly expanded terrestrial state park which has high visitor rates, interpretive facilities, docent presence, and parking. (Goal 3, Objective 1)
- Replicate within a state marine reserve the range of habitats found at fished sites south of Diablo Canyon Nuclear Power Plant. (Goal 3, Objective 2)
- Include pinnacle habitat within a state marine reserve. (Goal 4, Objective 1)
- Include and replicate sandy beach, rocky intertidal, kelp forest, pinnacles, and shallow hard and soft bottom habitat. (Goal 4, Objective 2)
- Establish a marine protected area complex (along with Point Buchon State Marine Conservation Area) that meets Master Plan Framework scientific guidelines for size. (Goal 5, Objective 3)



Figure 17. Pt. Buchon State Marine Reserve and Pt. Buchon State Marine Conservation Area including the Diablo Canyon Nuclear Power Plant Safety Zone.



**MPA:** Point Buchon State Marine Conservation Area  
**Area (sq. mi.):** 11.55  
**Along-shore span (mi):** 5.9  
**Depth range (ft):** 191-377

**Primary habitat types:** shallow hard and soft bottom, deep hard and soft bottom.

**Regulations:** Take of all living marine resources is prohibited except commercial and recreational take of salmon (*Oncorhynchus spp.*) and albacore (*Thunnus alalunga*).

**Boundaries:** This area is bounded by the state water line offshore and straight lines connecting the following points in the order listed unless otherwise stated (Figure 12):  
 35° 15.25' N. lat. 120° 56.00' W. long.;  
 35° 15.25' N. lat. 120° 57.80' W. long.; thence southward along the state water line to  
 35° 11.00' N. lat. 120° 55.20' W. long.;  
 35° 11.00' N. lat. 120° 52.40' W. long.; and  
 35° 15.25' N. lat. 120° 56.00' W. long.;

**Examples of species likely to benefit:** nearshore and shelf rockfishes, lingcod, cabezon, California halibut, squid, shearwaters, pelicans.

**Summary of Objectives:** Provide for increased protection of a diverse area containing shallow hard and soft habitats, kelp beds, pinnacles, and associated fish and invertebrate species, while minimizing impact to the salmon fishery. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect larval sources and enhance reproductive capacity of benthic fishes, invertebrates. (Goal 2, Objective 2)
- Provide additional protection for benthic species and typical forage species (squid and pelagic finfish) while allowing fishing for salmon and albacore. (Goal 2, Objective 3)
- Replicate with a state marine conservation area the range of habitats found at fished sites south of Diablo Canyon Nuclear Power Plant. (Goal 3, Objective 2)
- Minimize negative socio-economic impacts by incorporating a portion of the Rockfish Conservation Area (closed to groundfish take), and by allowing the harvest of salmon and albacore. (Goal 5, Objective 1)
- Establish a marine protected area complex (along with Point Buchon State Marine Reserve) that meets Master Plan Framework scientific guidelines for size. (Goal 5, Objective 3)

**MPA:** Vandenberg State Marine Reserve

**Area (sq. mi.):** 32.84

**Along-shore span (mi):** 14.3

**Depth range (ft):** 0-127

**Primary habitat types:** sandy beach, rocky intertidal, shallow hard and soft bottom, kelp bed.

**Regulations:** No take.

**Boundaries:** This area is bounded by the mean high tide line and straight lines connecting the following points in the order listed (Figure 18):

34° 44.65' N. lat. 120° 37.75' W. long.;

34° 44.65' N. lat. 120° 40.00' W. long.;

34° 33.25' N. lat. 120° 40.00' W. long.; and

34° 33.25' N. lat. 120° 37.25' W. long.

(A) Within the Vandenberg State Marine Reserve, no take of living marine resources is permitted except take incidental to the mission critical operations of the Vandenberg Air Force Base and approved commercial space launch operations approved by the Base Commander. (B) Public Entry. Public entry into the Vandenberg State Marine Reserve may be restricted at the discretion of the Department to protect wildlife, aquatic life, or habitat or by the Commander of Vandenberg Air Force Base to protect base operations.



(C) The Department shall enter into a Memorandum of Understanding (MOU) with the Commander of Vandenberg Air Force Base for the management and administration of the Vandenberg State Marine Reserve. The MOU shall include all uses necessary and compatible with the Vandenberg Air Force Base's national defense mission and details on cooperative enforcement and monitoring.

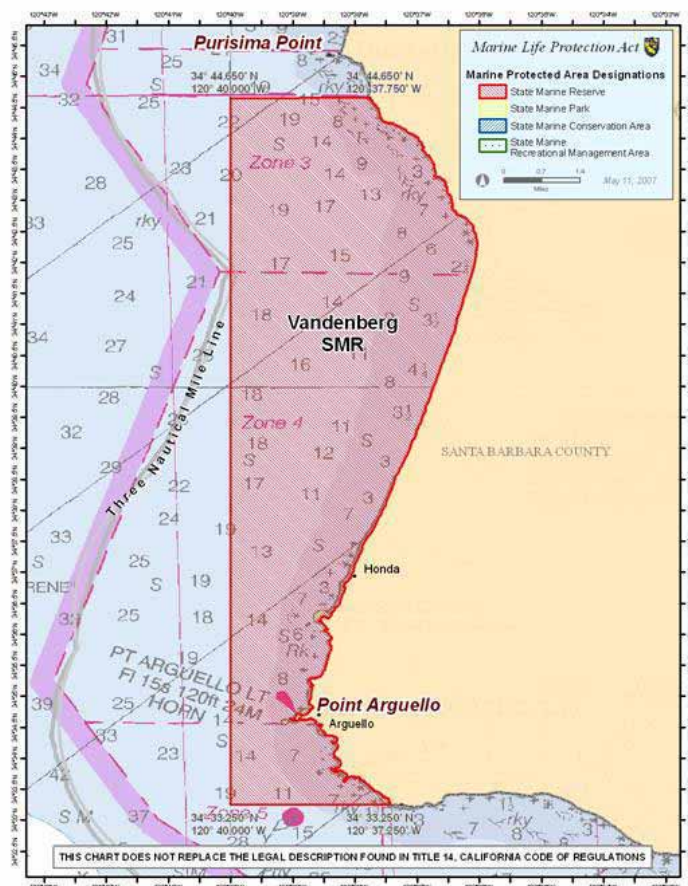
**Examples of species likely to benefit:** nearshore and shelf rockfishes, lingcod, cabezon, kelp greenling, surfperches, California halibut, Dungeness crab, rock crab, squid, shearwaters, pelicans, southern sea otter.

**Summary of Objectives:** Provide for complete protection of a diverse area containing shallow hard and soft habitats, kelp beds, and associated fish and invertebrate, while benefiting from protection provided by an existing state marine reserve and restrictions on vessel traffic, including fishing vessels, due to the presence of Vandenberg Air Force Base. This area is important to the formation of an ecologically sound MPA network component, by linking these habitats to similar habitats in other parts of the region.

**Detailed Objectives (with reference to regional goal and objective):**

- Protect area with high marine bird, marine mammal, fish, and invertebrate species diversity and abundance. (Goal 1, Objective 1)
- Protect communities associated with area with unique oceanographic conditions in transition zone near a biogeographical regional boundary, including sandy beach, rocky intertidal, kelp forest, and hard and soft bottom habitat, and in close proximity to each other. (Goal 1, Objective 2)
- Protect natural age and size structure of Nearshore Fishery Management Plan species which occur within the central coast. (Goal 1: Objective 3)
- Protect trophic structure and food web in area representative of shallow habitats south of Morro Bay. (Goal 1, Objectives 4)
- Protect ecosystem structure and functions in representative shallow habitat in southern end of central coast. (Goal 1, Objective 5)
- Increase ecological benefits to an area containing a mosaic of shallow hard and soft bottom habitats through the expansion of an existing state marine reserve. (Goal 1, Objective 5)
- Help protect marine bird and marine mammal species of concern by protecting forage base adjacent to colonies and rookeries. (Goal 2, Objective 1)
- Protect larval sources and enhance reproductive capacity of benthic fishes, invertebrates, and coastal pelagic finfish. (Goal 2, Objective 2)
- Establish a state marine reserve which encompasses an existing PISCO monitoring site, a Multi-Agency Intertidal Network (MARINe) monitoring site, and a Point Reyes Bird Observatory (PRBO) study site. (Goal 3, Objective 1)
- Replicate with a state marine reserve the same range of habitats found at fished sites at Point Sal. (Goal 3, Objective 2)
- Include and replicate within a state marine reserve sandy beach, rocky intertidal, and shallow hard and soft bottom habitats. (Goal 4, Objective 2)
- Establish a state marine reserve that meets preferred Master Plan Framework scientific guidelines for size. (Goal 5, Objective 3)

Figure 18. Vandenberg State Marine Reserve.



## 4.2 General Activities and Locations

### **Baseline Scientific Monitoring and Research plan**

Monitoring to support adaptive management of MPA networks or network components (a) begins with understanding of baseline conditions and (b) proceeds over time to monitor changes expected to result from the establishment of Marine Protected areas. Prior to full implementation, or concurrent with implementation of new or expanded MPAs, baseline data are needed to help guide future decisions on the effectiveness of the network component in meeting the goals of the MLPA and specific objectives of individual MPAs. These baseline indicators comprise a core set of biological and socioeconomic variables that will be an integral component of the MPAs' long term monitoring and where some urgency exists to commence data collection activities. Thus, these baseline indicators represent some, but not all, of the data categories needed for monitoring the MPA network.

Specifically, the baseline indicators fulfill the following three criteria:

1. Each will be useful for evaluating performance relative to the statewide, Central Coast regional, and MLPA goals and the individual MPA-specific objectives;
2. Each is likely to be highly sensitive to the changed management status of the MPAs following designation: Therefore, priority should be given to collecting data on these indicators as soon as possible relative to implementation of the MPAs; and
3. Practical scientifically-valid methods already exist for gathering data on each indicator.

Selection of these indicators was informed by consideration of the Central Coast regional and MPA specific goals and objectives and the broader set of long-term monitoring needs identified in Table 6. Following are lists of potential bio-physical and human use data collection programs ranked in priority for baseline data needs. Each includes estimates for the first year costs for the Central Coast project area. These costs would form the basis of estimates for long-term costs for future study regions, but should not be considered equivalent to annual costs for a long term monitoring plan and associated costs to support adaptive management. The final data collection programs will depend upon both the final set of MPAs selected and implementation dates.

### **Potential Bio-Physical Baseline Data Collection Programs**

**Indicator:** Distribution, diversity, relative abundance, and sizes of species and habitat attributes for deep canyons, coral, and rocky reef habitats.

**Priority:** High

**Description:** This program would use submersible submarine surveys to study deepwater species and habitats inside and outside of designated MPAs in the Central Coast. Surveys would focus on approximately 60-80 species of fish and 20-30 species of invertebrates at depths ranging from 50-300 meters at approximately 34 sites (17 MPAs) and would require approximately one sea day per site.

**Relation to Existing Programs:** These data are not being collected by existing programs.

**Estimated Cost:** \$1,600,000

**Indicator:** Distribution, diversity, relative abundance, and sizes of species and habitat attributes for kelp forest habitats.

**Priority:** High

**Description:** This program would use SCUBA surveys to study kelp forest species and habitats inside and outside of designated MPAs in the Central Coast. Surveys would focus on approximately 25 species of fish, 30 species of invertebrates, and 10 species of algae at approximately 30 sites (15 MPAs).

**Relation to Existing Programs:** This program would compliment existing monitoring programs.

**Estimated Cost:** \$400,000

**Indicator Data:** Distribution, diversity, relative abundance, and sizes of species and habitat attributes for kelp forest habitats.

**Priority:** High

**Description:** This program use fishing gear surveys to study kelp forest species inside and outside of designated MPAs with kelp forest habitats in the Central Coast. Surveys would focus on 25 species of fish at approximately 30 sites (15 MPAs) and would require multiple days of surveys at each location.

**Relation to Existing Programs:** These data are not being collected by existing programs.

**Estimated Cost:** \$250,000

**Indicator Data:** Distribution, diversity, relative abundance, and sizes of species and habitat attributes for midwater and deep soft bottom habitats.

**Priority:** Medium

**Description:** This program would use sled or ROV surveys to study soft bottom species and habitats inside and outside of designated MPAs in the Central Coast. Surveys would focus on fish at approximately 10 sites (5 MPAs based).

**Relation to Existing Programs:** These data are not being collected by existing programs.

**Estimated Cost:** \$400,000

**Indicator Data:** Distribution, diversity, relative abundance, and sizes of species and habitat attributes for rocky intertidal habitats.

**Priority:** Medium

**Description:** This program would use visual surveys to study rocky intertidal species and habitats inside and outside of designated MPAs in the Central Coast. Surveys would focus on algae and invertebrates at approximately 28 sites (14 MPAs).

**Relation to Existing Programs:** This program would compliment existing monitoring programs.

**Estimated Cost:** \$200,000

**Indicator Data:** Distribution, species composition, abundance (density), group size, and behaviors or marine mammal and bird populations

**Priority:** Medium

**Description:** This program would use shipboard surveys and follow randomly placed transect lines inside and adjacent to designated MPAs in the Central Coast. Surveys would gather information of a wide variety of species, with special attention to Marbled Murrelets, Common Murre, Sooty Shearwaters, Cassin's Auklet, Harbor seals, and Harbor porpoise. Surveys would

focus on 10 MPAs in the network where marine birds and mammals were listed as a priority in MPA-specific objectives.

**Relation to Existing Programs:** This program would compliment existing monitoring programs.

**Estimated Cost:** \$200,000

**Indicator Data:** Distribution, diversity, relative abundance, and sizes of species and habitat attributes for estuarine habitats

**Priority:** Low

**Description:** This program would study estuarine species and habitats at designated MPAs in the Central Coast (2 MPAs).

**Relation to Existing Programs:** Programs to gather these data may already exist at MPAs in the Central Coast. Such programs need to be researched.

**Estimated Cost:** Up to \$500,000 depending on existing programs.

**Indicator Data:** Distribution, diversity, relative abundance, and sizes of species and habitat attributes for sandy beach habitats

**Priority:** Low

**Description:** This program would use tag and recapture programs and visual and SCUBA surveys to study sandy beach species and habitats in less than 15 meter depths inside and outside of designated MPAs in the Central Coast. Surveys would focus on fish, invertebrates, and birds at all MPAs with sandy beach habitats.

**Relation to Existing Programs:** These data are not being collected by existing programs.

**Estimated Cost:** \$200,000

### **Potential Human-Use Baseline Data Collection Programs**

**Indicator Data:** Fine-scale spatial data on effort and harvest of commercial consumptive users.

**Priority:** High

**Description:** This program would use transponders on a sample of the commercial fishing fleet in order to gather information on the effort and harvest of these users. This program would also develop a protocol to be used with the transponder information.

**Relation to Existing Programs:** These data would complement the logbook information that is collected for the commercial squid and spot prawn fisheries.

**Estimated Cost:** \$280,000

**Indicator Data:** CRFS data, intercept surveys, logbook data for recreational consumptive users (Phase 1)

**Priority:** High

**Description:** Catch and fishing effort data for recreational consumptive users (including commercial passenger fishing vessels) are currently being collected from a variety of sources. This program will assimilate, compile, and analyze this existing information to make it more usable in assessing MPAs in the Central Coast Study Region, including the development of GIS tools.

**Relation to Existing Programs:** These data are already being collected, but the resulting information has not been synthesized.

**Estimated Cost:** \$100,000

**Indicator Data:** CRFS data, intercept surveys, logbook data for recreational consumptive users (Phase 2)

**Priority:** High

**Description:** Catch and fishing effort data for recreational consumptive users (including commercial passenger fishing vessels) are currently being collected from a variety of sources. This program will expand the collection of these data in order to better understand assess MPAs in the Central Coast Study Region

**Relation to Existing Programs:** These data are already being collected, but collection programs need to be expanded.

**Estimated Cost:** \$300,000

**Indicator Data:** Non-consumptive effort and welfare data (primary group).

**Priority:** High

**Description:** This program would measure effort and welfare (number of trips, number of dives, etc.) of non-consumptive SCUBA divers across time and space. Zip code information (travel cost) and expenditure patterns data would also be collected. Sampling methods might include postcard mail-back surveys to identify the user populations, internet surveys for more in-depth info and intercept surveys for fine scale spatial data including looking at charts/maps and creating shapefiles to determine where use occurs.

**Relation to Existing Programs:** These data are not being collected by existing programs.

**Estimated Cost:** \$400,000

**Indicator Data:** Cost and earnings data for commercial consumptive users.

**Priority:** Medium

**Description:** This program would collect data on cost and earnings of commercial fishermen before and after MPA implementation.

**Relation to Existing Programs:** These data are not being collected by existing programs.

**Estimated Cost:** \$300,000

**Indicator Data:** Stated importance data for commercial consumptive users.

**Priority:** Medium

**Description:** This program would expand upon the data collected by Ecotrust by conducting stated importance surveys on a regular short-term basis (e.g. annually) with commercial fishermen. This kind of information might be used to address gaps in other data on commercial consumptive users.

**Relation to Existing Programs:** This program would expand upon the past Ecotrust study.

**Estimated Cost:** \$250,000-\$300,000

**Indicator Data:** Stated preference data for recreational consumptive users

**Priority:** Medium

**Description:** Additional data would be collected to measure the knowledge, attitudes, and perceptions (beyond what is collected in CRFS surveys) of recreational consumptive users in relation to MPAs by means of representative sampling using surveys, group sessions, data mining, and other methods. Phone surveys might be used for license-holders. Intercept surveys would be necessary to collect data on users fishing from man-made structures.

**Relation to Existing Programs:** These data are not being collected by existing programs.

**Estimated Cost:** \$250,000-\$300,000

**Indicator Data:** Cost and earnings data for recreational consumptive use businesses

**Priority:** Medium

**Description:** These data are necessary to estimate impact of MPAs on employment, business profitability, and flow of pertinent tax revenues.

**Relation to Existing Programs:** These data have not been collected in a broad, uniform effort

**Estimated Cost:** \$100,000-\$200,000

**Indicator Data:** Non-consumptive effort and welfare data (secondary group).

**Priority:** Medium

**Description:** This program would measure effort and welfare of non-consumptive users for a "secondary" group, including kayakers, wildlife viewers (tidepool, bird, and whale) and unplanned ancillary activities. These users are less directly affected by MPAs than the "primary" group described above, though they may be greater in number.

**Relation to Existing Programs:** These data are not being collected by existing programs.

**Estimated Cost:** \$200,000

**Indicator Data:** Non-consumptive user knowledge, attitudes, and perceptions.

**Priority:** Medium

**Description:** This program would gather data on the knowledge, attitudes, and perceptions of non-consumptive users across time, space, and user-group. Information would be gathered for core non-consumptive user groups including divers, kayakers, and wildlife viewers (whale, bird, tidepool). Data would be gathered by means of surveys, group sessions, data mining, and other methods.

**Relation to Existing Programs:** These data are not being collected by existing programs.

**Estimated Cost:** \$100,000 (Estimated cost dependent on combination with effort and welfare data collection programs)

### **Long-term and Ongoing Monitoring Plan**

As stated in Section 6 of the master plan, the purpose of monitoring is to measure performance relative to stated goals and objectives and provide information for adaptive management. The Marine Life Protection Act (MLPA) calls for monitoring of selected areas to assist with adaptive management of the MPA network. Similar to the baseline program, ongoing monitoring is directed by the specific objectives of the individual MPAs (see individual MPA and MMA descriptions in section 8.4.1 above) within the regional network component as well as the overarching objectives of the regional component as a whole (see regional goals and objectives in section 8.4.1 above) and those of the MLPA. Given the anticipated size of the statewide network as well as network components, monitoring all MPAs for all goals and objectives is not feasible. Rather, where MPAs share goals and/or objectives, a representative subset of MPAs will be monitored to determine performance. It is expected that most objectives for each MPA will be evaluated.

The regional goals are: Goal 1) to protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems; Goal 2) to help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted; Goal 3) improve recreational, educational, and study opportunities provided by marine ecosystems that are subject to minimal human disturbances and manage

these uses in a manner consistent with protecting biodiversity; Goal 4) to protect marine natural heritage, including protection of representative and unique marine life habitats in central California waters, for their intrinsic value; Goal 5) ensure that central California's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines; and Goal 6) to ensure that the central coast's MPAs are designed and managed, to the extent possible, as a component of a statewide network (Section 8.4.1). Monitoring will be necessary and evaluated by performance indicators for specific objectives for each goal. Monitoring will encompass biophysical, socioeconomic, management, and enforcement parameters.

The long term monitoring program will consist of existing monitoring programs and collaborations. Ongoing monitoring programs that meet the necessary parameters will be utilized and expanded upon where necessary. Collaborations will also be sought to support additional monitoring efforts and where no ongoing monitoring is occurring. Ongoing monitoring efforts are discussed in greater detail below in the section Long Term Monitoring. Potential collaborations are identified under the monitoring plan and in the section Collaborations and Potential Partnerships. A request for proposals process will be used to support monitoring programs and develop specific protocol.

## **Biophysical Monitoring**

### **Monitoring ecosystem attributes**

A functioning ecosystem is one that maintains species diversity and abundance, trophic structure, and can contain multiple habitats. Further, ecosystem functions are those natural processes that provide a set of conditions to allow for the above factors to occur and be maintained. These processes are driven by both biological and physical factors which combine in specific areas, e.g. areas of upwelling or biogeographic transition zones.

Regional goal 1 is essentially the protection of ecosystems and ecosystem attributes. The primary objectives within goal 1 are to protect and maintain ecosystem structure and function; protect and maintain areas of high species diversity and abundance; protect and maintain trophic structure; protect marine communities associated with a diversity of habitats; and the natural size and age structure and genetic diversity of populations. While the objectives are intended to provide protection to ecosystems, ecosystems are not bounded in small areas. An MPA provides protection by means of regulations to a specific area containing part of the ecosystem. The regulations primarily limit fishing, but may restrict other activities that have the potential to damage resources. It is assumed that human activities, particularly fishing, have reduced or eliminated populations of some species in some areas, changed feeding and other ecological relationships, and/or resulted in alterations in ecosystem attributes. With the restriction of deleterious activities, ecosystem attributes should recover within the protected area.

The objectives in Goal 1 will be achieved through the protection of various ecozones and habitats represented across all MPAs. As an example, Año Nuevo SMR and Point Sur SMR contain headlands that create a lee, while upwelling zones have been identified in the Big Creek SMR and Point Buchon SMR, and areas of high species diversity will be protected with the Año Nuevo SMR, Piedras Blancas SMR, Cambria SMR, Point Buchon SMR, and



Vandenberg SMR. Some MPAs have been identified as containing specific habitats or species. For example, estuarine habitats will be protected in the Elkhorn Slough SMR and SMP or the Morro Bay SMRMA and SMR while many nearshore fishery management plan species are found in the Greyhound Rock SMCA. Similarly, certain MPAs have been identified to protect the trophic structure of seabirds, marine mammals, or higher trophic level fish.

Performance indicators will provide a unit to compare against reference areas outside the MPAs. Indicators for ecosystem structure and function include species composition, species diversity and number of species with increased recruitment. The expectation is that a full complement of species is present and that abundances are within the range of normal variability. If that is the case, then competition between species, predator/prey relationships and other functional attributes should be normal as well. If the MPA serves as a nursery, initial juvenile recruitment should be enhanced relative to reference areas outside MPAs. The number of species with enhanced recruitment measures the magnitude of the nursery function across species. Species composition and diversity can be calculated from measurements of the number of species, their relative abundance, and evenness within a sample.

### **Population Monitoring**

Regional goal 2 provides protection for populations and the rebuilding of depleted populations. Objectives that are necessary in protecting populations and population dynamics (goal 2) are to enhance reproductive capacity and protect larval sources through the retention of large, mature individuals, and to protect particular species of interest while allowing some harvest of others. An additional objective within goal 2 is the rebuilding of depleted species and protection of the habitats upon which they rely. As noted for goal 1 these objectives will be met through various MPAs.

Performance indicators for population monitoring include identifying the proportion of the regional population within MPAs, population size, recruitment and mortality, number of juveniles, number of reproductive females, and the number of larvae or offspring per adult.

Protection of larval sources and enhanced reproductive capacity goes hand-in-hand with protection of the population. With reduced mortality, it is expected that the number and size of individuals within MPAs will increase. With increasing numbers of large females, reproductive capacity should increase (be enhanced). If a MPA acts as a nursery site, there should be more juveniles inside the MPA than in outside reference areas. The increase in recruitment could result from self-recruitment (larvae settling back to the populations from which they were spawned) or from recruitment from outside areas. Similarly, if a MPA acts as a spawning site, there should be increased reproductive output from that MPA.

The amount of protection afforded a population by MPAs depends on the proportion of the population within MPAs and the residence time of that proportion. Population size can be calculated from measurements of density and the amount of available habitat. Estimating the proportion of the regional population within MPAs requires an estimate of the total abundance of the population within the region and residence time within MPAs. When most of the population lives within MPAs and the species is relatively sedentary, protection will be high. When the species is broadly distributed and/or mobile, protection will be lower. MPAs may

provide protection for a critical life stage. In this case, protection may be high even when a majority of the population is not protected.

The contribution of the MPAs to the restoration of overfished species can, in part, be measured by the increase in abundance within MPAs compared to areas outside of MPAs. Presumably, enhanced reproduction will also increase abundance of depleted species outside of MPAs. However, at present, it is difficult to follow the movement of larvae (or other propagules) produced in MPAs, although new genetic and other approaches can provide measures of larval dispersal, demographic connectivity between populations, and self-recruitment. It is also difficult to determine if settling larvae survive and grow to reproductive size. The potential contribution of MPAs to restoration of depleted populations can be calculated, but measuring the realized potential will require further research and development.

For seabirds and mammals, the primary indicator is the number of offspring per adult, which can be measured by monitoring breeding activity.

### **Habitat Monitoring**

Regional goal 4 is the protection of habitats. Objectives pertaining to the protection of habitats are the inclusion and replication of a diversity of habitats within the MPA network and network components, inclusion of a diversity of habitats within individual MPAs, and the protection of specific habitats. Additionally, goal 4 specifically calls for the inclusion of estuaries, heads of submarine canyons, and pinnacles. These objectives were used in designing network components and will be realized with implementation of the MPAs.

The indicators for habitat monitoring are the presence or absence of a particular habitat and the amount of habitat in each habitat category. While this indicator only measures quantity, indicators of quality are not currently available. Measuring habitat will require calculating habitat areas from existing fine-scale habitat maps, kelp bed aerial survey photos, and mapping previously unmapped hard and soft bottom substrates, eelgrass and surfgrass beds. It will also require using satellite imagery to map the location of upwelling plumes near Point Sur and the location of the transition zone near Point Conception.

Determining if the objectives are met will require measuring the amount of each habitat in the MPAs. Measurements are needed over time because anthropogenic activities can change habitats. The location of oceanographic features may also change over time.

### **Socioeconomic Monitoring**

Socioeconomic information is needed to evaluate regional Goal 3 which is to improve recreational, educational, and study opportunities provided by marine ecosystems that are subject to minimal human disturbances, and to manage these uses in a manner consistent with protecting biodiversity. Evaluating this goal will require monitoring human activities, the effect of the activities on the ecosystem, and the effectiveness of management.

Primary indicators for socioeconomic monitoring include changes in non-consumptive recreational, commercial, and educational and research activities. Indicators for recreation include the number of recreational trips by activity (scuba diving, boating and kayaking, wildlife

viewing, tidepooling), and recreational participant satisfaction. Indicators for education are the number of educational trips and the number of classroom study units related to central coast MPAs. Indicators for research are the number of research projects in the MPAs and the number of citations of publications resulting from projects in MPAs.

To determine the social and economic ramifications for users and associated communities there is a particular need to measure changes in recreational and commercial fishing and non-consumptive uses, not only as part of the evaluation of social and economic impacts, but also to determine if displacement of fishing activity is increasing biological impacts outside of MPAs.

### **Management and Enforcement Monitoring**

Information related to management and enforcement is needed for the evaluation of regional Goal 5 which is to ensure that central California's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines; and Goal 6 which is to ensure that the central coast's MPAs are designed and managed, to the extent possible, as a component of a statewide network. Specific regional objectives under goal 5 are basically to minimize negative socioeconomic impacts, develop objectives, a long term monitoring plan, and evaluation process, and use scientific guidelines in the Master Plan Framework. Regional objectives under goal 6 include developing a process for regional review and evaluation including stakeholder involvement, and developing a mechanism to coordinate future stakeholder groups to ensure the statewide network meets the goals of the MLPA.

Indicators for management and enforcement monitoring are discussed below in the long-term monitoring plan summary.

### **Network Monitoring**

Regional goals providing guidance on network design are: Goal 5) to ensure that central California's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines; and Goal 6) to ensure that the central coast's MPAs are designed and managed, to the extent possible, as a component of a statewide network.

The MLPA Science Advisory Team (SAT) developed guidelines as a framework for the design process with the intention of producing a network of MPAs that met the goals and objectives of the MLPA. MPA-specific objectives for network design provide directions for: 1) siting MPAs (e.g., site a MPA adjacent to a terrestrial park/reserve); 2) meeting network criteria for size, shoreline extent, etc.; 3) increasing socioeconomic benefits; 4) minimization of negative socioeconomic impacts; 5) provision for some types of fishing and/or harvest; and 6) provision for research and education.

It should be noted that some of the MPA objectives will not require monitoring but will be met upon adoption. These objectives are listed in Table 5 below. Other MPA objectives related to the protection of the physical habitat types will not require monitoring but only an initial verification of the presence of those habitats, as significant long-term changes to basic substrate types are not expected to occur within MPAs or the central coast region in general.

For the remainder of the MPA objectives, specific monitoring activities linked to them are provided below with the specific indicators to be monitored. The sampling design and frequency of monitoring will incorporate considerations of spatial and temporal variation in ecological and human-related patterns and processes. In any case, sampling frequency will vary from annually to every five years depending on the information being gathered and spatial location (Table 6).

Evaluating performance of the network or network components requires knowledge of connectivity. Biological connectivity of the network and network components depends on the movement of adults and larvae or other propagules (e.g., spores) between individual MPAs. As discussed above, adults and juveniles gain protection by residence within an MPA. The residence may be within a single MPA or within multiple MPAs. With larvae, the expectation is that some larvae produced in an MPA will settle and grow within another MPA. Of course, larvae settling in any one area are likely to come from multiple sources. Larvae settling in an MPA may come from areas outside of MPAs and larvae produced in an MPA may settle in or outside MPAs. To measure connectivity, the source of the settling larvae must be known.

With the current state of knowledge, it is possible to measure adult and juvenile movement with acoustic tags and/or mark and recapture studies. Although measuring larval production and settlement in the field is possible, tracking larval dispersal and determining larval sources is difficult. However, new genetic and other approaches can provide measures of larval dispersal, demographic connectivity between populations, and self-recruitment (larvae settling back to the populations from which they were spawned). Larval dispersal can also be modeled. With additional research, it may be possible to improve methods for tracking larvae or develop other approaches for measuring network properties. The biophysical monitoring program will provide useful information on, among other things, adult movement and the change in the density, size structure and larval production of populations over time. Research is needed to provide guidance on how to use the data to measure connectivity.

Final determinations on effectiveness of the region's network component will be made based upon the network component as a whole, though adaptive management may occur at the scale of individual MPAs, groups of MPAs, or the entire regional network component. Table 6 lists the goals of the MLPA the various MPAs expected to help achieve those goals, the general objectives, the overarching questions necessary to determine if the objectives have been met, and the general monitoring activities. Following the table is a summary of the monitoring plan necessary to conduct the activities listed.

Table 5. Central coast MPA objectives that will be met (or mostly met) by adoption and implementation of the MPA. For full objectives see section 8.4.1 above.

MLPA Goal By Number	MPAs	General Objective	Overarching Question	Monitoring Activity
2	Soquel Canyon SMCA Portuguese Ledge SMCA Point Lobos SMCA Point Buchon SMCA	Protect rockfishes and other components of a deep benthic community, while allowing some harvest	Is take of rockfish prohibited while other harvest is allowed?	Completed by adoption of MPA; will require monitoring of use to confirm
2	Elkhorn Slough SMP	Provide for traditional recreational consumptive and nonconsumptive uses while offering some protection due to the prohibition of commercial fishing.	Does the MPA allow for recreational and nonconsumptive uses and prohibit commercial ones?	Completed by adoption of MPA; will require monitoring of use to confirm
2	Carmel Bay SMCA	Allow continued recreational harvest of finfish and commercial harvest of kelp by hand in an area of historic recreational use value near Monterey harbor while protecting invertebrates.	Does the MPA allow continued uses and prohibit take of invertebrates?	Completed by adoption of MPA; will require monitoring of use to confirm
3	Elkhorn Slough SMR Soquel Canyon SMCA Portuguese Ledge SMCA Ed Ricketts SMCA Lovers Point SMR Pacific Grove Marine Gardens SMCA Carmel Bay SMCA Point Lobos SMR Point Lobos SMCA Big Creek SMCA Big Creek SMR Cambria SMR Morro Bay SMRMA Morro Bay SMR Point Buchon SMR Vandenberg SMR	Provide increased research, education and study opportunities	Is MPA adjacent or near to research facilities or sites and do research and education activities increase over time?	Partially completed by adoption of MPA, track research and education activities.
3	Big Creek SMCA Big Creek SMR	Provide opportunities afforded by a nearby terrestrial reserve...to link classroom curricula.	Does MPA provide opportunity to link to classroom curricula?	Completed by adoption of MPA; will require monitoring of use to confirm
3	Big Creek SMCA Big Creek SMR	Provide opportunities for collaborative research projects involving commercial fishermen, including a possible study on the impact of salmon fishing.	Does MPA provide opportunities for collaborative research?	Completed by adoption of MPA; will require monitoring of use to confirm
3	Ed Ricketts SMCA Pacific Grove Marine Gardens SMCA	Promote opportunity for use of volunteer scuba divers in research and monitoring projects by establishing a state marine conservation area in a location heavily used by scuba divers where volunteer monitoring ...already takes place.	Is the MPA in an area where volunteer monitoring takes place?	Completed by adoption of MPA; will require monitoring of use to confirm

<b>MLPA Goal By Number</b>	<b>MPAs</b>	<b>General Objective</b>	<b>Overarching Question</b>	<b>Monitoring Activity</b>
3	Pacific Grove Marine Gardens SMCA Carmel Bay SMCA	Maintain an existing state marine conservation area located near a population center that is accessible for recreational opportunities, both consumptive and non-consumptive.	Is the MPA near the population center and accessible to recreational opportunities?	Completed by adoption of MPA
3	Carmel Bay SMCA	Allow for the comparison of a recreational fishing area adjacent to a no-take area.	Does the MPA allow for take/no-take comparison?	Completed by adoption of MPA
3	Año Nuevo SMR Point Lobos SMR Point Sur SMRPt. Buchon SMR NaturalBridges SMR Elkhorn Slough SMR Piedras Blancas SMR White Rock (Cambria) SMCA	Site a marine protected area adjacent to a terrestrial state park or state reserve ...	Is MPA adjacent to a State Park or Reserve?	Año Nuevo State Reserve, Point Lobos State Reserve, Point Sur State Historic Park, and Montana de Oro  Completed by adoption of MPA
5	Point Lobos SMR Point Lobos SMCA Big Creek SMCA Big Creek SMR Point Buchon SMR Point Buchon SMCA	Establish marine protected area complexes that meet Master Plan Framework scientific guidelines for minimum size	Does complex meet minimum guidelines?	Completed by adoption of MPA
5	Soquel Canyon SMCA Portuguese Ledge SMCA Point Sur SMR Point Sur SMCA Piedras Blancas SMR Piedras Blancas SMCA Vandenberg SMR	Establish marine protected areas or complexes that meet Master Plan Framework scientific guidelines regarding preferred size.	Does the MPA meet the preferred size guidelines?	Completed by adoption of MPA
5	Ed Ricketts SMCA	Minimize negative socio-economic impacts by establishing a state marine conservation area which allows recreational fishing and hand harvest of kelp by local aquaculturists, while affording protection to invertebrates and prohibiting all other commercial take.	Does MPA allow recreational fishing and hand harvest of kelp and prohibit other take?	Completed by adoption of MPA
5	Pacific Grove Marine Gardens SMCA	Allow continued recreational fishing in traditional use area and hand harvest of kelp close to abalone aquaculture facilities.	Are recreational fishing and kelp harvest allowed in the area?	Completed by adoption of MPA

<b>MLPA Goal By Number</b>	<b>MPAs</b>	<b>General Objective</b>	<b>Overarching Question</b>	<b>Monitoring Activity</b>
5	Morro Bay SMRMA	Minimize negative socio-economic impacts by establishing a state marine recreational management area in a location that has experienced relatively little fishing effort but has been a traditional waterfowl hunting area.	Does the area allow waterfowl hunting while prohibiting other take?	Completed by adoption of MPA
5	Morro Bay SMR	Minimize negative socio-economic impacts by establishing a state marine reserve in a location that is already closed to fishing...	Is the area already closed to fishing?	Completed by adoption of MPA

Table 6. Central coast MPA monitoring activities based upon MLPA Goals and general individual MPA objectives. For full objectives see section 8.4.1 above.

<b>MLPA Goal By Number</b>	<b>MPAs</b>	<b>General Objective</b>	<b>Overarching Question</b>	<b>Potential Monitoring Activity and Frequency</b>
1	Año Nuevo SMR Greyhound Rock SMCA Soquel Canyon SMCA Portuguese Ledge SMCA Point Lobos SMR Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Piedras Blancas SMR Piedras Blancas SMCA Cambria SMR Morro Bay SMRMA Morro Bay SMR Point Buchon SMR Vandenberg SMR	Protect area of high species diversity...and maintain species diversity and abundance...	Do species richness and/or diversity stay the same or increase in MPAs relative to areas of similar habitat adjacent to and distant from MPAs?	<p>Measure community structure and species composition including habitat forming species within and outside MPAs over time</p> <p>Monitoring frequency should occur annually to every other year, except Morro Bay SMRMA and Morro Bay SMR bird diversity should be monitored upon implementation and every 3<sup>rd</sup> year thereafter</p>

<b>MLPA Goal By Number</b>	<b>MPAs</b>	<b>General Objective</b>	<b>Overarching Question</b>	<b>Potential Monitoring Activity and Frequency</b>
1	Año Nuevo SMR Soquel Canyon SMCA Portuguese Ledge SMCA Carmel Pinnacles SMR Point Lobos SMR Point Lobos SMCA Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Piedras Blancas SMR Piedras Blancas SMCA Cambria SMR Morro Bay SMRMA Morro Bay SMR Point Buchon SMR Vandenberg SMR	Protect marine communities associated with various diverse habitats	Is the habitat present and does it persist in a viable state within the MPA?	<p>Monitor habitat presence, composition, and status over time</p> <p>Monitoring frequency should occur upon implementation and every 3<sup>rd</sup> year thereafter,</p>
1	Año Nuevo SMR Greyhound Rock SMCA Elkhorn Slough SMR Elkhorn Slough SMP Point Lobos SMR Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Piedras Blancas SMR Piedras Blancas SMCA Cambria SMR Morro Bay SMRMA Morro Bay SMR Point Buchon SMR Vandenberg SMR	Protect natural size and age structure and genetic diversity of various marine species populations	Do focal species inside marine reserves increase in size, numbers, and biomass relative to areas of similar habitat adjacent to and distant from MPAs?	<p>Measure size range, density, and makeup of focal species assemblages within, adjacent to and far from MPAs</p> <p>Monitoring frequency should occur annually to every other year</p>
1	Año Nuevo SMR Point Lobos SMR Point Sur SMR Point Sur SMCA Piedras Blancas SMR Piedras Blancas SMCA Cambria SMR Morro Bay SMRMA Morro Bay SMR Point Buchon SMR Vandenberg SMR	Protect natural trophic structure and food web including forage base ...for listed marine birds and marine mammals as well as higher trophic level fish...	Is the food web integrity greater within the MPA than outside: Do the abundance and size/age structure of key predator and prey species differ inside and outside MPAs in areas of comparable habitat?	<p>Map trophic relationships then estimate biomass for different trophic levels and measure average weight of higher trophic level species where possible</p> <p>Monitoring frequency should occur every 3<sup>rd</sup>-5<sup>th</sup> year</p>



MLPA Goal By Number	MPAs	General Objective	Overarching Question	Potential Monitoring Activity and Frequency
1	Año Nuevo SMR Point Lobos SMR Big Creek SMR Point Buchon SMR Vandenberg SMR	Protect ecosystem structure and functions associated with various habitats	Is the proportion of area within which focal species are restored to or maintained at self replenishing levels greater within the MPA than in similar habitats outside?	Use community structure and focal species size range and density data to model ability to replenish  Monitoring frequency should occur every 3 <sup>rd</sup> -5 <sup>th</sup> year
1	Elkhorn Slough SMR Elkhorn Slough SMP	Protect estuarine area with high bird diversity.	Does MPA contain high bird diversity and is this diversity maintained?	Monitor bird diversity within and outside the area over time.  Monitoring frequency should occur upon implementation and every 3 <sup>rd</sup> year thereafter
1	Elkhorn Slough SMR Elkhorn Slough SMP	Protect area with diversity of estuarine habitats...	Is the habitat present and does it persist in a viable state within the MPA?	Monitor habitat presence, composition, and status over time  Monitoring frequency should occur upon implementation and every 3 <sup>rd</sup> year thereafter
1	Elkhorn Slough SMR Morro Bay SMRMA Morro Bay SMR	Protect natural structure and food web of estuarine system...	Is the food web integrity greater within the MPA than outside: Do the abundance and size/age structure of key predator and prey species differ inside and outside MPAs in areas of comparable habitat?	Map trophic relationships then estimate biomass for different trophic levels and measure average weight of higher trophic level species where possible  Monitoring frequency should occur upon implementation and every 3 <sup>rd</sup> year thereafter
1	Soquel Canyon SMCA Portuguese Ledge SMCA	Help restore overfished species by maintaining large individuals	Do focal species inside MPAs increase in size, numbers, and biomass relative to areas of similar habitat adjacent to and distant from MPAs?	Measure size range, density, and makeup of focal species assemblage within, near and distant from MPA over time  Monitoring frequency should occur annually to every other year

MLPA Goal By Number	MPAs	General Objective	Overarching Question	Potential Monitoring Activity and Frequency
1	Point Sur SMR Point Sur SMCA	Provide protection to species associated with an area that contains a persistent upwelling plume and generally southerly flow, well-suited to provide larval dispersal to other areas.	Proportion of area within which focal species are restored to or maintained at self replenishing levels	Use community structure and focal species size range and density data to model ability to replenish  Monitoring frequency should occur every 3 <sup>rd</sup> -5 <sup>th</sup> year in the Point Sur SMR and once upon implementation in the Point Sur SMCA
2	Ed Ricketts SMCA	Protect invertebrates and the habitats on which they depend while allowing the harvest of finfish and kelp.	Do species richness and/or diversity stay the same or increase in MPAs relative to areas of similar habitat adjacent to and distant from MPAs?	Measure community structure and species composition including habitat forming species within and outside MPAs over time  Monitoring frequency should occur annually to every other year
2	Año Nuevo SMR Greyhound Rock SMCA Elkhorn Slough SMR Soquel Canyon SMCA Portuguese Ledge SMCA Point Lobos SMR Point Lobos SMCA Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Piedras Blancas SMR Piedras Blancas SMCA Cambria SMR Point Buchon SMR Point Buchon SMCA Vandenberg SMR	Protect larval source and enhance reproductive capacity of various species including overfished species	Do reserves retain large, mature, fecund individuals of selected species and do recruitment rates of selected species change over time inside marine reserves versus areas outside?	Measure size range, density, and makeup of focal species assemblage and relative recruitment <sup>15</sup> rates of selected species inside and outside MPAs  Monitoring frequency should occur annually to every other year

<sup>15</sup> **Recruitment:** The amount of fish added to the exploitable stock each year due to growth and/or migration into the fishing area. For example, the number of fish that grow to become vulnerable to the fishing gear in one year would be the recruitment to the fishable population that year. This term is also used in referring to the number of fish from a year class reaching a certain age. For example, all fish reaching their second year would be age 2 recruits. (Source: "Technical Terms" **NOAA's National Marine Fisheries Service Northeast Fisheries Science Center** [http://www.nefsc.noaa.gov/techniques/tech\\_terms.html](http://www.nefsc.noaa.gov/techniques/tech_terms.html))

MLPA Goal By Number	MPAs	General Objective	Overarching Question	Potential Monitoring Activity and Frequency
2	Lovers Point SMR Cambria SMR Morro Bay SMRMA Morro Bay SMR	Protect large individuals of resident marine species in known nursery area.	Do focal species inside MPAs increase in size, numbers, and biomass relative to areas of similar habitat adjacent to and distant from MPAs?	Measure size range, density, and makeup of focal species assemblage within, near and distant from MPA over time  Monitoring frequency should occur annually to every other year
2	Año Nuevo SMR Greyhound Rock SMCA Elkhorn Slough SMR Moro Cojo Lagoon SMR Point Lobos SMR Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Morro Bay SMRMA Morro Bay SMR Vandenberg SMR	Help protect various marine birds and mammals by protecting feeding, roosting, and nesting habitat...	Are foraging, roosting, and nesting behaviors different inside MPA versus outside and is disturbance greater in fished areas?	Use visual surveys of area before and after implementation to measure frequency of disturbance from sea and shore-based activities  Monitoring should occur prior to implementation and three-times per year for the first 5 years
3	Piedras Blancas SMR	Enhance classroom component of research and monitoring as related to the Friends of the Elephant Seal organization.	Relative measure of ability to convey conservation message using local examples	Survey of students in the program  Monitoring should occur prior to implementation then once per year for 5 years
3	Elkhorn Slough SMR Moro Cojo Lagoon SMR Carmel Pinnacles SMR Point Lobos SMR Point Sur SMR Big Creek SMR Piedras Blancas SMR Cambria SMR Morro Bay SMRMA <sup>16</sup> Morro Bay SMR Point Buchon SMR Vandenberg SMR	Replicate representative habitats within state marine reserves	Is the habitat present and does it persist in a viable state within the MPA?	Monitor habitat presence, composition, and status over time  Monitoring frequency should occur upon implementation and every 3 <sup>rd</sup> year thereafter

<sup>16</sup> Though not a true SMR, the Morro Bay SMRMA includes a component of no-take area equivalent in protection to an SMR

<b>MLPA Goal By Number</b>	<b>MPAs</b>	<b>General Objective</b>	<b>Overarching Question</b>	<b>Potential Monitoring Activity and Frequency</b>
3	Lovers Point SMR Pacific Grove Marine Gardens SMCA Carmel Pinnacles SMR Point Lobos SMR	Enhance recreational non-consumptive diving experience at site of traditional high diving use...	Are non-consumptive recreational experiences in areas subject to minimal disturbance improving? What are the attitudes and perceptions of users and their recreational experience and how has that changed over time?	Surveys of divers to determine relative satisfaction  Frequency of surveys should occur prior to implementation then 2-3 times per year for the first 5 years
3	Pacific Grove Marine Gardens SMCA	Enhance recreational fishing within the state marine conservation area through a prohibition on commercial take and by providing for a natural size and age structure of resident finfish species in an adjacent state marine reserve.	Is recreational fishing success (catch per unit of effort) improving along with changes in focal species size range, abundance and population structure	Surveys of fishermen and fishery dependent data from CRFS program combined with measuring size range, density, and makeup of focal species assemblage  Monitoring frequency should occur annually to every other year
4	Año Nuevo SMR Elkhorn Slough SMR Moro Cojo Estuary SMR Carmel Pinnacles SMR Point Lobos SMR Point Sur SMR Big Creek SMR Piedras Blancas SMR Cambria SMR Morro Bay SMR Point Buchon SMR Vandenberg SMR	Include and replicate various habitats in state marine reserves	Is the habitat present and does it persist in a viable state within the MPA?	Monitor habitat presence, composition, and status over time  Monitoring frequency should occur upon implementation and every 3 <sup>rd</sup> year thereafter
5	Soquel Canyon SMCA Portuguese Ledge SMCA Point Lobos SMCA	Minimize negative socio-economic impacts to the various fisheries while protecting benthic finfishes	Is take of benthic fishes prohibited while take of other species allowed and is catch per unit of effort in these fisheries maintained?	Partially completed by adoption of MPA. Track catch and effort in subject fisheries.  Monitoring should occur annually

<b>MLPA Goal By Number</b>	<b>MPAs</b>	<b>General Objective</b>	<b>Overarching Question</b>	<b>Potential Monitoring Activity and Frequency</b>
5	Point Lobos SMR Piedras Blancas SMR	Optimize positive socio-economic benefits by improving protection in area that has particularly high non-consumptive use patterns...	Are non-consumptive recreational experiences in areas subject to minimal disturbance improving? What are the attitudes and perceptions of users and their recreational experience and how has that changed over time?	Surveys of non-consumptive users  Frequency of surveys should occur prior to implementation then 2-3 times per year for the first 5 years
5	Point Lobos SMCA Point Sur SMR Point Sur SMCA Big Creek SMCA Big Creek SMR Point Buchon SMCA	Minimize negative socio-economic impacts by incorporating a portion of the Rockfish Conservation Area ...and considering other fisheries	Is take of rockfish prohibited while take of other species continues?	Partially completed by adoption of MPA. Track catch and effort in subject fishery.  Monitoring should occur annually

## **Performance Determination**

Performance will be measured for the network as a whole, for network components, and for groups of MPAs with common objectives. In some instances, performance will be measured for a single MPA to determine if MPA specific goals are met.

In some instances, such as the need to include a diversity of habitats, performance will simply be a measure of the presence or absence and/or quantity of a particular habitat or feature. This can be measured at the individual MPA level or across the network of MPAs.

In other instances to measure performance some metrics will need to be measured and compared against reference sites. With studies conducted in nature, it is not possible to control all factors driving the system. It is possible to compare areas with and without an impact (e.g., establishing MPAs), but measuring the impact requires differentiating the response to the impact to those caused by other factors. In other words, is a response the outcome of a MPA designation? Likewise, is a response due to reduced fishing pressure or reduced pollution, or other factors?

One approach to this problem is Before-After-Control-Impact (BACI) monitoring (Green 1979, Stewart-Oaten 1986). In a BACI design, samples are taken in impacted and reference areas before and after the impact starts (such as before MPA designation). The premise of the BACI design is that treatments can be referenced against some control, in this case the “before” condition. Where applicable the BACI approach will be used.

Similar to the BACI approach reference sites within and outside of MPAs will be used to make comparisons. To accommodate for variance numerous measurements across the range of variability will be made, ensuring that data are collected for the most important factors that drive the system. This approach over time will allow for trends to develop within and outside MPA boundaries.

To support the BACI design some baseline data exists and will be identified. Other baseline data will be gathered across various MPAs and reference sites. The baseline data that will be necessary to achieve the monitoring goals many are identified above. Baseline data and much of the monitoring activities will be solicited through a RFP (request for proposals) process.

The Department will be the lead agency for data management, assessment and communication. Data will be collected from the monitoring programs and outside sources and integrated into a database. Data will be analyzed to evaluate performance of the network and network components relative to the goals and objectives, and provide the information needed for adaptive management. Results and conclusions will be communicated to resource managers and the public. Long-term storage and management of data will be provided by the Department’s Biogeographic Data Branch.

## **Monitoring of fishing effort**

For this monitoring program, the most important variable to measure is fishing effort before and after implementation of the MPAs. Populations in MPAs are expected to respond in relation to the prior level of fishing, with more response in heavily fished than in lightly fished MPAs.

Fishing effort in areas outside MPAs will change not only in response to the MPAs, but also in response to changes in the regulatory, economic and social environment. Because fishing effort in outside areas is variable both temporally and spatially, all MPA/reference comparisons will need to consider fishing effort. The evaluation of MPAs will also need to consider if displaced fishing effort is affecting areas outside of MPAs.

Recreational fishing will be monitored through the Department's California Recreational Fishing Survey (CRFS) which collects data on catch and fishing effort for private and rental boats, commercial passenger fishing vessels (CPFVs), man-made structures such as piers and jetties, and beaches and banks. The data can be referenced to 1 minute of latitude by 1 minute of longitude (approximately 1 square nautical mile), a scale that will allow analysis at the level of an individual MPA. The survey began in 2004 as a modification of a previous recreational fishing survey, and will continue through time, CRFS is a source of baseline and post-implementation data. Logbooks submitted to the Department from CPFVs will also provide valuable long-term data.

Collecting data for commercial fishing is more problematic. Data from logbooks submitted to the Department are available for spot prawn, and squid, although spot prawn data do not have fine spatial resolution. Data for other types of commercial fishing will need to be collected from a new program. Methods could include shipboard transponders and/or observers, remote sensing or aerial surveys, and/or incentive-based voluntary reporting. Information on preferred areas for fishing collected by Ecotrust can serve as a proxy for pre-implementation fishing effort.

### **Monitoring by habitat**

Monitoring activities are presented in order of priority. Recommendations of the Baseline Science-Management Panel (BSMP) were considered when setting priorities, but modified for the purpose of long-term monitoring. Deep water rocky habitat was ranked first because it supports many of the species mentioned in the objectives (e.g., rockfish and other groundfish species) and, based on the Ecotrust analysis; this habitat has had the most consumptive use. Shallow rocky habitat, including kelp beds, was ranked second because it supports many of the species mentioned in the objectives. Since habitat mapping is required for the evaluation of Goal 4 and many MPA-specific objectives, it is considered high priority and ranked third. Within medium priority activities, deep water soft bottom and rocky intertidal were ranked one and two, respectively. Low priority activities are not included here. Measuring residence time of species is needed to evaluate the level of protection afforded by MPAs and is considered for each habitat type.

### **Deep Water (> 30m) Hard Bottom Monitoring**

Eighteen MPAs have deep water (> 30 m) hard bottom habitat (Table 7) with seven having habitat in >100 m. For logistical reasons MPAs with little hard bottom habitat or those that are not well mapped will not be monitored. MPAs that have been identified by the science panel as either having substantial hard bottom habitat > 0.25 mi<sup>2</sup> or are of interest for other reasons will have long term monitoring. Based on the known amount of available hard bottom habitat and professional judgment the science panel identified 12 MPAs that should be sampled: Soquel Canyon SMCA, Portuguese Ledge SMCA, Carmel Pinnacles SMR, Pt Lobos SMR, Point

Lobos SMCA, Point Sur SMR, Point Sur SMCA, Big Creek SMR, Big Creek SMCA, Piedras Blancas SMCA, Point Buchon SMR, and Point Buchon SMCA. It must be noted that as the pool of knowledge increases on these areas MPAs the monitoring list may be modified.

Table 7. MPAs with deep water (> 30 m) hard bottom habitat (area in mi<sup>2</sup>).

MPA Name	30-100 m	100-200 m	>200 m
Soquel Canyon SMCA	2.38	2.05	0.87
Portuguese Ledge SMCA	0.38	1.62	1.51
Pacific Grove Marine Gardens SMCA	0.14	0	0
Asilomar SMR	0.08	0	0
Carmel Pinnacles SMR	0.37	0	0
Carmel Bay SMCA	0.04	0	0
Pt. Lobos SMR	1.13	0	0
Pt. Lobos SMCA	0.26	1.64	0.95
Point Sur SMR	1.8	0	0
Point Sur SMCA	1.84	0.01	0
Big Creek SMCA	0.06	0.05	0.02
Big Creek SMR	0.11	0.01	0.03
Piedras Blancas SMR	0.15	0	0
Piedras Blancas SMCA	0.56	0	0
Cambria SMR	0.02	0	0
Point Buchon SMR	0.75	0	0
Point Buchon SMCA	0.69	0.02	0
Vandenberg SMR	0.25	0	0

The Science Advisory Team recommended a list of species likely to benefit from MPAs. From this list focal species (Table 8) were identified to provide direct comparisons to reference sites outside the MPAs. The focal species will provide one measure with which to monitor change in populations over time.

Table 8. Focal fish and invertebrate species for deep water (> 30m) hard bottom habitats.

Common Name	Scientific Name	Reason for Selection
bocaccio	<i>Sebastes paucispinis</i>	shift number, size <sup>1</sup>
cowcod	<i>Sebastes levis</i>	shift number, size <sup>1</sup>
lingcod	<i>Ophiodon elongatus</i>	shift number <sup>1</sup>
blue rockfish	<i>Sebastes mystinus</i>	shift number, size <sup>1</sup>
greenspotted rockfish	<i>Sebastes chlorostictus</i>	shift size <sup>1</sup>
copper rockfish	<i>Sebastes caurinus</i>	shift size <sup>1</sup>
olive rockfish	<i>Sebastes serranoides</i>	shift size <sup>1</sup>
squarespot rockfish	<i>Sebastes hopkinsi</i>	fished
yelloweye rockfish	<i>Sebastes ruberrimus</i>	shift number <sup>1</sup>
yellowtail rockfish	<i>Sebastes flavidus</i>	shift size <sup>1</sup>
widow rockfish	<i>Sebastes entomelas</i>	shift number <sup>1</sup>
vermillion rockfish	<i>Sebastes miniatus</i>	shift size <sup>1</sup>
galatheid crabs	Galatheididae	incidental catch in spot prawn fishery
red rock crab	<i>Cancer productus</i>	fished, incidental catch in spot prawn fishery



Common Name	Scientific Name	Reason for Selection
box crab	<i>Lopholithodes foraminatus</i>	fished, incidental catch in spot prawn fishery
crinoids	<i>Florometra serratissima</i>	habitat forming
sponges	Porifera	habitat forming
anemones	<i>Metridium spp.</i> , <i>Urticina picivora</i>	habitat forming
black corals	<i>Antipathes spp.</i>	ecosystem component
basket stars	<i>Gorgonocephalis eucemis</i>	habitat forming
sea stars	<i>Ceramaster spp.</i> , <i>Mediaster aequilis</i> , <i>Pteraster spp.</i>	predatory
spot prawn	<i>Pandalus platyceros</i>	fished

<sup>1</sup> Shift number, size means that studies have shown that populations have been reduced in abundance (or density) and/or the size distribution has been altered

Existing data on deep water habitats is limited for the central coast region but will be critical in establishing baseline information. In 2003, the National Marine Fisheries Service (NMFS) extended the sampling area for their annual trawl surveys for groundfish to include all of Washington, Oregon and California from approximately 55 to 1280 m. To avoid losing the nets, higher relief areas are avoided, but the trawls do sample lower relief hard bottom habitat. In 1992-1993 Yoklavich, et al. (2000) surveyed benthic fish populations in Soquel Canyon. In 1997-1998 Yoklavich, et al. (2002) surveyed benthic fish populations inside and outside of the Big Creek Marine Ecological Reserve (now Big Creek State Marine Reserve). Both surveys were conducted with a submersible. Strip transects were videotaped to provide documentation of fish abundance and habitat type.

For the Channel Islands MPA monitoring program in southern California, a Remotely Operated Vehicle (ROV) is used to survey fish in hard bottom habitats beyond the reach of divers (20-80 m) (<http://www.dfg.ca.gov/mrd/fir/dss.html>). Survey techniques used in ROV and submersible surveys are similar, but not identical. To compare methods, Dr. Milton Love and Donna Schroeder surveyed two of the ROV survey sites with a submersible in 2005. Results of the comparison should be available soon. Nasby et al. (2002) integrated detailed seafloor mapping and submersible transects to estimate fish densities across broad areas of a deepwater bank off Oregon.

To provide standardized baseline information the science panel developed a stratified random block sample design intended to be robust enough to allow for different methodologies, such as ROV, AUV, or towed camera surveys. Deep water hard bottom habitats will be stratified by depth; 30-100m, 100-200m, and >200m. Based on the current knowledge of habitat distribution, a grid with blocks 500m x 500m (exact grid size may change as specific protocols and sites are further refined) will be placed on maps depicting hard bottom habitats. Blocks will be randomly selected within each stratum. Certain criteria, e.g. blocks may not be adjacent to each other, may be applied to ensure the distribution of blocks is representative of the habitat within each strata. Each of these blocks will provide the core of the sampling and will be re-surveyed each year. Similarly, blocks will be selected at reference sites that contain similar habitat in each of the identified strata.

At each sample block replicate transects will be surveyed. Transect direction will be random/haphazard for each survey block and each year. Transect length will be determined as

protocol are refined but based on suggestions by the science panel are initially set to be 100-150m in length.

Existing survey techniques can be used to measure size and density of conspicuous benthic fish and invertebrates, including all focal fish species (Table 8), although some work will be needed to create detailed sampling protocols, including quality assurance/quality control (QA/QC). Survey methods need to be developed for invertebrates.

Transect survey techniques should provide data for all focal invertebrates, except crabs and spot prawn, which will need to be sampled with traps. In areas with limited visibility, sampling with traps and/or fishing gear will be needed.

Targeted research/monitoring projects can provide data on residence times of selected focal species. Starr et al. (2000, 2002) have developed techniques for tagging and tracking deep water species such as bocaccio and greenspotted rockfishes. Monitoring activities that addresses these questions and details on other non-visual monitoring programs will be provided as those projects develop.

### **Shallow Water (< 30m) Hard Bottom Monitoring**

Eighteen MPAs have shallow water (< 30m) hard bottom habitat (Table 9).

Table 9. MPAs with shallow water (< 30m) hard bottom habitat (area in mi<sup>2</sup>).

<b>MPA Name</b>	<b>Hard 0-30</b>	<b>Average Kelp</b>	<b>PISCO Sampling Site</b>
<i>Año Nuevo SMR</i>	3.56	0.01	X
<i>Greyhound Rock SMCA</i>	1.96	0.01	X
<i>Natural Bridges SMR</i>	0.58	0.02	X
<i>Edward F. Ricketts SMCA</i>	0.06	0.05	X
<i>Lovers Point SMR</i>	0.09	0.08	X
<i>Pacific Grove Marine Gardens SMCA</i>	0.48	0.14	
<i>Asilomar SMR</i>	0.59	0.11	
<i>Carmel Pinnacles SMR</i>	0.07	0.01	
<i>Carmel Bay SMCA</i>	0.71	0.30	X
<i>Pt. Lobos SMR</i>	1.03	0.27	X
<i>Point Sur SMR</i>	3.41	0.84	X
<i>Big Creek SMCA</i>	0.40	0.17	
<i>Big Creek SMR</i>	0.57	0.21	X
<i>Piedras Blancas SMR</i>	1.60	0.50	X
<i>Cambria SMP</i>	1.34	0.57	X
<i>Cambria SMR</i>	1.02	0.38	X
<i>Point Buchon SMR</i>	0.60	0.21	
<i>Vandenberg SMR</i>	3.27	0.02	X

Visual surveys will provide data for all focal species (Table 10), except grass rockfish, cabezon, and brown rock crab. Traps and/or hook and line fishing will be needed for these species and to sample areas with limited visibility. At some sites, particularly Año Nuevo SMR,

and Greyhound Rock SMCA, where diver safety precludes scuba surveys, ROVs may be used.

Table 10. Focal fish and invertebrate species for shallow water (< 30m) hard bottom habitats.

Common Name	Scientific name	Reason for selection
lingcod	<i>Ophiodon elongatus</i>	shift number <sup>1</sup>
kelp greenling	<i>Hexagrammos decagrammus</i>	fished
grass rockfish	<i>Sebastes rastrelliger</i>	fished
brown rockfish	<i>Sebastes auriculatus</i>	fished
vermilion rockfish	<i>Sebastes miniatus</i>	shift size <sup>1</sup>
copper rockfish	<i>Sebastes caurinus</i>	shift size <sup>1</sup>
black rockfish	<i>Sebastes melanops</i>	shift number <sup>1</sup>
blue rockfish	<i>Sebastes mystinus</i>	shift size <sup>1</sup>
olive rockfish	<i>Sebastes serranoides</i>	shift size <sup>1</sup>
gopher rockfish	<i>Sebastes carnatus</i>	fished
kelp rockfish	<i>Sebastes atrovirens</i>	fished
cabezon	<i>Scorpaenichthys marmoratus</i>	fished
black surfperch	<i>Embiotoca jacksoni</i>	major component of ecosystem
striped surfperch	<i>Embiotoca lateralis</i>	major component of ecosystem
abalones	<i>Haliotis</i> spp	shift number, size <sup>1</sup>
red urchin	<i>Strongylocentrotus franciscanus</i>	fished, removal affects other species
purple urchin	<i>Strongylocentrotus purpuratus</i>	population level affects other species
sea stars	<i>Pisaster</i> spp.	keystone species
brown rock crab	<i>Cancer antennarius</i>	fished
bull kelp	<i>Nereocystis luetkeana</i>	habitat forming
giant kelp	<i>Macrocystis pyrifera</i>	habitat forming

<sup>1</sup> Shift number, size means that studies have shown that populations have been reduced in abundance (or density) and/or the size distribution has been altered

The Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) has ongoing monitoring at 14 sites within the central coast region, with 10 inside MPAs (Table 9). Sites have been sampled annually, starting between 1999 and 2004, depending on the site. Divers conduct visual surveys of conspicuous fish species and count selected invertebrate and algal species along replicate 30 x 2 m transects. Uniform contact sampling is used to measure substrate type and relief as well as the percent cover of benthic organisms. Additionally, the monitoring program for the Diablo Canyon Nuclear Power Plant has been sampling for fish and invertebrates since 1978 (Tenera 1998).

Reef Check, a volunteer organization, has 12 stations in the central coast region, 11 in MPAs. Additional sites inside and outside MPAs will be added as the program expands. Sampling began in the fall of 2006 and will continue twice a year in the spring and fall. Reef Check protocols are adapted from the PISCO/CRANE protocols and will provide density and size information for all the focal species. Surveys are limited to depths less than 18 m. Reef Check has recently entered into an MOU to provide monitoring data to CDFG.

The Cooperative Research and Assessment of Nearshore Ecosystems (CRANE) Program is a collaborative monitoring program between CDFG and various universities, private organizations, and government programs designed to provide data for fishery management and performance of marine protected areas. The CRANE program began sampling in 2004 and included several sites within existing MPAs. The CRANE program will provide the basic framework for monitoring and performance evaluation. The CRANE program was specifically developed as collaboration and will therefore utilize and expand on partnerships. Details about the CRANE program can be found at <http://www.dfg.ca.gov/MRD/fir/sss.html#crane>.

### **Deep Water (> 30m) Soft Bottom Monitoring**

Twenty-one MPAs have mid and deep water (> 30m) soft bottom habitat (Table 11). All 21 have habitat between 30 and 100 m; 7 have habitat in deeper water. Additionally, a list of focal species has been developed for this habitat (Table 12).

Table 11. MPAs with mid and deep water (>30 m) soft bottom habitat (area in mi<sup>2</sup>).

<b>MPA Name</b>	<b>Soft 30-100 m</b>	<b>Soft 100-200 m</b>	<b>Soft &gt;200 m</b>
<i>Año Nuevo SMR</i>	2.70	0.00	0.00
<i>Greyhound Rock SMCA</i>	9.03	0.00	0.00
<i>Soquel Canyon SMCA</i>	13.20	1.77	3.14
<i>Portuguese Ledge SMCA</i>	1.46	4.45	1.48
<i>Pacific Grove Marine Gardens SMCA</i>	0.02	0.00	0.00
<i>Asilomar SMR</i>	0.01	0.00	0.00
<i>Carmel Pinnacles SMR</i>	0.07	0.00	0.00
<i>Carmel Bay SMCA</i>	0.05	0.00	0.00
<i>Pt. Lobos SMR</i>	2.32	0.06	0.00
<i>Pt. Lobos SMCA</i>	0.18	2.94	2.88
<i>Point Sur SMR</i>	2.34	0.00	0.00
<i>Point Sur SMCA</i>	8.10	0.00	0.00
<i>Big Creek SMCA</i>	2.19	0.36	6.12
<i>Big Creek SMR</i>	2.61	0.84	7.05
<i>Piedras Blancas SMR</i>	2.56	0.00	0.00
<i>Piedras Blancas SMCA</i>	8.20	0.00	0.00
<i>Cambria SMP</i>	0.44	0.00	0.00
<i>Cambria SMR</i>	0.33	0.00	0.00
<i>Point Buchon SMR</i>	4.66	0.00	0.00
<i>Point Buchon SMCA</i>	7.93	2.91	0.00
<i>Vandenberg SMR</i>	9.69	0.00	0.00

Table 12. Focal fish and invertebrate species for mid and deep water (> 30 m) soft bottom habitats.

Common Name	Scientific Name	Reason for Selection
petrale sole	<i>Eopsetta jordani</i>	shift number, size
Dover sole	<i>Microstomus pacificus</i>	fished
English sole	<i>Parophrys vetulus</i>	fished
slender sole	<i>Lyopsetta exilis</i>	fished
rex sole	<i>Glyptocephalus zachirus</i>	fished
Pacific sandab	<i>Citharichthys sordidus</i>	fished
sablefish	<i>Anoplopoma fimbria</i>	fished
splitnose rockfish	<i>Sebastes diploproa</i>	fished
chilipepper	<i>Sebastes goodei</i>	fished
spotted ratfish	<i>Hydrolagus colliei</i>	ecosystem component
shortspine thornyhead	<i>Sebastolobus alascanus</i>	fished
longspine thornyhead	<i>Sebastolobus altivelis</i>	fished
California skate	<i>Raja inornata</i>	fished
longnose skate	<i>Raja rhina</i>	fished
sea pens	<i>Stylatula spp, Ptilosarchus spp, Anthoptilum spp.</i>	habitat forming
flat mud star	<i>Luidia foliolata.</i>	predator
sunflower star	<i>Pycnopodia helianthoides</i>	predator
carpet star	<i>Thrissacanthias penicillatus</i>	predator
fragile red sea urchin	<i>Allocentrotus fragilis</i>	ecosystem component
Dungeness crab	<i>Cancer magister</i>	fished

Monitoring protocols used to survey hard bottom habitat can be adapted to monitor soft bottom habitats. However, besides the annual trawl survey by NMFS described in “Deep Water (>30m) Hard Bottom Monitoring”, there is no ongoing monitoring of mid and deep water soft bottom habitats. Submersible surveys by Yoklavich, et al. (2000) in Soquel Canyon, and Yoklavich, et al. (2002) in and adjacent to Big Creek Marine Ecological Reserve (now Big Creek SMR) included deep water soft bottom habitat. Hixon and Tissot (2007) ran submersible transects for fishes and invertebrates over deep mud seafloors off Oregon. Visual survey techniques will capture all focal species except Dungeness crab, which can be sampled with traps. Trawls can also be used. Trawls can capture all species, although sea pens may be under-represented because they anchor into the substrate.

Specific monitoring activities for mid and deep water (>30 m) soft bottom habitats will be presented as programs develop.

### **Rocky Intertidal Monitoring**

Twelve MPAs have rocky intertidal habitat (Table 13). The Multi-Agency Rocky Intertidal Network (MARINe), a partnership of more than 40 federal, state, academic and other institutions, monitors 20 sites in the central coast region; five sites are inside MPAs (Table 13). The focal species for rocky intertidal monitoring are presented in table 14.

Table 13. MPAs with rocky intertidal habitat (area in mi<sup>2</sup>).

MPA Name	Rocky intertidal	MARINE monitoring site
<i>Año Nuevo SMR</i>	4.89	
<i>Greyhound Rock SMCA</i>	3.31	X
<i>Natural Bridges SMR</i>	3.58	
<i>Edward F. Ricketts SMCA</i>	0.8	
<i>Lovers Point SMR</i>	1.42	X
<i>Pacific Grove Marine Gardens SMCA</i>	1.92	
<i>Asilomar SMR</i>	2.85	
<i>Carmel Bay SMCA</i>	2.62	X
<i>Pt. Lobos SMR</i>	13.67	X
<i>Point Sur SMR</i>	3.71	X
<i>Big Creek SMCA</i>	1.77	
<i>Big Creek SMR</i>	2.95	
<i>Piedras Blancas SMR</i>	5.83	X
<i>Cambria SMP</i>	3.77	
<i>Cambria SMR</i>	4	
<i>Morro Bay SMRMA</i>	0.18	
<i>Point Buchon SMR</i>	2.74	
<i>Vandenberg SMR</i>	9.55	X

Table 14. Focal fish and invertebrate species for intertidal hard bottom habitats.

Common Name	Scientific Name	Reason for Selection
black abalone	<i>Haliotis cracherodii</i>	shift number, size
owl limpet	<i>Lottia gigantea</i>	shift size
California mussel	<i>Mytilus californianus</i>	habitat forming
ochre sea star	<i>Pisaster ochraceus</i>	keystone species
aggregating anemone	<i>Anthropleura elegantissima/sola</i>	ecosystem component
small acorn barnacle	<i>Chthamalus dalli/fissus/Balanus glandula</i>	ecosystem component
large acorn barnacle	<i>Tetraclita rubescens</i>	ecosystem component
gooseneck barnacle	<i>Pollicipes polymerus</i>	ecosystem component
turban snail	<i>Tegula funebris</i>	harvested
feather boa kelp	<i>Egregia menziesii</i>	habitat forming
Rockweed	<i>Hesperophycus californicus</i>	habitat forming
Rockweed	<i>Silvetia compressa</i>	habitat forming
Turfweed	<i>Endocladia muricata</i>	habitat forming
Surfgrass	<i>Phyllospadix scouleri/torreyi</i>	habitat forming
monkeyface prickleback	<i>Cebidichthys violaceus</i>	local depletion

MARINE uses two sampling protocols: a “core” protocol that measures the percent cover of 12 target species (Table 14), and a more intensive “biodiversity” protocol. Core sites are sampled twice a year in the fall and spring. Biodiversity sampling occurs irregularly. The spatial and temporal extent of the MARINE program will provide valuable long-term baseline information for the evaluation of MPAs.

The percent cover of target species as well as other associated species is measured by photographing approximately five permanent 50 X 75 cm plots established in areas of high target species density. The photographs are then scored in the laboratory using point-contact methods. In areas with sufficient populations, the number and size distribution of owl limpets (*Lottia gigantea*) is measured in five permanent circular plots. Band transects or irregularly-shaped plots, depending on the site, are used to estimate the number and size of black abalone (*Haliotis cracherodii*) and seastars (primarily *Pisaster ochraceus*). Timed searches are used where densities are too low for band transects. The cover of surfgrass and associated species is measured on approximately three permanent transects, 10 m long, with point contact methods.

The list of focal species for intertidal hardbottom monitoring and MARINE target species (Table 14) are identical except for the inclusion of turban snails and monkeyface prickleback. These two species were included because they are harvested. While turban snails are not a MARINE target species, they are sampled annually. MARINE protocols will not provide data for fish such as the monkeyface prickleback. Special studies, including trapping and/or hook and line fishing using the traditional recreational gear known as a “poke pole”, will be needed for this species.

It is expected that additional monitoring will closely follow MARINE protocols. However, it may be necessary in some instances to augment the sampling with additional replication and/or random sampling.

### **Marine Mammal and Seabird Monitoring**

If some fish and invertebrate species increase in size and number as expected, MPAs may affect seabirds and marine mammals by increasing or shifting their forage base.

Focal seabirds and marine mammals (Table 15) occur throughout the central coast region.

Table 15. Focal marine birds and mammals.

Common Name	Scientific Name	Reason for Selection
<b><i>Marine Birds</i></b>		
Brandt's cormorant	<i>Phalacrocorax penicillatus</i>	disturbance, increase in forage base
brown pelican	<i>Pelecanus occidentalis</i>	disturbance, increase in forage base
common murre	<i>Uria aalge</i>	disturbance, increase in forage base
double-crested cormorant	<i>Phalacrocorax auritus</i>	disturbance, increase in forage base
pelagic cormorant	<i>Phalacrocorax pelagicus</i>	disturbance, increase in forage base
rhinoceros auklet	<i>Cerorhinca monocerata</i>	disturbance, increase in forage base
pigeon guillemot	<i>Cephus columba</i>	disturbance, increase in forage base
grebes	<i>Podicipedidae</i>	increase in forage base
loons	<i>Gaviidae</i>	increase in forage base
marbled murrelet	<i>Brachramphus marmoratus</i>	disturbance, increase in forage base

Common Name	Scientific Name	Reason for Selection
<b>Marine Birds</b>		
sooty shearwater	<i>Puffinus griseus</i>	hot spots for prey, indicator of prey availability
Cassin's auklet	<i>Ptychoramphus aleuticus</i>	Indicator of krill and larval fish abundance
black oyster catcher	<i>Haematopus bachmani</i>	intertidal ecosystem component
<b>Marine Mammals</b>		
sea otter	<i>Enhydra lutris</i>	keystone species
California sea lion	<i>Zalophus californianus</i>	predator
harbor seal	<i>Phoca vitulina</i>	predator
elephant seal	<i>Mirounga angustirostris</i>	predator
harbor porpoise	<i>Phocoena phocoena</i>	aggregate in specific areas

Aerial, shoreline, and strip surveys can be used to measure the distribution and abundance and foraging patterns of focal species of seabirds and mammals. Surveys of breeding sites can measure breeding success (number of offspring per adult). Studies of diet can provide information for evaluation of foraging behavior and reproductive success, as well as information on the availability of prey species. Although no specific monitoring protocol has been established to monitor marine mammals or seabirds existing programs may meet many of the monitoring needs.

NMFS and the Monterey Bay National Marine Sanctuary (MBNMS) have a program called Collaborative Survey of Cetacean Abundance and the Pelagic Ecosystem (CSCAPE) which conducts annual surveys of marine mammals. Track lines are surveyed on a large scale grid (~160 km) from the US/Canadian border to the US/Mexico border and on a smaller grid (18.5 km) within the boundaries of the MBNMS. Although the survey targets marine mammals, seabirds are also recorded. The sampling provides good information on abundances, but the grid is too large for monitoring individual MPAs.

The United States Geological Service (USGS) conducts surveys of sea otters in the spring and fall in the area between Monterey Bay and Santa Barbara. Sightings are made from shore or with aerial surveys in inaccessible areas. Burney LeBoeuf, at U.C. Santa Cruz, has conducted annual surveys of elephant seals in the MBNMS since 1968.

Dr. Jim Harvey and students at the Moss Landing Marine Laboratory conduct biannual surveys of shorebirds and annual surveys of harbor seals and sea otters in Elkhorn Slough. Elkhorn Slough National Estuarine Research Reserve program volunteers have surveyed shorebirds at 24 sites bimonthly since 1998. Surveys are also conducted at rookeries to determine breeding success for herons, egrets, cormorants and Caspian terns.

Shorebird populations in Morro Bay have been monitored biannually by Morro Bay National Estuary Program volunteers in conjunction with the PRBO Conservation Science (PRBO). Since 1992, from April through August, PRBO has conducted weekly surveys of seabird abundance, breeding performance, and diet at Año Nuevo Island and monthly diet surveys since 2001. At Vandenberg SMR, PRBO has conducted weekly surveys (April through August) of breeding seabird population size and performance since 1999 and seabird diets and seabird



and marine mammal foraging distributions since 2000. Roosting seabird distributions have been surveyed biweekly from January through December since 2001.

### **Coastal Marsh and Estuary Monitoring**

Nine MPAs have coastal marsh and estuarine habitat (Table 16); most of the habitat is in Elkhorn Slough and Morro Bay. The list of focal species created for estuarine habitats is presented in table 17.

Table 16. MPAs with coastal marsh and estuary habitat (area in mi<sup>2</sup>).

<b>MPA Name</b>	<b>Coastal marsh</b>	<b>Tidal flats</b>	<b>Eelgrass</b>	<b>Estuary</b>
<i>Natural Bridges SMR</i>	0.68	0.00	0.00	0.00
<i>Elkhorn Slough SMR</i>	9.16	9.16	0.03	1.48
<i>Elkhorn Slough SMP</i>	0.95	0.99	0.01	0.09
<i>Morro Cojo SMR</i>	0.00	0.00	0.00	0.46
<i>Piedras Blancas SMR</i>	0.00	0.00	0.00	0.01
<i>Cambria SMP</i>	0.47	0.15	0.00	0.01
<i>Morro Bay SMR</i>	1.52	0.72	0.00	0.3
<i>Morro Bay SMRMA</i>	6.69	5.23	1.04	3.01
<i>Vandenberg SMR</i>	0.01	0.01	0.00	0.00

Table 17. Focal species for estuaries.

<b>Common Name</b>	<b>Scientific Name</b>	<b>Reason for Selection</b>
topsmelt	<i>Atherinops affinis</i>	lay eggs on plants
leopard shark	<i>Triakis semifasciata</i>	use estuary as nursery, fished
black surfperch	<i>Embiotoca jacksoni</i>	fished
shiner surfperch	<i>Cymatogaster aggregata</i>	fished
ghost shrimp	<i>Calianassa</i> spp.	collected for bait
innkeeper worm	<i>Urechis caupo</i>	ecosystem component
gaper clams	<i>Tresus</i> spp.	ecosystem component
eelgrass	<i>Zostera</i> spp.	habitat forming

Both Elkhorn Slough and Morro Bay have ongoing monitoring. As part of the Elkhorn Slough National Estuarine Research Reserve program, volunteers have collected water quality samples monthly at 24 stations since 1998. Baited traps are used to capture crabs and visual surveys are done of surface burrow structures to measure populations of gaper clams, fat innkeeper worms, and ghost shrimp. Since 1994, Morro Bay National Estuary Program volunteers have conducted annual aerial and sonar surveys to map the distribution and abundance of eelgrass in the Bay.

Ongoing monitoring will provide sufficient information for some focal species (Table 15). Monitoring in Elkhorn Slough will provide information for ghost shrimp, innkeeper worms, and gaper clams. Surveys would need to be conducted in Morro Bay for these species. Eelgrass is mapped in Morro Bay, but not in Elkhorn Slough. Given the limited amount of habitat, mapping eelgrass in Elkhorn Slough may not be cost effective.

At present, there is no ongoing monitoring for focal fish species in Morro Bay or Elkhorn Slough. In Elkhorn Slough there is some historical data from Moss Landing Marine Lab research projects and class trawls, but nothing after 2003. Trawl, gill net, and/or trap sampling will be needed for the evaluation of focal fish species. Details on these programs will be added as they are developed.

### **Socioeconomic monitoring**

To evaluate changes in opportunities for recreation, education and research (goal 3), it will be necessary to measure activities within and outside MPAs before and after implementation. In contrast to the biophysical system, impacts on activities will begin to occur simultaneously with implementation. In this case, a baseline can be established with existing data and/or user surveys. If the MPAs function as expected, the level of activity should increase inside MPAs.

The MPA-specific objective to increase positive socioeconomic benefits applies primarily to non-consumptive uses in Piedras Blancas SMR, recreational fishing in Cambria SMP, and non-consumptive diving in Hopkins SMR, Pacific Grove SMCA, Asilomar SMR, Carmel Pinnacles SMR, and Point Lobos SMR. Priorities for monitoring developed by the BSMP are provided in the following text; however, priorities for baseline and long-term monitoring will differ. As noted in the report of the MLPA Initiative Staff (2006), prioritization is primarily a policy decision, not a scientific judgment.

### **Non-Consumptive Recreation, Education, and Research**

Establishing a baseline for the indicators described above in Long-term and Ongoing Monitoring will require surveys, literature reviews or other data collection, as there is little existing information. Most of the existing information on recreational activities is aggregated at the level of the county and state, a scale too large to be useful for evaluating the central coast network or individual MPAs. LaFranchi and Tamanaka (2005) conducted a preliminary survey of recreational use in Monterey and Santa Cruz Counties. These data are useful, but limited in scope.

Surveys of non-consumptive users as well as educational and research institutions can be done via mail or the internet or, in the case of present use, by intercepting people on site. Survey instruments can be designed to collect information about the time and location of use, attitudes, perceptions, and cost. The Baseline Science and Monitoring Panel (BSMP) considered a survey of divers' high priority because divers are most directly affected by MPA designation. The survey would include effort by location and time, travel cost and expenditures. Including other user groups (kayakers, wildlife viewing and unplanned activities) and information on knowledge, attitudes, and perceptions for all users was considered medium priority.

A literature search can be conducted to establish a baseline number of research publications as well as the number of post-implementation citations.

## **Consumptive Uses**

As noted above, determining the location and intensity of fishing before and after implementation of the MPAs is critical to the assessment of biophysical impacts (e.g. from displaced fishing effort, see discussion above on monitoring fishing effort) as well as socioeconomic impacts.

For the economic and social dimension, the BSMP considered collecting data on costs and earnings from businesses depending on recreational consumptive use and measuring the knowledge, attitudes and perceptions of recreational users' medium priority.

Data on costs and earnings, employment and other characteristics can be collected to ascertain economic and social effects of MPAs on fishery participants and fishing operations (medium priority). The BSMP determined that socioeconomic data on coastal communities should not be a priority; however, impacts can be measured by analyzing linkages between resource users and coastal communities.

## **Management and Enforcement Monitoring**

The framework for the evaluation of Management and Enforcement is provided by the Regional MPA Management Plan. The Plan is the guide for implementation and a measure of performance is implementation relative to the Plan.

The Management Plan includes the following elements:

1. Introduction (“*Why?*” and “*Where?*”)
  - a. Description of region
  - b. Regional design and implementation considerations
  - c. Regional goals, and objectives
  - d. Description of individual MPA boundaries (including maps), regulations, and objectives
2. General Activities and Locations (“*What?*” and “*Where?*”)
  - a. Scientific Monitoring and Research plan
  - b. Outreach, Interpretation and Education plan
  - c. Enforcement plan
  - d. Contingencies and Emergency Planning
3. Operations (“*How?*”)
  - a. Equipment and Facilities
  - b. Staffing
  - c. Collaborations and Potential Partnerships
4. Costs and Funding (“*How Much?*”)
  - a. Estimated costs
  - b. Potential funding sources
5. Timelines and Milestones (“*When?*”)
  - a. Timeline and Criteria for Implementation
  - b. Timeline for Evaluation and Review of Effectiveness

Evaluation of management performance should consider the nature and extent of work performed to implement each program activity, specifically: 1) scientific monitoring; 2) outreach, interpretation and education; 3) enforcement; and 4) contingency and emergency planning. The descriptions of program elements should include information on equipment and facilities; staff and budget; collaborators, partners, and stakeholder involvement; as well as the timelines and milestones that have or have not been met.

The evaluation of program elements should consider implementation relative to regional goals and objectives, as well goals and objectives in individual activity plans (e.g., the scientific monitoring plan). The effect of staffing and budget on implementation should also be evaluated. To determine if central coast MPAs are operating as a network component, and if the regional network is operating as part of a statewide network, implementation should be evaluated for consistency within the regional and statewide system. Inconsistencies should be explained.

Although management and enforcement will begin with implementation, time is needed to create an operational history. To have sufficient information, management and enforcement should be evaluated 5 years after implementation.

Indicators for all program elements include extent of implementation and extent of stakeholder and public involvement. Indicators specific to program elements follow.

One indicator for the first program element “scientific monitoring” is the availability of information for adaptive management. The description of scientific monitoring should include program objectives, use of the data for evaluation of regional and MPA-specific goals and objectives, and use of the data for adaptive management. Data gaps should be identified, and availability and use of the data by stakeholders, researchers, and other outside entities described.

Indicators for the second program element “outreach, interpretation, and education” include distribution of materials explaining the regulations, understanding and acceptance of the regulations, distribution of educational materials, the presence of interpretive signs, and extent of stakeholder involvement. The description of outreach, interpretation, and education should include use of the materials by stakeholders and other groups, as well as a measure of stakeholder understanding of the materials.

Indicators for the third program element “enforcement” include clearly defined enforcement procedures, enforcement coverage, and information dissemination to encourage compliance. The description of enforcement should include the number and extent of patrols, citations, and contacts with users.

Indicators for the fourth program element “contingency and emergency planning” include speed of response and presence of residual problems. The description of emergency responses should include an evaluation of the availability of resources and lessons learned.

## **Evaluation of the Network Design**

Monitoring to evaluate the execution of the guidelines is discussed in this section. Monitoring to evaluate the management of the network or network component is discussed in the section “Management and Enforcement Monitoring” and monitoring to evaluate biological properties of the network or network component is discussed in “Biophysical Monitoring”.

## **Data Management, Assessment and Communication**

To assure data quality and integrity, quality assurance/quality control (QA/QC) procedures will be needed from field sampling to data analysis. Where appropriate, sampling equipment needs to be calibrated and tested prior to use. When sampling at sea, limits need to be set on operating conditions (e.g., wave height, water clarity) to provide for safety of the crew and to assure data quality and consistency. Data entered into electronic format should be double checked. Data in electronic format should be verified with range checks and other tests of reasonableness. QA/QC procedures and operations should be documented.

QA/QC is also needed to assure data consistency, particularly when data are collected by separate programs. Sampling methods need to be standardized. Sampling protocols should be written in detail and distributed to all survey participants. Field notes, ship logs, and other records need to be kept to demonstrate that protocols were followed; deviations in protocols need to be documented. In some instances, it may be necessary to conduct inter-calibrations to measure data consistency among participants.

Scientific and public review will also be needed. It is expected that stakeholder and scientific advisory groups will be involved in monitoring, data analysis and evaluation.

## **Outreach, Interpretation and Education plan**

The Department will hire a full-time outreach and education specialist to address a variety of Marine outreach needs, including MLPA. Additionally entry level staff will be hired in each region who will help implement outreach plans and provided direct contact with various user groups in the field. Programs may be developed to provide volunteer and cooperative outreach support and will be described as they are identified.

As specific outreach materials and programs are developed, details will be added to this document. Funding for outreach may come from the California Ocean Protection Council through bond funds received in the 2007/2008 budget cycle.

## **Enforcement plan**

In order to facilitate enforcement, the Department proposes using a multi-tiered effort that targets high risk areas (areas prone to infractions) with higher levels of enforcement while maintaining sufficient enforcement in all MPAs. In certain areas, formal and informal partnerships will be relied upon to increase the number of “eyes-on-the-water”, person-hours of enforcement, and visibility of enforcement personnel. In some cases, formal memoranda of understanding (MOUs) will be developed to allow fund transfer between partner agencies.

Table 18 lists each MPA in the central coast region along with enforcement considerations. Staff needs to implement this plan are discussed in subsection 8.4.3.

Table 18. Enforcement considerations for central coast region MPAs.

MPA Name	Primary Enforcement Method	Potential Partnerships/ Assistance	Special Considerations	Special Equipment Needs
Año Nuevo SMCA	Ocean/Vessel patrol with some shoreline patrol	California State Parks	14 to 16 miles to get patrol skiff to the area. Large Patrol vessel is about 25 miles away.	Boat launch at Año Nuevo-need to be able to trailer small boat closer to the area. Some aircraft patrol.
Greyhound Rock SMCA	Ocean/Vessel patrol with some shoreline patrol		Same issues as Año Nuevo	Same issues as Año Nuevo
Elkhorn Slough SMR	Shoreline patrol with some small skiff patrol	Elkhorn Slough Foundation, NOAA/Elkhorn Slough National Estuarine Research Reserve		Boats
Elkhorn Slough SMCA (SMP	Shoreline patrol with some small skiff patrol	Elkhorn Slough Foundation, NOAA/Elkhorn Slough National Estuarine Research Reserve		Boats
Moro Cojo Slough SMR	Shoreline patrol with some small skiff patrol	Elkhorn Slough Foundation, NOAA/Elkhorn Slough National Estuarine Research Reserve		
Soquel Canyon SMCA	Ocean/Vessel patrol	Monterey Bay Marine Sanctuary	Heavily fished area - will require extensive on water patrol.	Small skiff and large boat patrol. Some aircraft patrol.
Portuguese Ledge SMCA	Ocean/Vessel patrol	Monterey Bay Marine Sanctuary	Not connected to shore - requires boat patrol	Small skiff and large boat patrol. Some aircraft patrol.
Edward F. Ricketts SMCA	Shoreline patrol and some boat patrol	Coast Guard, Monterey and Pacific Grove Police Departments. Monterey Bay Aquarium and Hopkins Marine Station. Monterey Bay Marine Sanctuary	Heavily used area. Many non-consumptive users.	Small boat patrol.
Lovers Point SMR	Shoreline patrol and small skiff patrol	Stanford University/Hopkins Marine Station. Monterey Bay Aquarium. Coast Guard. Monterey Police Department. Monterey Bay Marine Sanctuary	Heavily used area. Many non-consumptive users.	Boats
Pacific Grove Marine Gardens SMCA	Shoreline patrol and small skiff patrol	State Parks. Monterey Bay Sanctuary. Pacific Grove PD. Coast Guard	Heavily used area. Many non-consumptive users.	Boats
Carmel Pinnacles SMR	Ocean/Vessel patrol	Monterey Bay Sanctuary		

MPA Name	Primary Enforcement Method	Potential Partnerships/ Assistance	Special Considerations	Special Equipment Needs
Carmel Bay SMCA	Shoreline patrol and Ocean/Vessel patrol	Monterey Bay Sanctuary. Carmel PD		Boats
Point Lobos SMR	Shoreline patrol and Ocean/Vessel patrol	California State Parks. Monterey Bay Sanctuary.	High use area for divers.	Boats
Point Lobos SMCA	Ocean/Vessel patrol	California State Parks. Monterey Bay Sanctuary.		Boats
Point Sur SMR	Ocean/Vessel patrol with some shoreline patrol	Coast Guard	Distance from harbor. Weather hampers ability to patrol area by boat.	Large and small boats for patrol. Aircraft patrol
Point Sur SMCA	Ocean/Vessel patrol	Coast Guard	Distance from harbor. Weather hampers ability to patrol area by boat.	Large and small boats for patrol. Aircraft patrol
Big Creek SMCA	Ocean/Vessel patrol		Remote area. Only large boat patrol can patrol area.	Large patrol boat and aircraft.
Big Creek SMR	Shoreline patrol and Ocean/Vessel patrol	University of California/Big Creek Reserve	Remote area. Only large boat patrol can patrol area.	Large patrol boat and aircraft.
Piedras Blancas SMR	Shoreline patrol and Ocean/Vessel patrol		Fairly remote	Small and large patrol boats and aircraft.
Piedras Blancas SMCA	Ocean/Vessel patrol		Fairly remote	Small and large patrol boats and aircraft.
Cambria SMCA (SMP)	Shoreline patrol with some boat patrol			Boats
White Rock (Cambria) SMR	Shoreline patrol with some boat patrol	University of California/Ken Norris Rancho Marino Reserve		Boats
Morro Bay SMRMA	Shoreline patrol with some small boat patrol.	State Parks.	Multi use area with hunting, fishing, and non consumptive users.	Boats
Morro Bay SMR	Shoreline patrol with small and large boat patrol	California State Parks		
Point Buchon SMR	Ocean/Vessel patrol with shoreline patrol	California State Parks	Diablo Canyon Power Plant proximity.	Large and small patrol boats
Point Buchon SMCA	Ocean/Vessel patrol		Diablo Canyon Power Plant proximity.	Large and small patrol boats



MPA Name	Primary Enforcement Method	Potential Partnerships/ Assistance	Special Considerations	Special Equipment Needs
Vandenberg SMR	Shoreline patrol and Ocean/Vessel patrol	Vandenberg Air Force Base	Access to Vandenberg for shoreline patrol. Limited patrol by aircraft	Large and small patrol boats

### **Enforcement Personnel**

Table 19 Central coast enforcement personnel with marine emphasis (August 2006).

Pigeon Point to Big Sur		Big Sur to Point Conception		Total
Land Based	Patrol Boat	Land Based	Patrol Boat	
1 Lt. / 2 Wardens	1 Lt. / 2 Wardens	2 Wardens	2 Lt. / 4 Wardens	4 Lieutenants
	1 patrol boat		2 patrol boats	10 Wardens

The Department has 14 marine emphasis enforcement staff located within the central coast project covering the area between Pigeon Point and Point Conception. The four lieutenants and ten wardens have a primary emphasis of at sea and shore based marine patrol within this large area. There are also inland wardens that work the non-marine issues along the same area of the central coast. These wardens deal with all inland hunting, fishing, pollution, habitat loss, and other related enforcement issues. This small group of marine emphasis and land based wardens will not be able to adequately handle the added responsibilities of enforcement of these MPAs without assistance. Currently the Law Enforcement Division has 65 vacant positions and is unable to redirect enforcement personnel or current new hires to a new mandate.

The 2006/2007 Governors Budget allowed the Department to create nine new enforcement positions (including engineer positions) to assist with MLPA, MLMA, and Halibut Trawl Bill implementation. These positions cannot be filled, trained, and deployed until at least September of 2008. Until that time, the Department will not implement identified patrol efforts in most of the new MPAs along the central coast.

The Department will be unable to fill enforcement positions designated to MLPA enforcement until it acquires a new hiring list in 2007. The hiring process includes testing, background investigation, hiring, and training. This process takes 18 to 24 months to bring a new warden into the field. The Department is having a difficult time with recruitment and retention of wardens due to salary disparities with other law enforcement agencies. Our warden recruitment is not currently able to keep up with attrition due to retirements and separations. Unless the problem with recruitment and retention is fixed, we may have difficulties placing wardens into these new MLPA positions in the foreseeable future.

Current MPA enforcement will be accomplished using existing personnel resources. Positions cannot be redirected to concentrate on MLPA enforcement due to duties and responsibilities currently facing enforcement. The Department will use MLPA funding to pay overtime to existing wardens to patrol these new areas. Current enforcement staff on the central coast will be supplemented by wardens to assist with patrol effort within the MPAs through directed enforcement details paid through MPA funding.

MPA's will be patrolled by many techniques including large patrol boats, small patrol skiffs, aircraft, and by wardens on the coast. Each MPA has special needs requiring specialized patrol efforts. Areas closer to ports will require less effort to get to, but because of their proximity to population centers, will have a higher use than remote areas. Remote areas may get fewer users, but require a more significant travel. This last patrol would include large boat or aircraft patrol.

### **Training**

Coastal Wardens working within the central coast area of California will receive training on the new suite of marine protected areas in their patrol districts. This training will include but is not limited to area boundaries and area specific regulations.

### **Timeline for Implementation of New Enforcement Staff**

Enforcement of MPAs in the central coast project will be implemented in phases as DFG enforcement staff levels are augmented to handle the extra work load created by these new MPAs.

#### **Year One (2006-2007)**

The Department filled the first of nine new enforcement positions as a Captain in January of 2007. The new MLPA Captain will work closely with department staff in implementing the option approved by the Commission in April of 2007. This Captain will also be closely involved in second round of MLPA initiative in the North Central Coast. As the next eight MLPA positions are filled, this captain will supervise the MLPA enforcement effort in the central coast area.

Start the hiring process for the nine new enforcement positions authorized by the 2006/2007 budget. If no problems are encountered in the hiring process, the Department expects these wardens to be in the field by the end 2008. One to two years are required to complete the hiring process and training to bring a new warden into the field. The ability to hire and train new staff is dependent on State budget, hiring constraints, and academy availability.

During the first year, enforcement will be done with existing DFG enforcement staff. Wardens will receive training on the new MPA boundaries and regulations. Generally speaking, MPAs close in proximity to existing staff will get more patrol effort than those areas that are more remote. The Department will direct our effort mainly to MPAs with high use or sensitivity during the first year.

Because of limited staff near the MPA's, DFG will initiate directed patrols to increase visibility and decrease unauthorized user impacts. Directed patrols will be conducted intermittently and can be initiated for a number of reasons.

Year one's enforcement effort should be projected to be moderate due to staffing levels and other mandates. DFG will direct patrol efforts toward these MPAs, with the understanding that redirection of existing enforcement staff from their current duties is not an option. Overtime and

directed patrols will augment available MPA enforcement. MPAs close to ports will routinely see more effort than the MPAs that are more remote. DFG will implement increased MPA patrol efforts as new positions are established and filled.

## **Year Two (2007-2008)**

Continue with the hiring process for the nine positions authorized in the 2006/2007 budget.

Continue to patrol MPAs with existing enforcement staff as described in year one.

Late in year two, assuming the recruitment and retention problems are solved, the Department should have the first group of wardens filling the MPA funded positions. These wardens will be assigned coastal positions between Pigeon Point and Point Conception. Four wardens would be assigned between Pigeon Point and Big Sur, and four wardens between Big Sur and Point Conception. The eight wardens would be supervised by one lieutenant located in the Monterey Bay area. These wardens will be MPA emphasis wardens, but will also be involved with other DFG enforcement patrols and priorities.

These wardens will offer an increased level of service and patrol in the MPAs. The patrol efforts in all of the MPAs will see significant increase, especially areas that are more remote where minimal patrol effort was seen in year one. MPAs near ports will receive a significant boost in patrol effort as a result of these new positions. These wardens will work closely with other DFG wardens and utilize other DFG staff as needed and available to assist with MPA enforcement. Directed enforcement patrols and details will continue to be utilized to infiltrate problem areas and work identified issues.

### **Additional DFG Enforcement Resources**

DFG has three large patrol boats in the 54 to 65 foot class stationed at major ports along the central coast. Each large patrol boat is staffed by one lieutenant and two wardens. DFG also has a fleet of single and twin engine fixed wing aircraft that work in conjunction with both marine and land based wardens to help identify and investigate violations.

### **Contingencies and Emergency Planning**

Details on contingencies for natural disasters and/or unforeseen changes in local conditions will be added if necessary.

## **4.3 Operations**

### **Equipment and Facilities**

At this point, no additional equipment or facilities have been identified that are necessary to the successful implementation of MPAs in the central coast region.

### **Staffing**

Based on staff positions received in the 2006/2007 State budget, the Department hired a management/policy level staff person to oversee implementation of the central coast MPAs and planning in subsequent study regions. Ten of the other new positions have been hired to assist with planning in the next study region. These staff included a range of expertise and classifications from entry level data collection and analysis to specialist and supervisory level planning staff. The staff form the core of a new Department Marine Region project focused solely on MPA planning issues.

In addition to the above, staff have been added to existing Department Marine Region projects with duties that will include implementation of the central coast MPAs in addition to implementation and ongoing management under the scope of the Marine Life Management Act. Examples of projects that have new staff include: groundfish management; bay and estuary management; invertebrate management; state finfish management and state fishery review; research vessel operations; and fishery independent data collection. All of these staff perform duties which support a range of Department priorities, including MPA monitoring, management and implementation.

Enforcement staffing and implementation concerns are discussed in section 8.4.2 above.

### **Collaborations and Potential Partnerships**

Collaboration will be particularly important in monitoring and evaluation. Collaboration can build financial, institutional and intellectual synergies, producing more with better results. Academic institutions and governmental agencies have ongoing monitoring programs that will provide valuable data. Volunteer programs are being developed and have the potential to greatly augment the scope of sampling. Commercial and recreational fishermen have in-depth, personal knowledge that can inform all aspects of monitoring. It will be desirable to work with commercial fishermen who have boats and fishing gear as well as specialized knowledge of fishing that will be needed to conduct some of the monitoring proposed in this plan. Cooperative sampling will be an integral part of this monitoring program and sampling will build upon existing programs as much as possible. Existing data and potential for collaboration are presented below in Table 20.

Table 20. Existing data collection efforts which may provide information or potential collaboration in the Central Coast study region.

Organization	Sampling occurs with in study region	Sample sites within MPAs	Long term monitoring	zone	comments
PISCO	X	X	X	Shallow subtidal	Standardized, surveys fish, macro-invertebrates, algae, substrate type, relief, benthic cover
Reef Check	X	X	X	Shallow subtidal	Modified PISCO/CRANE protocol, will be comparable to PISCO/CRANE at some resolutions
REEF			X	Shallow subtidal	Uses timed swims instead of transects – would provide community composition information
MARINe	X	X	X	Rocky intertidal	Rocky intertidal surveys, uses indicator species, uses combination of photo quadrats, transects, and timed searches
LIMPETS	X			Rocky intertidal	Samples 4 sites, transects, quadrats
NMFS and MBNMS					Marine mammal surveys, seabirds, spans very large geographic areas
USGS					Sea otters, aerial and shore-based surveys
UCSC			X		Elephant seals in MBNMS
Moss Landing Elkhorn Slough	X	X		estuary	Shorebirds, harbor seals, sea otters in Elkhorn Slough
National Estuarine Research Reserve program	X	X		estuary	Shorebirds and rookeries, water samples, crab, gaper clams, some other invertebrates
Morro Bay National Estuary program and PRBO	X			estuary	Seabird abundance, breeding performance and diet at Año Nuevo, eel grass

#### 4.4. Costs and Funding

##### Estimated costs

Preliminary cost estimates of baseline monitoring are provided in section 4.2 above.

##### Potential funding sources

Funding to initiate MPA related monitoring was provided to the Department and California Ocean Protection Council in the 2006/2007 State budget. These funds will primarily be used to support baseline monitoring programs. Long-term funding sources will be described as they become available and are identified.

## **4.5 Timelines and Milestones**

### **Timeline and Criteria for Implementation**

The Commission will make a final determination on regulations for new MPAs in the central coast region in April 2007. Upon adoption of regulations, final Administrative Procedure Act documents will be prepared and submitted to the Office of Administrative Law (OAL). OAL may take up to 30 working days to review these documents and the regulatory adoption process. If approved by OAL, the regulations are submitted to the Secretary of State and become effective 30 days later.

### **Timeline for Evaluation and Review of Effectiveness**

Once data on the effects of MPAs have been obtained, they can then be evaluated with respect to data collected in other California and worldwide MPAs to determine if the intended goals have been achieved. The evaluation of these data along with a statement of statistical confidence determines the MPAs effectiveness.

Since most biological responses will lag behind the change in protection, minimum time limits must be established. These minimum limits should allow sufficient time for change to occur and for planned monitoring to detect this change with statistical significance. To meet the ongoing needs of an adaptive management process, however, it is also necessary to establish upper time limits. Upper time limits ensure the MPAs will be reviewed in a reasonable amount of time.

Though some changes may be very rapid, most will take many years to accrue, especially given the biology of fish and invertebrate species in the region. In order to allow the process of adaptive management to continue, however, review cannot be put off indefinitely. Thus, it is recommended that a major review of this monitoring program's results occur approximately five years after reserve implementation. Interim annual reviews should highlight success or failure of the monitoring itself as well as data which show more instantaneous changes, such as landings and income from fisheries.

## **5. South Coast Region (Point Conception to the California/Mexico border)**

Timeline to be Determined