

## **California Marine Life Protection Act (MLPA) Initiative**

### **Evaluation of Existing Central Coast Marine Protected Areas**

**DRAFT**

*September 28, 2005*

Comments on this draft document should be addressed to MLPA staff via email to [mlpacomments@resources.ca.gov](mailto:mlpacomments@resources.ca.gov) by October 15<sup>th</sup>, 2005. Comments should be as specific as possible and, when appropriate, reference the page, section, or appendix to which the comment applies.

**CONTENTS**

EXECUTIVE SUMMARY .....3  
1.0 INTRODUCTION .....6  
2.0 EVALUATION OF EXISTING MPAs .....9  
    2.1 Año Nuevo Special Closure.....9  
    2.2 Elkhorn Slough State Marine Reserve .....10  
    2.3 Hopkins State Marine Reserve.....11  
    2.4 Pacific Grove State Marine Conservation Area.....12  
    2.5: Carmel Bay State Marine Conservation Area .....14  
    2.6 Point Lobos State Marine Reserve.....15  
    2.7 Julia Pfeiffer Burns State Marine Conservation Area.....16  
    2.8 Big Creek State Marine Reserve.....18  
    2.9 Atascadero Beach State Marine Conservation Area .....19  
    2.10 Morro Beach State Marine Conservation Area.....20  
    2.11 Pismo State Marine Conservation Area .....21  
    2.12 Pismo-Oceano State Marine Conservation Area.....21  
    2.13 Vandenberg State Marine Reserve.....22  
3.0 GAP ANALYSIS .....23  
    3.1 Intertidal Habitats.....24  
    3.2. Estuaries.....24  
    3.3 Seagrasses .....24  
    3.4 Soft and Hard Substrata.....24  
    3.5 Kelp Forests .....25  
    3.6 Pinnacles and Submarine Canyons .....25  
    3.7 Oceanographic Habitats.....26  
    3.8 Size, spacing and depth of MPAs .....26  
4.0 OTHER TYPES OF SPATIAL CLOSURES IN THE REGION .....27  
5.0 SUMMARY EVALUATION AND RECOMMENDATIONS FOR EXISTING MPAS .....28  
    5.1 Summary Evaluation of Existing MPAs, Management Measures and Restrictions.....28  
        5.1.1 Existing MPAs (including Ano Nuevo Special Closure) .....28  
        5.1.2 Other existing management measures and restrictions.....29  
    5.2 Recommendations for Modifications to Existing Central Coast MPAs.....31  
REFERENCES CITED.....32  
FURTHER REFERENCES FOR EXISTING MPAS .....33

**List of Maps**

Map 1: Central Coast Study Region and Existing Marine Protected Areas

**List of Appendices**

- Appendix I: Draft Evaluation Matrix For Existing Central Coast Marine Protected Areas
- Appendix II: Draft Gap Analysis Of Habitat Representation In Existing Central Coast Marine Protected Areas
- Appendix III: Draft Analysis Of Habitats In Other Types Of Spatial Closure Areas In The Central Coast

## EXECUTIVE SUMMARY

The Marine Life Protection Act (MLPA) requires the evaluation of existing Marine Protected Areas (MPAs) to assess the need for modification of those MPAs or the addition of new MPAs in the region to meet the requirements of the Act. This draft evaluation of existing MPAs in the Central Coast study region (Pigeon Point to Point Conception) provides information to assist the Central Coast Regional Stakeholder Group in developing recommendations for changes to existing MPAs and developing proposals for new MPAs. The Central Coast study region has 12 existing state MPAs and 1 existing state Special Closure area (encompassing 3.8% of the total area of the study region).

This draft evaluation of existing MPAs is based on readily available information and includes:

- A narrative description of each existing MPA and special closure. There are 5 State Marine Reserves, 7 State Marine Conservation Areas, 1 Special Closure, and no State Marine Parks in the study region (Section 2.0).
- An evaluation of the amount of representative and unique habitats of the Central Coast in existing MPAs and the extent to which existing MPAs meet the Central Coast regional goals, objectives, and design considerations are provided in an evaluation matrix (Appendix I).
- A gap analysis of levels of protection of representative and unique habitat types in different types of MPAs (Section 3.0 and Appendix II).
- A preliminary assessment of other types of closure areas that limit fishing activity or are closed to public access, such as selected fishery closures and powerplant and military security zones, that may offer habitat and species protections that are similar to MPAs was conducted (Section 4.0 and Appendix III).
- A summary evaluation of existing MPAs and other types of closures (Section 5.0).

The 12 existing MPAs and one special closure in the Central Coast Study Region encompass approximately 43.0 mi<sup>2</sup> (32.5 nm<sup>2</sup>) of water surface area. While they are spread along most of the study region's coastline, there are notable gaps between Morro Bay and Big Creek in the south and between Elkhorn Slough and Pigeon Point in the north (with the exception of the special closure at Año Nuevo). A wide array of habitats is included to varying extents, though deeper water habitats are generally not represented at all (especially deeper than 100m) and many habitats are represented at low levels:

- **Intertidal Zone:** Sandy beaches are represented at 11% of their total length in existing MPAs, with only about 2% of the total is in state marine reserves. Rocky intertidal shores and cliffs are represented in existing MPAs at 15% of their total amount, with 8% in state marine reserves. Elkhorn Slough SMR is the only estuarine MPA and it captures 27% (linear measure) to 43% (areal measure) of the coastal marsh and 42% of the tidal flats in the region.
- **Estuaries:** There are 2 large and several small estuaries along the Central Coast. In terms of total area, approximately 6.9 nm<sup>2</sup> of estuarine environment has been mapped based on information from the National Wetlands Inventory, California Natural Diversity Database, and USGS topographic maps. Only 0.67mi<sup>2</sup> (0.51nm<sup>2</sup>) of that area (or 43%) occurs in an existing MPA (Elkhorn Slough SMR).

- **Seagrasses:** Only about 1% of the region's eelgrass beds are in the existing estuarine MPA (Elkhorn Slough SMR). Twenty-two percent of mapped surfgrass beds present along the coastline in the shallow subtidal zone are found in existing MPAs, with 12.6% in state marine reserves.
- **Soft and hard bottom habitats:** Based on coarse scale data (which overestimates the amount of soft substrata), about 7% of the region's soft bottom habitat in the 0-30m range, 3% of the 30-100m range, and none of the deeper soft bottom habitat is in existing MPAs. Based on the more accurate but geographically limited fine-scale data, 5% of the *mapped* soft bottom habitat at 0-30m and <2% at 30-100m is in existing SMRs or SCMAs, with none of the deep range protected. For rocky bottom habitats, based on coarse-scale data, less than 5% of the 0-30m range, 2% of the 30-100m range, and none of the deeper rocky habitat is protected in existing MPAs. Based on the more accurate but geographically limited fine-scale data, 2-5% of the *mapped* hard bottom habitat at 0-30m and <2% at 30-100m is in existing SMRs or SCMAs, with none of the deep range protected.
- **Kelp forests:** Kelp abundance varies annually; it is represented inside existing MPAs at 7.7 -17% of the total amount depending on survey year. In state marine reserves, the representation of kelp varies from 3.6 to 9% of the total. Approximately 13% of persistent kelp (present in 3 of 4 years) is represented in existing MPAs; 3 state marine reserves have 6% of the total amount of persistent kelp (Hopkins SMR, Point Lobos SMR, and Big Creek SMR).
- **Pinnacles and submarine canyons:** Pinnacles were identified based on bathymetry for a portion of the study region; Big Creek SMR, Point Lobos SMR, and Carmel Bay SMCA all have pinnacles in the 0-30 and 30-100m depth zones. Most existing MPAs do not extend deep enough to include submarine canyon habitats (exceptions include Carmel Bay SMCA and Julia Pfeiffer Burns SMCA). Almost 33% of shallow (0-30m) canyon habitat and less than 2% of 30-100m canyon habitat are captured in these MPAs. Minimal amounts (<1%) of deep canyon habitat (>100m) are represented in existing MPAs.
- **Oceanographic habitats:** Oceanographic habitats have not been mapped. Based on qualitative information, freshwater plumes may occur at Elkhorn Slough SMR (Elkhorn Slough and nearby Salinas River), Carmel Bay SMCA (Carmel River), Big Creek SMR (Big Creek) and Pismo-Oceano SMCA (Santa Maria). A larval retention area may occur in Carmel Bay SMCA, based on coastal geographic and current patterns. A few existing MPAs *may* overlap with upwelling features; these *may* include Ano Nuevo Special Closure, Pacific Grove SMCA, Carmel Bay SMCA, Point Lobos SMR, Julia Pfeiffer Burns SMCA, Big Creek SMR, and Vandenberg SMR. However, since most of the existing MPAs do not extend far offshore or include deep water habitats, upwelling features in deep waters are not represented in existing MPAs.

Other types of spatial closure areas in the region were also evaluated. Within the central coast study region, the area of the RCAs that is currently protected year-round from fishing activities that may impact over-fished groundfish is approximately 45.0 mi<sup>2</sup> (34nm<sup>2</sup>) (2.0 mi<sup>2</sup> (1.5nm<sup>2</sup>) greater than the area within MPAs). This area lies between 180 m and 270 m (100 and 150 fathoms) of depth protecting much of the continental shelf/slope break. Though detailed habitat

information is unavailable for most of this area, it is fair to assume that the area includes representatives of all habitats within this depth range. Diablo Canyon nuclear powerplant security zone is small (1.4nm<sup>2</sup>), but protects intertidal and nearshore rocky habitats from human access. The Vandenberg Air Force Base security zone is large (104 nm<sup>2</sup>) and also offers habitat protections by limiting human access.

The evaluation of the extent to which each existing MPA contributes toward regional goals, objectives and design considerations shows that some MPAs are contributing more than others (Appendix I). While each of the MPAs contributes something toward meeting regional objectives, overall the existing MPAs display the lack of coherent planning and purpose that inspired the legislature to pass the MLPA. Of the areas with specific objectives noted for their establishment, most were designed to protect single species or types of species. Though three MPAs were established with the intent of fostering scientific research and study in areas with little human impact (Hopkins SMR, Big Creek SMR, and Vandenberg SMR) all three are smaller than current scientific recommendations based on the ability of an area to be self sustaining. The MPAs were established over a period of more than 30 years with no specific plan to coordinate between areas or for long-term monitoring of their success.

The existing array of MPAs along the central coast does not include representation of all habitat types and provides little in the way of ecosystem protection or coherent management. Based on the habitat gap analysis, improvements to this array are clearly possible. The overall goals and objectives of the region should be taken into consideration so that the combination of MPAs, other management, and non-MPA restrictions meet the requirements of the MLPA.

## **1.0 INTRODUCTION**

The Marine Life Protection Act (MLPA) requires an analysis of the region's existing state marine protected areas (MPAs) to assess the need for changing boundaries or management of existing MPAs or the creation of new MPAs to fulfill the requirements of the Act. A MPA, according to California State law, is a discrete geographic area that has been designated by law, administrative action, or voter initiative to protect or conserve marine habitat and life. This evaluation focuses on the Central Coast study region, extending from Pigeon Point to Point Conception in state waters. The Central Coast study region has 12 existing state MPAs and 1 existing state Special Closure area that together encompass 3.8% of the total area of the study region (Table 1, Map 1). There are 5 State Marine Reserves, 7 State Marine Conservation Areas, 1 Special Closure, and no State Marine Parks in the study region.

Preliminary site characterizations and evaluations of existing MPAs in the region were conducted by the California Department of Fish and Game (CDFG) in early 2005 (CDFG 2005a) and included as an appendix to the Central Coast Regional Profile (MLPA Initiative 2005). Those preliminary evaluations were refined, and included in Section 2.0 of this document. In addition, the extent to which existing MPAs meet the Central Coast regional goals, objectives, and design considerations; and the guidelines in the MLPA and Master Plan Framework (CDFG 2005b) were assessed. Results of the evaluation of each existing MPA are provided in an evaluation matrix included as Appendix I.

A gap analysis is an evaluation of the amount of each habitat type in protected areas relative to the total amount in a region, and helps to identify habitats that are underrepresented in protected areas (National Gap Analysis Program, 1994). A gap analysis was conducted to determine the extent to which existing MPAs capture representative and unique habitats of the Central Coast study region; results are provided in Appendix II and described in Section 3.0..

In addition, this evaluation provides a preliminary assessment of other types of closure areas that limit fishing activity or are closed to public access, such as selected fishery closures and powerplant and military security zones, that may offer habitat and species protections that are similar to MPAs (Section 4.0). An analysis of the amount of each habitat type in these other types of closure areas was conducted (Appendix III); further evaluation of the contribution of these other closure areas toward regional goals, objectives, and design considerations is still underway.

Based on the evaluation of existing MPAs and the gap analysis, a summary evaluation of the effectiveness of existing Central Coast MPAs and their contribution toward regional goals and objectives is provided (Section 5.0). From this summary evaluation, recommendations for modifications to existing Central Coast MPAs will be made based on input from the Central Coast Regional Stakeholder Group (CCRSG).

Both the evaluation of existing MPAs and the gap analysis relied on readily available data, including Geographic Information System (GIS) mapped data, published and unpublished reports, and personal communication with some individuals familiar with these sites.

It is important to note that existing spatial data for habitats is of variable quality, resolution, and spatial extent depending on the habitat type and portion of the region. For example, accurate seafloor mapping to identify fine-scale substrate types (rocky or soft-bottom) has only been conducted in about 25% of the region and for some existing MPAs; coarse-scale substrata data is available for most of the region, but this dataset under-represents the amount of rocky habitat. Caveats on data quality are provided as notes, where possible.

**Table 1: Shoreline Length and Area of Existing State MPAs in the Central Coast Study Region**

<b>MPA NAME</b>	<b>Shoreline Length (mi)</b>	<b>Area (mi<sup>2</sup>)</b>	<b>Percentage of Total Study Region Area</b>
Special Closure: Año Nuevo Invertebrate Area	5.52	2.20	0.19%
Elkhorn Slough State Marine Reserve	3.16	1.35	0.12%
Hopkins State Marine Reserve	0.52	0.16	0.01%
Pacific Grove State Marine Conservation Area	3.45	1.53	0.13%
Carmel Bay State Marine Conservation Area	3.11	2.79	0.24%
Point Lobos State Marine Reserve	1.96	1.19	0.10%
Julia Pfeiffer Burns State Marine Conservation Area	2.07	2.65	0.23%
Big Creek State Marine Reserve	2.19	2.26	0.20%
Atascadero Beach State Marine Conservation Area	1.61	6.32	0.55%
Morro Beach State Marine Conservation Area	1.96	6.81	0.59%
Pismo State Marine Conservation Area	0.38	0.08	0.01%
Pismo-Oceano Beach State Marine Conservation Area	3.80	13.28	1.16%
Vandenberg State Marine Reserve	3.68	2.47	0.22%
<b>Total for State Marine Reserves</b>	11.50	7.43	0.65%
<b>Total for State Marine Parks</b>	0.00	0.00	0%
<b>Total for State Marine Conservation Areas</b>	16.33	33.46	2.91%
<b>Total for all State MPAs in Central Coast</b>	33.35	43.09	3.76%
<b>Total for Central Coast Study Region</b>	approximately 427 mi	1148.46	

## 2.0 EVALUATION OF EXISTING MPAs

The purpose of the evaluation of existing MPAs is to assess the overall effectiveness of each MPA and the extent to which each MPA contributes to regional goals, objectives, and design considerations. This evaluation of existing MPAs includes (1) a narrative description of each MPA (a refinement of CDFG 2005a) and (2) a matrix characterizing each MPA by amount of habitats present; size, depth range, and spacing; and the extent to which it contributes to each of the regional goals, objectives and design considerations developed by the CCRSG (see Appendix I). Information from spatial data sources, unpublished and published reports, and personal communication with local experts was compiled for each existing MPA.

### 2.1 Año Nuevo Special Closure

**Year established:** 1958

**Approximate area:** 2.20 mi<sup>2</sup> (1.66nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 - 33 ft (0-10 m) (GIS)

**Approximate shoreline length:** 7.00 mi (6.09 nm)

**Approximate alongshore span:** 5.52 mi (4.80 nm) (Nautical Chart)

**Habitat types:** Sandy and rocky intertidal, tidal flats, surfgrass, bull kelp forest, as well as soft and hard bottom to 30 m depth. Intertidal geologic formations include sandstone, siltstone and mudstone of the Vaqueros formation, Monterey formation, Santa Cruz mudstone, and Purisma formation (SWAT). *Dodecaceria fewkes* reef present. Tidal flats in the lee of Año Nuevo Island has species similar to Elkhorn Slough. Major upwelling location, especially on south side of island (Pearse pers comm.).

**Surrounding habitat types:** Franklin Point to Pigeon Point is comparable to Año Nuevo. More bull kelp between Año Nuevo and Scott Creek.

**Summary of existing regulations:** Take of invertebrates is not allowed within the boundaries of Año Nuevo State Reserve between the high tide mark and 100 feet beyond the low tide mark between November 30 and April 30 (29.05(3) of Ocean Fishing Regulations)

**Primary objectives:** Prevent the take of invertebrate species along boundary of Año Nuevo State Reserve. Protect Elephant Seals.

**Existing enforcement:** Adjacent to Año Nuevo State Reserve. Regulations are enforced by on-site State Park rangers. Park rangers give tickets to individuals who are caught violating reserve regulations. Park volunteer naturalists (docents) are trained to report any regulation violations to park rangers. In addition, park rangers may call CDFG wardens for assistance with violations occurring offshore.

**Important species present:** Elephant seals (haulout, roosting, foraging) (productivity increased by pinneped wastes), Bull kelp, *Dodecaceria fewkes* (tube worm), black oystercatchers (RSG), harbor seals, marble murrelets, fat innkeeper worms (John Pearse pers. comm..)

**Human Use patterns:** Tourists come to see elephant seals. Historic abalone diving, historic clamming location until banned. Not much diving due to murky water and abundant white sharks. Popular sport-fishing location (Pearse pers. comm.)

**Baseline and ongoing monitoring and research studies:** From the 1970's to the 1990's, species richness has increased (though less than other locations) (John Pearse pers. comm.).

**Public Access:** Shore access prohibited by park service, must access by boat.

**Basic Evaluation:** Some modification to Ano Nuevo may be needed to better align it to the goals of the MLPA.

## 2.2 Elkhorn Slough State Marine Reserve

**Year established:** 1980

**Approximate area:** 1.35 mi<sup>2</sup> (1,02 nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 10 ft (0-3 m) (GIS)

**Approximate shoreline length:** 19.22 mi (16.71 nm)

**Approximate alongshore span:** 3.16 mi (2.75 nm) (Nautical Chart)

**Habitat types:** Coastal marsh, tidal flats, small rocky intertidal section. Both surfgrass and eelgrass, as well as soft bottom habitat. One of two large estuaries in the study region. Contains newly formed clay soils derived from a mostly agricultural watershed. Main channel extends 10 km inland from the bay and ranges from 7.5 to 1.5 meters deep. Other habitats include mudflats, salt and brackish tidal marshes, salt ponds, and dredged islands.

**Surrounding habitat types:** Similar estuarine soft bottom habitat.

**Summary of existing regulations:** No take is allowed both through State regulations and designation as a Federal National Estuarine Research Reserve.

**Primary objectives:** This area was originally designated as an ecological reserve. Fish and Game Code Section 1580 (ecological reserves) states that "the policy of the state is to protect threatened or endangered native plants, wildlife, or aquatic organisms or specialized habitat types, both terrestrial and non-marine aquatic, or large heterogeneous natural gene pools for the future use of mankind through the establishment of ecological reserves." Although the language does not specifically refer to ecological reserves in marine areas, the Fish and Game Commission has extended this policy to those areas. The Elkhorn Slough Ecological Reserve was established to protect sensitive salt marsh, mudflat, and open water habitats, and to provide a quality, undisturbed estuarine site for education, restoration, research and monitoring.

**Existing enforcement:** The area is easily-observed, well-known, almost surrounded by land, and has a Department of Fish and Game facility on site. There is an existing docent program. Adjacent protected areas include land owned by ESNERR (1400 acres), the Nature Conservancy (140 acres), Elkhorn Slough Foundation (2000 acres), and California State Parks.

**Important species present:** Eelgrass (which has declined by more than 95% since the 1920s). 559 species of invertebrates (Caffrey 2002) including the fat innkeeper worm (80% of subtidal biomass), *Phoronopsis viridis* (in danger of local extinction), gaper clam (*Tresus nuttallii*), bent-nosed clam (*Macoma nasuta*), moon snail (*Polinices lewisii*), sea hare (*Aplysia californica*), ghost shrimp (*Callinassa californiensis*), shore crabs (*Pachygrapsus crassipes* and *Hemigrapsus oregonis*), pea crabs (Pinnotherid), amphipods, tannids, and polychaetes. There are at least 102 species of fish, including 16 species that use the slough as a spawning or nursery ground (eg northern anchovy, pacific herring, cabezon, and 6 sp of flatfish such as halibut, sole, sanddab, and others). Other fish include pacific staghorn sculpin, black surfperch, bay pipefish, 5 species of gobies, topsmelt, jacksmelt, shiner, white surfperch, leopard shark, bat ray, shad, mosquitofish, prickly sculpin, threestripe stickleback, striped bass speckled sanddab, leopard sharks, starry flounder. The American Bird Conservatory ranks Elkhorn Slough as a "Globally Important Bird Area" and it harbors 255 bird species. Otters and harbor

seals utilize the estuary, as well as seal lions, harbor porpoises, and juvenile gray whales on an infrequent basis (Caffrey 2002).

**Human use patterns:** On the average summer day kayak concessions rent to 50-150 people. 60,000 visitors/year utilize ESNERRs interpretation facilities and shore access trails (including 10,000 students on school trips) 300,000 visitors/year visit the beach at the Slough's mouth. Slough Safari business takes tourists to visit the estuary. Recreational fishermen use the area and commonly catch: rubberlip surfperch, pile perch, black perch, jacksmelt, sand sole, staghorn sculpin, starry flounder, walleye perch, cabezon, bat ray, leopard shark, and round stingray. Harvesting of benthic invertebrates includes: gaper, Washington, littleneck and softshelled clams, oysters, piddocks, and ghost shrimp (collected for bait-severely depleted).

**Baseline and ongoing monitoring and research studies:** Monthly volunteer water quality monitoring since 1988 at 24 sites around the Slough, including the Reserve. Continuous water quality monitoring, using four sites (two on the Reserve), to measure temperature, salinity, turbidity, dissolved oxygen and pH. Hyperspectral images are being used to map the distribution of plant communities of interest (nuisance algae, eelgrass, pickleweed, native grasses, and noxious weeds). Tidal erosion rates at about 40 intertidal stations along the main channel and in the MPA are monitored annually. Abundance, feeding rates, and reproductive success of herons, egrets, and cormorants in rookeries are assessed by volunteers. Caspian Tern breeding success is being monitored. Distribution, abundance, and diversity of shorebirds and waterbirds at seven ponds and tidal lagoons in the MPA are monitored to detect long-term changes or short-term anomalies. Native and invasive crabs are monitored along the estuarine gradient, in areas of different land use. Tracking of shark and ray abundances occurs at one site in the MPA. Current research includes: 1) Investigation of use of mudflats and other intertidal habitats by shorebirds, and the influence of tidal and seasonal dynamics. 2) Comparison of invertebrate communities associated with native oyster beds vs. invasive tubeworm beds. 3) Experiments and time series analysis to determine whether invasive upland plants are invading the ecotone and high marsh.

**Public access:** Boat ramps at the harbor and in Kirby Park. Kirby park has free parking for 50 vehicles, handicap portable restroom. ESNERR periodically provides access. (Linda McIntyre pers. comm.).

**Basic evaluation:** With on-site presence of Department staff, and with a history of baseline monitoring and research studies, the site functions well as one of the few fully-protected estuarine areas in the state.

**Other considerations:** Duke energy natural gas fired power plant is located near mouth of slough. From 1950-1990 put 1 million cu m / day of water at 5 degrees C above ambient temperature into slough, now they are putting it into Monterey Bay. Tidal scouring in Elkhorn Slough has become a concern since Moss Landing Harbor was built in 1946, exposing the estuary to tidal flushing.

### 2.3 Hopkins State Marine Reserve

**Year established:** 1984

**Approximate area:** 0.16 mi<sup>2</sup> (0.12 nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 60 ft (18.3 m) (GIS)

**Approximate shoreline length:** 0.79 mi (.69 nm)

**Approximate alongshore span:** 0.52 mi (.45 nm) (Nautical Chart)

**Habitat types:** Sandy and rocky intertidal. Mostly granite reef; smaller portions of sand, especially on outside edge. Subtidal includes mostly sand, low and medium boulders. Dominated by foliose red algae species. Giant kelp forest, surfgrass, and pinnacles present.

**Surrounding Habitat types:** Similar

**Summary of existing regulations:** No take is allowed.

**Primary objectives:** The primary purpose is to allow for research in an area that is free of disturbance due to exploitation.

**Existing enforcement:** The area is easily-observed from shore, well-known, marked on the seaward boundary by buoys, and staff from the Hopkins Marine Station (HMS) are on site every day. Bay Net volunteers stationed nearby

**Important species present:** Nearshore rockfish (*Sebastes carnatus*, *S. chrysomelas*, *S. atrovirens*, *S. caurinus*) were determined to be significantly longer inside the reserve than outside the reserve. Nearshore species include *Semicossyphus pulcher*, *Sebastes nebulosus*, *Sebastes miniatus*, *S. caurinus*, *Ophiodon elongatus*, *S. marmoratus*, and *Hexagrammos decagrammus*. Average fish density is .68 per 10m<sup>2</sup>. (Estes and Paddock 2002). Many crabs and nudibranchs (Shargel pers. comm.).

**Human use patterns:** Kayakers and divers. Utilized by students and scientists from HMS.

**Baseline and ongoing monitoring and research studies:** Numerous studies of algae, invertebrates, and fish have taken place. Long-term monitoring of the intertidal zone dates back to the 1930s, starting with the Hewitt Transect, a 1933 baseline study in the rocky intertidal (CCRS meeting 9/8/05). The Department carried out relatively intensive fish counts, and some re-monitoring of those counts has taken place. A recent study was completed comparing counts and sizes of benthic fishes in and adjacent to the MPA. In addition, the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) has had permanent intertidal and subtidal monitoring sites here for several years.

**Public access:** Shoreline closed to the public by HMS. Divers can access by boat (Anchored outside the reserve)

**Basic evaluation:** The area contains one of the oldest fully-protected marine research sites in the state and contains a variety of shallow habitat types within a relatively small area. It is a classic example of how a small but fully protected MPA can function well by providing a multitude of research opportunities with populations of marine organisms occurring at natural densities and size frequencies. While it is relatively small, studies have documented significantly greater biomass and size frequencies of nearshore fishes compared with adjacent fished areas. This site is overlapped by a State Water Quality Protection Area designation.

## 2.4 Pacific Grove State Marine Conservation Area

**Year established:** 1984

**Approximate area:** 1.54 mi<sup>2</sup> (1.16 nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 60 ft (18.3 m) (GIS)

**Approximate shoreline length:** 4.47 mi (3.89 nm)

**Approximate alongshore span:** 3.45 mi (3.00 nm) (Nautical Chart)

**Habitat types:** Sandy and rocky intertidal. Mostly granite reef; smaller portions of sand, especially on outside edge. Rock reefs in deeper water have been surveyed by researchers in submersibles. Giant kelp forest, surfgrass, and pinnacles (one from 60ft to 30 ft).

**Surrounding habitat types:** Similar, except higher proportion of sand bottom offshore. Similar to Carmel Point (CCRSG).

**Summary of existing regulations:**

Only the following species may be taken recreationally: finfish, and invertebrates other than mollusks or crustaceans. Scientific collecting prohibited on southern side

Only the following species may be taken commercially by ring net, lampara net, or bait net: sardines, mackerel, anchovies, squid, and herring.

**Primary objectives:** Established by legislative action, the primary objective is to provide protection from exploitation for certain fishes and invertebrates.

**Existing enforcement:** The area is easily-observed from shore by law enforcement personnel as well as private citizens, is well-known, and benefits from an increased community awareness of the need to protect marine resources. During daylight hours thousands of people pass by or visit the area on a daily basis. Pacific Grove is located in an urban area where the public can easily observe activities in the water from shore. Bay Net volunteers stationed nearby (Gaffney and Shimek, pers. comm.)

**Important species present:** Population of Acoel flatworm, *Polychoerus carmelensis*, which is endemic to the Monterey Peninsula (threatened/endangered) (Pearse pers. comm.) Sponges, cucumbers, moon snails, chitons, sea stars, large kelp canopy, vermillion rockfish, cabezon, grass rockfish, sheephead, kelp bass, kelp greenling, treefish (rare), cabezon, vermillion rockfish, kelp greenling, halibut, sheephead, calico bass, pile perch, rubberlip perch, bull and giant kelp, juvenile canary rockfish (CCRSG).

**Human use patterns:** Adjacent area popular for commercial boat deep dives. Used by non-consumptive scuba divers for calm and rough water diving (also for dive training), tidepoolers, kelp harvesters, shore and skiff fishing, recreational and commercial fishing, recreational spearfishing.

**Baseline and ongoing monitoring and research studies:** Many researchers from CDFG and several academic institutions have conducted life-history studies, recruitment studies, and tagging studies in this region. Tenera Environmental completed a study in 2003 which investigated the effects of visitor use on the intertidal area and established baseline levels for the more common intertidal species. Submersible studies of deeper-water fishes have also been carried out offshore of this site.

**Public access:** accessible tidepools with adjacent parking, easy access for beach diving.

**Basic evaluation:** The area presently offers some resource protection since regulations prohibit commercial finfishing (except for pelagic species) and allow the harvest of only certain invertebrates. The presence of sea otters precludes the harvest of most species of invertebrates permitted for take (e.g. urchin). However, the area does function well as an MPA by providing recreational opportunities, allowing a low but sustainable level of kelp and recreational finfish harvest, and providing a safe and local site for scientific collecting for research and public education. This area contains extensive intertidal and subtidal reef habitat and provides easy access to intertidal areas from shore. It also provides a source of kelp for local aquaculture businesses. Part of this site is overlapped by a State Water Quality Protection Area designation.

## 2.5: Carmel Bay State Marine Conservation Area

**Year established:** 1976

**Approximate area:** 2.79 mi<sup>2</sup> (2.11 nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 203 ft (61.9 m) (GIS)

**Approximate shoreline length:** 5.73 mi (5.0 nm)

**Approximate alongshore span:** 3.11 mi (2.70 nm) (Nautical Chart)

**Habitat types:** Granite reef along rocky and sandy shores; extensive areas of sand offshore; granite pinnacles present; head of Carmel submarine canyon. Surfgrass and giant kelp forest present.

**Surrounding habitat types:** Similar, except for the submarine canyon, which has greater depths than in the MPA.

**Summary of existing regulations:** Take of all living marine resources is prohibited except the recreational take of finfish by hook-and-line or spear and the commercial take of kelp under specific conditions.

**Primary objectives:** This area was originally designated as an ecological reserve. Fish and Game Code Section 1580 (ecological reserves) states that "the policy of the state is to protect threatened or endangered native plants, wildlife, or aquatic organisms or specialized habitat types, both terrestrial and non-marine aquatic, or large heterogeneous natural gene pools for the future use of mankind through the establishment of ecological reserves." Although the language does not specifically refer to ecological reserves in marine areas, the Fish and Game Commission has extended this policy to those areas.

**Existing enforcement:** The area is adjacent to population centers, and is therefore easily observed from shore. Pleasure boats, dive boats, and party boats frequent the area. CDFG provides enforcement presence on the water as well as from land. State beach ranger presence (Gaffney and Shimek pers. comm.).

**Important species present:** Many black abalone. Type locality for the flatworm, *Polychoerus carmelensis*, and the slime sponge, *Oscarella carmela* (Pearse pers. comm.) Large kelp canopy sponges, giant pacific octopus, scallops, sea stars, otters, harbor seal, large lingcod, cabezon, vermillion rockfish, china rockfish, kelp greenling, white surfperch, rainbow surfperch, striped surfperch, cabezon, vermillion rockfish, sheephead, halibut, kelp greenling, lobster, pile perch, opal eye, hat abalone, calico bass, rubberlip perch, extensive *Stylaster* and *Allopora* hydrocorals (off Butterfly house and at inner and outer pinnacles), leopard sharks in Stillwater cove, and spot prawn (CCRSG).

**Human use patterns:** Accessible deep diving, popular commercial and private boat diving, especially Monastery beach, divers from skiff and shore, preferred dive spot for experienced divers. No commercial fishing, but recreational fishing is allowed. 0-50 ft recreational fishermen, 50-100 ft non-consumptive divers, not many users far from shore. Scientific collecting allowed with permit. Important for spearfishing.

**Baseline and ongoing monitoring and research studies:** The area near Pescadero Point, Stillwater Cove, and Arrowhead Point is the focus of a number of marine ecological studies, mostly through Moss Landing Marine Lab. San Francisco State University has conducted life-history and recruitment studies of fish in this area. A high school class carries out an ongoing monitoring program. There have also been submersible studies in the surrounding area. In

addition, the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) has had permanent intertidal and subtidal monitoring sites here for several years.

**Public access:** Parking limited, hard to access. For boats, difficult to get to unless weather conditions allow access around Point Pinos. Boat launch at Stillwater cove and Pt Lobos. Cannot carry a spear if launching from Pt Lobos.

**Basic evaluation:** This area contains reef and sand habitat, a kelp bed, and includes the head of a submarine canyon. It provides opportunities for recreational angling and diving as well as limited commercial kelp harvest and is adjacent to the fully-protected area at Point Lobos. The existing degree of protection is probably consistent with its uses, and the site appears to function well as an MPA with limited harvest. CDFG has documented its long term use as a fishing area for recreational anglers on Commercial Passenger Fishing Vessels and in skiffs, as well as from extractive free divers (CenCal competitive free-diving competitions). This level of use appears to be sustainable in the absence of commercial fishing for finfish and invertebrates. The presence of the submarine canyon head provides a source of spot prawn recruitment to the commercial trap fishery in the adjacent area. This site is overlapped by a State Water Quality Protection Area designation.

## 2.6 Point Lobos State Marine Reserve

**Year established:** 1973 (invertebrates since 1963)

**Approximate area:** 1.19 mi<sup>2</sup> (0.90 nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 233 ft (71 m) (GIS)

**Approximate shoreline length:** 6.19 mi (5.38 nm)

**Approximate alongshore span:** 1.96 mi (1.70 nm) (Nautical Chart)

**Habitat types:** Sandy and rocky intertidal. Mostly granitic reef dropping from shore to sand bottom. Reef habitat with many crevices and pinnacles. Extensive giant kelp forest, as well as surfgrass. Many pinnacles. Sand, cobble, medium boulders, and pinnacle make up most of subtidal area. Abundant articulated corallines, encrusting corallines, and foliose reds in subtidal (Estes and Paddock 2002)

**Surrounding habitat types:** Carmel submarine canyon is nearby. Extensive hard bottom offshore, as determined from submersible studies.

**Summary of existing regulations:** No take is allowed.

**Primary objectives:** This area was originally designated as an ecological reserve. Fish and Game Code Section 1580 (ecological reserves) states that "the policy of the state is to protect threatened or endangered native plants, wildlife, or aquatic organisms or specialized habitat types, both terrestrial and non-marine aquatic, or large heterogeneous natural gene pools for the future use of mankind through the establishment of ecological reserves." Although the language does not specifically refer to ecological reserves in marine areas, the Fish and Game Commission has extended this policy to those areas.

**Existing enforcement:** State Park rangers within the adjacent terrestrial reserve monitor access from shore, and monitor approaches by boats. The presence of visitors every day of the year in the adjacent terrestrial reserve provides an additional deterrent to potential violators of regulations. Docent program.

**Important species present:** Rockfish determined to be significantly larger within the reserve than outside the reserve (Estes and Paddock 2002). Near-shore species include:

*Semicossyphus pulcher*, *Sebastes*, *nebulosus*, *Sebastes miniatus*, *S. caurinus*, *Ophiodon elongatus*, *Scorpaenichthys marmoratus*, *Hexagrammos decagrammus*, *Sebastes carnatus*, and *Sebastes atrovirens*. Average fish density is .85 per 10 m<sup>2</sup>. (Estes and Paddock 2002). Other species include scallops, large sponges, hydrocoral, pacific octopus, harbor seals, otters, cabezon, vermilion rockfish, leopard shark, grass rockfish, sheephead, kelp bass, kelp greenling, cooper rockfish, black and yellow rockfish, longfin sculpin, striped surfperch, kelp surfperch, pile, rubberlip, buffalo sculpin, occasionally risso's dolphin, and rarely orca. Sheephead can be seen regularly. Hydrocoral off granite point, mysid shrimp swarms in Whalers cove, leopard sharks in Whalers cove.

**Human use patterns:** Popular dive spot (recreational and technical non-consumptive divers), boat and beach diving, accessible deep diving, diving limited by headcount and no-go area, divers turned away almost every weekend, safe access for recreational water access.

**Baseline and ongoing monitoring and research studies:** UC Santa Cruz students found slightly greater abundances of benthic fish in the MPA than in adjacent areas (source?). CDFG has conducted habitat-based surveys of fish abundance within the MPA. Submersible surveys have been carried out offshore of the MPA. In addition, the Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO) has had permanent intertidal and subtidal monitoring sites here for several years.

**Public access:** For divers: only 30/ day allowed, pay to enter state park (\$6), \$8 for a reservation (total \$15). Fills up on weekends and holidays, large no dive area. One of few accessible boat launch ramps south of Monterey Bay in central coast. (2 boat ramps, one in Whalers cove and one to the west).

**Basic evaluation:** This site contains a complex variety of habitats, primarily hard bottom, and contains high densities of large, adult bottom fishes such as rockfishes and lingcod. Although relatively small, the MPA functions well as a fully protected area because of its high species diversity and variety of habitat, and it is effectively enforced. Studies by CDFG and others have documented high population densities and large sizes of economically important near-shore fish species, in particular rockfishes, lingcod, cabezon, and greenlings, with population densities and size frequencies significantly greater than in adjacent and more distant fished areas. In addition, the site is a prime destination for non-extractive scuba divers, and use is limited by local policy. This site is overlapped by a State Water Quality Protection Area designation.

## 2.7 Julia Pfeiffer Burns State Marine Conservation Area

**Year established:** 1970

**Approximate area:** 2.65 mi<sup>2</sup> (2.0 nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 358 ft (109 m) for MPA boundary (GIS), which extends 6000 feet (1829 m) offshore, but site-specific regulations apply to the harvest of invertebrates only within 1000 (305 m) feet from shore, which is approximately 60 (18.3) feet deep.

**Approximate shoreline length:** 3.46 mi (3.00 nm)

**Approximate alongshore span:** 2.07 mi (1.80 nm) (Nautical Chart)

**Habitat types:** Hard and soft bottom. Giant kelp beds, pinnacles and underwater cliffs, Diopatra (worm) tube beds, unstable gravel and boulder fields, and surge channels present. Some pinnacles have up to 75 ft of vertical relief in over 50 ft horizontally. Surfgrass and submarine canyon also present.

**Surrounding habitat types:** Similar habitats are found to south. To the north, Partington Canyon extends close to shore. Offshore is a mixture of hard and soft bottom, with some depths exceeding 300 fathoms (1,800 ft) within 3 miles of shore.

**Summary of existing regulations:**

Only the following species may be taken recreationally: finfish, chiones, clams, cockles, rock scallops, native oysters, crabs, lobsters, ghost shrimp, sea urchins, mussels and marine worms (except that no worms may be taken in any mussel bed unless taken incidentally to the take of mussels).

Only the following species may be taken commercially: finfish, crabs, ghost shrimp, jackknife clams, sea urchins, squid, kelp and worms (except that no worms may be taken in any mussel bed, nor may any person pick up, remove, detach from the substrate any other organisms, or break up, move or destroy any rocks or other substrate or surfaces to which organisms are attached).

**Primary objectives:** This site was established to protect unique habitat primarily due to prevalence of outstanding wall and pinnacle communities. It contains the most extensive series of pinnacles and underwater cliffs along the Big Sur Coast.

**Existing enforcement:** Enforcement is aided by the lack of access to intertidal and subtidal area from shore (although fishing from shore occurs at Partington Point) due to park requirements to stay on trails. Department of Parks and Recreation staff provide on-site presence. CDFG provides on-water presence. Commercial and recreational harvest restrictions pertain to invertebrates only, and for those which might be taken illegally, access is difficult at best.

**Important species present:** Giant kelp, diopatra worms.

**Human use patterns:** Very small number of divers.

**Baseline and ongoing monitoring and research studies:** Moss Landing Marine Laboratory - extensive diving surveys from 1987 to 1989 with some follow-up in mid 1990's, related to impacts of the massive landslide and subsequent manipulations by Caltrans in 1983-84. Extensive qualitative surveys of plant, invertebrate, and fish communities by sub-habitat types have been completed (John Oliver, MLML, and Jim Barry, Department of Parks and Recreation). Side-scan sonar maps and data from surveys conducted by Rick Kvitek (CSUMB) in 1994, 1995, 1997, and 1998.

**Public access:** Difficult to access, remote. Shoreline inaccessible from adjacent terrestrial state park.

**Basic evaluation:** The area presently offers little in the way of resource protection since only certain invertebrates are protected from harvest. Among the allowable species, the presence of the sea otter precludes harvest by man for some of these (e.g. crab, urchin). However, the area does function well by providing recreational opportunities. The Department of Parks and Recreation has a long-term database here, including information on habitat, fishes, invertebrates, and algae. At present, except for Big Creek State Marine Reserve, there are not any no-take areas between Pt. Lobos State Marine Reserve, and Vandenberg State Marine Reserve. The northern Boundary of Big Creek State Marine Reserve is about 5 miles from southern boundary of Julia Pfeiffer Burns State Marine Conservation Area. This site is overlapped by a State Water Quality Protection Area designation.

## 2.8 Big Creek State Marine Reserve

**Year established:** 1994

**Approximate area:** 2.26 mi<sup>2</sup> (1.71 nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 300 ft (0-91 m) (GIS)

**Approximate shoreline length:** 3.05 mi (2.65 nm)

**Approximate alongshore span:** 2.19 mi (1.90 nm) (Nautical Chart)

**Habitat types:** Sandy and rocky intertidal; soft bottom and hard bottom subtidal; giant kelp and surfgrass beds; many wash rocks and pinnacles. Subtidal a combination of sand, flat rock, low boulder, medium boulder, and pinnacles. Encrusting corallines and turf brown algae abundant (Estes and Paddock 2002). Majority of subtidal substrate is sand (Yoklavich 2002). Much of the seafloor habitat at Big Creek SMR has been mapped.

**Surrounding habitat types:** To the north and south a mixture of hard and soft bottom with scattered kelp beds. Several heads of submarine canyons adjacent on seaward side.

**Summary of existing regulations:** No take is allowed. No disturbance of the bottom; no boats, diving or other use (boat transit only); public entry restricted.

**Primary objectives:** To satisfy requirements of the Marine Resources Protection Act of 1990 the Fish and Game Commission was required to establish four ecological reserves along the mainland coast. The Big Creek State Marine Reserve (originally named the Big Creek Marine Resources Protection Act Ecological Reserve) was one of the reserves established pursuant to the Act. The Act specified that the specific purpose of these reserves was "to provide for scientific research related to the management and enhancement of marine resources".

**Existing enforcement:** Full-time reserve manager provides on-site presence. Local users of adjacent areas (skiff fishermen), who are allowed access through the MPA, assist in insuring compliance with regulations. Department provides on-water enforcement presence. Contiguous with the University of California Landels-Hill Big Creek Reserve, which protects about 16 km<sup>2</sup> of coastal terrestrial habitats. To further facilitate compliance with reserve regulations, the boundaries should be placed at more easily recognized points than is now the case. For example, the northern boundary could be made contiguous with the Landels-Hill Big Creek Reserve (a terrestrial protected area adjacent) and the southern boundary extended to Gamboa Point to make it clearly recognizable from sea (Yoklavich 2002)

**Important species present:** Most abundant (> 0.1% total) rockfish: halfbanded, blue, pygmy, olive, and gopher. Relatively abundant (< 0.1% total) rockfish: Bocaccio and shortbelly, copper, and rosy. Relatively abundant non-rockfish: speckled and Pacific sanddabs, blackeye goby, and painted greenling (Yoklavich 2002). Many nearshore rockfish present (*S. pulcher* *S. nebulosus* *S. miniatus* *S. caurinus* *O. elongatus* *S. marmoratus* *H. decagrammus* *S. carnatus* *S. chrysomelas* *S. atrovirens*), but significant size and length difference between inside and outside of reserve not apparent. Average fish density is .80 per 10m<sup>2</sup> (Estes and Paddock 2002). 93% of the 25,159 fish found within the reserve were rockfish representing at least 20 species (Yoklavich 2002) Other species present: cabezon, kelp greenling, black surfperch, rubberlip surfperch, pile surfperch, striped surfperch, bull kelp, giant kelp, harbor seals, California sea otter, chinook salmon, starry rockfish, vermilion rockfish, yellowtail rockfish, California halibut, black and yellow rockfish, gopher rockfish, china rockfish, grass rockfish, California sheephead (Reilly pers. comm.); important feeding area for sea otters.

**Human use patterns:** Surfers. Surf fishermen nearby. Live fish fishermen fishing just outside the reserve (help to enforce regulations). Students and scientists use the area for research, in association with Big Creek Reserve

**Baseline and ongoing monitoring and research studies:** Benthic habitat mapping and characterization and baseline information for entire reserve (Yoklavich, VenTresca). Ongoing mapping of ocean currents and related hydrographic studies (C. Collins, F. Schwing). Benthic fish surveys and baseline research for deep habitats (Yoklavich) and general subtidal (VenTresca, Paddock). Some baseline surveys of intertidal invertebrates (Pearse) and subtidal benthic invertebrates (Mira Parks). Socioeconomic aspects of local fisheries (Pomeroy, Smiley). PISCO long-term subtidal monitoring site (Carr)

**Public access:** relatively remote.

**Basic evaluation:** This site contains a variety of habitats with hard and soft substrates, including kelp beds, and is one of the few existing MPAs which extend to 50 fm depth. This site functions well as a completely protected area while allowing research, particularly the documentation of population densities of near-shore and offshore fishes. Studies by CDFG, National Marine Fisheries Service, and others have quantified density and size frequency of populations of rockfishes, lingcod, cabezon, and other economically important fin-fishes within and outside the MPA boundaries, and have found significant numbers of large, reproductively mature fishes within, as well as adjacent to this site. Populations of fishes in adjacent areas are of higher density than within fished areas closer to ports, primarily due to the remoteness of the areas and their difficult access from shore (DFG). If fishing pressure increases in the future in adjacent areas, the MPA will continue to serve as a baseline for indices of natural populations. The MPA benefits from the presence of an on-site manager and has excellent enforcement.

## 2.9 Atascadero Beach State Marine Conservation Area

**Year established:** 1985

**Approximate area:** 6.33 mi<sup>2</sup> (4.78 km<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 236 ft (72 m) (GIS)

**Approximate shoreline length:** 2.07 mi (1.8 nm)

**Approximate alongshore span:** 1.61 mi (1.40 nm) (Nautical Chart)

**Habitat types:** Rocky and sandy intertidal, mostly sandy bottom offshore.

**Surrounding habitat types:** similar

**Summary of existing regulations:** Take of clams is prohibited. Take of other living marine resources is allowed.

**Primary objectives:** Protect Pismo clams from over-harvest

**Existing enforcement:** CDFG provides enforcement from shore. The primary purpose of enforcement would be to prevent harvest of sub-legal size clams.

**Important species present:** Diopatra beds, 10 species of surf perch, two kinds of clams

**Human Use patterns:** Fishers, surfers, and beachgoers (CCRSG). Adjacent area used for hiking and other outdoor activities.

**Baseline and ongoing monitoring and research studies:** Transects sampled in winter by CDFG to monitor recruitment of young clams.

**Public access:** Area is accessible from Atascadero State Beach and from nearby Morro Bay.

**Basic evaluation:** Between 1990 and 1994, sea otters established themselves within the area containing the three Pismo clam state marine conservation areas (SMCA) in San Luis Obispo County. Foraging on the larger clams by otters reduced the availability of legal-sized clams (minimum 4.5 inches greatest shell diameter) to recreational harvesters. CDFG clam transects and interviews of recreational clam harvesters, conducted annually in the Pismo Beach to Morro Bay area, documented this event. For example, in 1990, 32 of 224 clammers interviewed on Pismo Beach harvested 204 legal-sized clams (6.4 per person). In 1994 and subsequent years, CDFG transects have yielded virtually no clams over 3 inches in diameter. For these reasons, the three state marine conservation areas designed to protect and augment the population of legal-sized Pismo clams no longer meet their original objective.

**Other considerations:** Outflow from Duke energy plant in Morro Bay. Sewer outflow from Morro Bay (CCRSG).

## 2.10 Morro Beach State Marine Conservation Area

**Year established:** 1985

**Approximate area:** 6.82 mi<sup>2</sup> (5.15 nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 243 ft (74 m) (GIS)

**Approximate shoreline length:** 2.09 mi (1.81 nm)

**Approximate alongshore span:** 1.96 mi (1.70 nm) (Nautical Chart)

**Habitat types:** Rocky and sandy intertidal, mostly sandy bottom offshore. Minimal kelp forest (bull kelp). Sand spits and dunes, shale rocky reef at 30-100 meters, Morro Creek outlet.

**Surrounding habitat types:** similar

**Summary of existing regulations:** Take of clams is prohibited. Take of other living marine resources is allowed.

**Primary objectives:** Protect Pismo clams from over harvest

**Existing enforcement:** CDFG provides enforcement from shore. The primary purpose of enforcement would be to prevent harvest of sub-legal size clams. Shares north border with Montana de Oro State Park.

**Important species present:** Pismo Clam, Diopatra beds, sand dollar beds, feeding area for sea otters, bull kelp, important breeding area for Western Snowy Plover on beach.

**Human use patterns:** Fishers, surfers, and beachgoers. No drive up access, so fewer people use it than Atascadero Beach SMCA (CCRSG).

**Baseline and ongoing monitoring and research studies:** Clam transects sampled in winter by CDFG to monitor recruitment of young.

**Public access:** Difficult

**Basic evaluation:** Between 1990 and 1994, sea otters established themselves within the area containing the three Pismo clam state marine conservation areas (SMCA) in San Luis Obispo County. Foraging on the larger clams by otters reduced the availability of legal-sized clams (minimum 4.5 inches greatest shell diameter) to recreational harvesters. CDFG clam transects and interviews of recreational clam harvesters, conducted annually in the Pismo Beach to Morro Bay area, documented this event. For example, in 1990, 32 of 224 clammers interviewed on Pismo Beach harvested 204 legal-sized clams (6.4 per person). In 1994 and subsequent years, CDFG transects yielded virtually no clams over 3 inches in diameter. For these reasons, the

three state marine conservation areas designed to protect and augment the population of legal-sized Pismo clams no longer meet their original objective.

## 2.11 Pismo State Marine Conservation Area

**Year established:** 1977

**Approximate area:** 0.08 mi<sup>2</sup> (0.06 nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 10 ft (3 m) (GIS)

**Approximate shoreline length:** 0.38 mi (.33 nm)

**Approximate alongshore span:** 0.38 mi (.33 nm) (Nautical Chart)

**Habitat types:** All soft bottom

**Surrounding habitat types:** similar

**Summary of existing regulations:** Take of all invertebrates and marine aquatic plants is prohibited except the commercial take of algae other than giant kelp and bull kelp. Take of finfish is allowed.

**Primary objectives:** To establish baseline for assessing sea otter impact to clam population

**Existing enforcement:** CDFG provides enforcement from shore. The primary purpose of enforcement would be to prevent harvest of sub-legal size clams.

**Important species present:** Pismo Clam

**Human use patterns:** Used by surfers and beachgoers (CCRSG).

**Baseline and ongoing monitoring and research studies:** Transects sampled by CDFG in winter to monitor recruitment of young clams.

**Public access:** Nearby road access.

**Basic evaluation:** Between 1990 and 1994, sea otters established themselves within the area containing the three Pismo clam state marine conservation areas (SMCA) and the one invertebrate SMCA in San Luis Obispo County. Foraging on the larger clams by otters reduced the availability of legal-sized clams (minimum 4.5 inches greatest shell diameter) to recreational harvesters. Department clam transects and interviews of recreational clam harvesters, conducted annually in the Pismo Beach to Morro Bay area, documented this event. For example, in 1990, 32 of 224 clammers interviewed on Pismo Beach harvested 204 legal-sized clams (6.4 per person). In 1994 and subsequent years, department transects yielded virtually no clams over 3 inches in diameter.

While the primary purpose of this invertebrate conservation area was to protect and enhance populations of Pismo clams, the general objective was to provide protection from human harvest to all invertebrates. While this SMCA no longer meets its objective related to Pismo clams, it does provide a long-term measure of intertidal and shallow subtidal soft-bottom invertebrate populations in the absence of fishing. For this reason it would be useful to retain this small MPA to continue this long-term monitoring.

## 2.12 Pismo-Oceano State Marine Conservation Area

**Year established:** 1985

**Approximate area:** 13.30 mi<sup>2</sup> (10.04 nm<sup>2</sup>) (GIS)

**Approximate depth range:** 0 to 135 ft (0-41.2 m) (GIS)

**Approximate shoreline length: 3.95 mi (3.43 nm)**

**Approximate alongshore span:** 3.80 mi (3.30 nm) (Nautical Chart)

**Habitat types:** All soft bottom

**Surrounding habitat types:** similar

**Summary of existing regulations:** Take of clams is prohibited. Commercial take of giant kelp and bull kelp is prohibited. Take of other living marine resources is allowed.

**Primary objectives:** Protect Pismo clams from over harvest

**Existing enforcement:** CDFG provides enforcement from shore. The primary purpose of enforcement would be to prevent harvest of sub-legal size clams.

**Important species present:** Pismo Clam

**Human use patterns:** Used by fishers, surfers, and beachgoers (CCRSO).

**Baseline and ongoing monitoring and research studies:** Transects sampled in winter by CDFG to monitor recruitment of young clams.

**Public access:** Relatively difficult access.

**Basic evaluation:** Between 1990 and 1994, sea otters established themselves within the area containing the three Pismo clam state marine conservation areas (SMCA) in San Luis Obispo County. Foraging on the larger clams by otters reduced the availability of legal-sized clams (minimum 4.5 inches greatest shell diameter) to recreational harvesters. Department clam transects and interviews of recreational clam harvesters, conducted annually in the Pismo Beach to Morro Bay area, documented this event. For example, in 1990, 32 of 224 clambers interviewed on Pismo Beach harvested 204 legal-sized clams (6.4 per person). In 1994 and subsequent years, department transects yielded virtually no clams over 3 inches in diameter. For these reasons, the three state marine conservation areas designed to protect and augment the population of legal-sized Pismo clams no longer meet their original objective.

## 2.13 Vandenberg State Marine Reserve

**Year established:** 1994

**Approximate area:** 2.48 mi<sup>2</sup> (1.87 nm<sup>2</sup>) GIS

**Approximate depth range (feet):** 0 to 60 (18 m) (GIS)

**Approximate shoreline length:** 6.66 mi (5.8 nm)

**Approximate alongshore span:** 3.68 mi (3.20 nm) (Nautical Chart)

**Habitat types:** The area contains a mixture of hard and soft bottom, rocky and sandy intertidal. The geology of the rocky intertidal is Monterey shale. This is a high energy area that is likely heavily scoured by violent wave action. Oil was observed in north part of reserve in 1998.

**Surrounding habitat types:** Fairly similar to the north, south, and offshore, although a higher percentage of soft bottom to the north.

**Summary of existing regulations:** No take is allowed. No disturbance of bottom; no boats, diving or other use (boat transit only); public entry restricted. In offshore area outside boundaries, a recent ban on gill nets was enacted legislatively.

**Primary objectives:** To satisfy requirements of the Marine Resources Protection Act of 1990 the Fish and Game Commission was required to establish four ecological reserves along the mainland coast. The Vandenberg State Marine Reserve (originally named the Vandenberg Marine Resources Protection Act Ecological Reserve) was one of the reserves established pursuant to the Act. The Act specified that the specific purpose of these reserves was "to

provide for scientific research related to the management and enhancement of marine resources”.

**Existing enforcement:** Access from land is restricted via Vandenberg Air Force Base security restrictions. This is a very remote location that is publicly inaccessible from land and sea. Surrounded by Vandenberg Air Force Base terrestrial wildlife closure.

**Important species present:** Black abalone (abundant populations have been subject to decline from withering syndrome)

**Human use patterns:** Rarely used. Fishing in adjacent area. The Vandenberg Dive Club occasionally dives this site.

**Baseline and ongoing monitoring and research studies:**

Benthic habitat mapping (Cochrane, USGS). Mapping ocean currents and related hydrographic studies (Russ Vetter, NMFS). Eggs and larval fish surveys and research (Vetter, NMFS).

Abalone enhancement, growth studies (Friedman, Haaker). Intertidal invertebrate surveys (PISCO-Pete Raimondi, UCSC; Steve Murray, UC). Evaluation of effects of oil spill on intertidal (Pete Raimondi, UCSC; Andy Lisner, MMS). Some baseline data on fish abundance in the adjacent Purisima Point area exists from a CDFG research cruise in 1998.

**Public access:** Very limited due to Vandenberg AFB access restrictions. Shallow rocky subtidal makes boat access difficult. Coastal cliff makes water access difficult/impossible.

**Basic evaluation:** This site contains primarily shallow soft-bottom substrate but includes some low-relief subtidal reef. Based on CDFG surveys in the late 1990s, the site and the immediately adjacent area appear to function well in protecting high population densities of black abalone. The adjacent area, while not within an MPA, benefits from military-imposed restricted access (Safety Zone 4) is enforced as a no-stopping area by the Air Force). No other sites along the southern-central California mainland contain high densities of black abalone.

### 3.0 GAP ANALYSIS

A marine gap analysis was conducted for the Central Coast study region using the best readily available information to determine the current level of representation of habitats in different types of MPAs. All habitats identified in the MLPA or the MPF (CDFG 2005b) were included in the evaluation. The results of the gap analysis are presented in Appendix II and summarized below.

The best available spatial GIS data were used to estimate the amount of each habitat in state marine reserves, state marine conservation areas, and the special closure area (Ano Nuevo). It is important to note that the quality of data vary by habitat and by portion of the region. This analysis is quantitative and fairly accurate for those habitats with good spatial data (eg. kelp, intertidal habitats, and soft and hard bottom substrata *where accurately mapped with fine-scale data*). This analysis is qualitative and approximate for those habitats with poor or minimal spatial data (eg. rocky reefs in the southern part of the region where fine-scale habitat mapping has not been conducted, pinnacles, and oceanographic features such as upwelling zones throughout the region).

### **3.1 Intertidal Habitats**

Sandy beaches are represented at 11% of their total length (as measured by NOAA-Environmental Sensitivity Index, 2002) in existing MPAs; only about 2% of the total is in state marine reserves. Rocky intertidal shores and cliffs are represented in existing MPAs at 15% of their total amount in the study region, with 8% in state marine reserves.

Elkhorn Slough SMR captures 27% of the coastal marsh, as mapped as a linear features in the NOAA-ESI dataset. Coastal marsh is not just a linear feature of shorelines, but can be extensive in intertidal areas. Coast marsh, mapped as polygonal features from a variety of datasets (National Wetlands Inventory and California Natural Diversity Database) total 1.5 nm<sup>2</sup> (2.0 mi<sup>2</sup>), with 0.65 nm<sup>2</sup> (0.86 mi<sup>2</sup>) or 43% included in Elkhorn Slough SMR; most of the remaining coastal marsh in the region is in Morro Bay and is not included in an MPA.

Elkhorn Slough SMR includes 42% of the tidal flats in the study region, as mapped as linear features in the NOAA-ESI (2002) dataset. However, it should be noted that there are also extensive tidal flats in Morro Bay that are not mapped and included in these totals.

### **3.2. Estuaries**

There are 2 large and several small estuaries along the Central Coast. In terms of total area, approximately 6.9 nm<sup>2</sup> of estuarine environment has been mapped based on information from the National Wetlands Inventory, California Natural Diversity Database, and USGS topographic maps. Only 0.51nm<sup>2</sup> of that area (or 43%) occurs in an existing MPA (Elkhorn Slough SMR).

### **3.3 Seagrasses**

Eelgrass beds are present in Elkhorn Slough and Morro Bay; only about 1% of the region's eelgrass beds are in the existing estuarine MPA (Elkhorn Slough SMR). Surfgrass beds are present along the coastline in the shallow subtidal zone. Twenty-two percent of mapped surfgrass beds are present in existing MPAs, with 12.6% in state marine reserves.

### **3.4 Soft and Hard Substrata**

Calculations on amount of hard (rocky) and soft substrata in existing MPAs were made using the fine-scale multi-beam and sonar data (Kvitek et al. 2005), where available; these data provide the most accurate assessment of hard and soft substrata but are limited in geographic extent. Only about 25% of the study region has been accurately mapped and classified to rocky or soft bottom habitat type; most of the seafloor mapping work to date has been conducted in the northern half of the study region and some of it has focused on existing MPAs. Coarse-scale substrata data (Greene et al 2004) are available for most of the region, but are not very

accurate and underestimate the amount of hard substrata. Amount of both fine-scale and coarse-scale hard and soft substrata in existing MPAs are presented separately in Appendix II.

Soft bottom habitat is more common than rocky bottom habitat in the region. Based on coarse scale data (which overestimates the amount of soft substrata; Greene et al 2004), about 7% of the region's soft bottom habitat in the 0-30m range, 3% of the 30-100m range, and none of the deeper soft bottom habitat is in existing MPAs. Based on the more accurate but geographically limited fine-scale data (Kvitek et al 2005), 5% of the *mapped* soft bottom habitat at 0-30m and <2% at 30-100m is in existing SMRs or SCMAs, with none of the deep range protected.

For rocky bottom habitats, based on coarse-scale data, less than 5% of the 0-30m range. 2% of the 30-100m range, and none of the deeper rocky habitat is protected in existing MPAs. Based on the more accurate but geographically limited fine-scale data (Kvitek et al 2005), 2-5% of the *mapped* hard bottom habitat at 0-30m and <2% at 30-100m is in existing SMRs or SCMAs, with none of the deep range protected.

### 3.5 Kelp Forests

Kelp forest total abundance varies from year to year (from a low of 2.5 mi<sup>2</sup> (1.9 nm<sup>2</sup>) to 17.9 mi<sup>2</sup> (13.5 nm<sup>2</sup>)) in the four years surveyed by CDFG. The amount of kelp inside existing MPAs correspondingly varies from 7.7 -17% of the total amount in the study region. In state marine reserves, the representation of kelp varies from 3.6 to 9% of the total, depending on survey year. In state marine conservation areas, kelp is represented at 4-8% of the total amount.

Due to the inter-annual variability in kelp, it is useful to assess the persistence of kelp over time and determine whether persistent patches of kelp are found inside existing MPAs. Only 4 years of data on kelp coverage are available, and these survey years do not span the range of oceanographic conditions (El Nino – La Nina) that affect kelp abundance. However, using the data available (1989, 1999, 2002, and 2003) kelp was classified as persistent if it was present in 3 of the 4 survey years. Persistent kelp covered a small area (3.2 mi<sup>2</sup>) (2.4 nm<sup>2</sup>) of the study region; 13% of that amount is represented in existing MPAs. There are 3 state marine reserves with 6% of the total amount of persistent kelp (Hopkins SMR, Point Lobos SMR, and Big Creek SMR).

### 3.6 Pinnacles and Submarine Canyons

Pinnacles have not been mapped for the region, but using changes in bathymetry (>10m variation in elevation within a grid cell) as a surrogate, pinnacles have tentatively been identified for some portions of the region. In addition, pinnacles at the 3m scale were mapped in Big Creek SMR (Yoklavich). Big Creek SMR, Point Lobos SMR, and Carmel Bay SMCA all have pinnacles in the 0-30 and 30-100m depth zones.

In state waters, submarine canyons are only found in the northern part of the study region. Most of the existing MPAs do not extend deep enough to capture submarine canyon habitat. A couple

of exceptions include Carmel Bay SMCA and Julia Pfeiffer Burns SMCA, which include submarine canyon habitat. Almost 33% of shallow (0-30m) canyon habitat and less than 2% of 30-100m canyon habitat are captured in these MPAs. Minimal amounts (<1%) of deep canyon habitat (>100m) are represented in existing MPAs.

### 3.7 Oceanographic Habitats

Oceanographic habitats, including freshwater plumes, retention areas, and upwelling zones, have not been mapped for the region. But based on an evaluation of surrogates (presence of major rivers, presence of headlands, and sea surface temperature data compiled by the Pacific Fisheries Environmental Laboratory), the presence of these features was qualitatively assessed for each existing MPA.

Freshwater plumes are expected to occur where a major river meets the sea, or where coastal hydrology has created estuarine environments (such as Elkhorn Slough and Morro Bay). The existing MPAs expected to experience significant freshwater plumes at times of the year include Elkhorn Slough SMR (estuarine, with inputs from Elkhorn Slough and close proximity to Salinas River), Carmel Bay SMCA (with inputs from Carmel River), and Big Creek SMR (with inputs from Big Creek). Pismo-Oceano SMCA potentially has freshwater inputs from the Santa Maria River just to the south. In addition to the Salinas and Santa Maria Rivers (the largest in the region), there are several other medium to large rivers, including the Pajaro, Sur, and Santa Ynez which likely create freshwater plumes, but they are not located in close proximity to existing MPAs.

There has been little mapping of retention areas or upwelling zones in the study region. One retention zone has been identified in northern Monterey Bay (just below Santa Cruz; Paduan and Rosenfeld 1996); however, there is not an existing MPA there. Larval retention areas are expected to be found in the upwelling shadow or lee of large headlands. Based on geographic features, Carmel Bay SMCA may occur in or near a retention area.

Upwelling features can be very large and extend for many miles offshore. Upwelled water as mapped by PFEL or the presence of large headlands were used to identify existing MPAs that may experience significant upwelling. In the Central Coast study region, there is likely to be seasonal upwelling at Ano Nuevo, Point Sur, along the Big Sur coast, Point Arguello, and Point Conception. Therefore, quite a few existing MPAs *may* overlap with upwelling features; these *may* include Ano Nuevo Special Closure, Pacific Grove SMCA, Carmel Bay SMCA, Point Lobos SMR, Julia Pfeiffer Burns SMCA, Big Creek SMR, and Vandenberg SMR. However, since most of the existing MPAs do not extend far offshore or include deep water habitats, upwelling features in deep waters are not represented in existing MPAs.

### 3.8 Size, spacing and depth of MPAs

Existing MPAs averaged 3.3 mi<sup>2</sup> (2.5 nm<sup>2</sup>) in size, and ranged from 0.08 mi<sup>2</sup> (0.06 nm<sup>2</sup>) (Pismo SCMA) to 13.28 mi<sup>2</sup> (10.04 nm<sup>2</sup>) (Pismo-Oceano SMCA). Alongshore span of existing MPAs

averaged 2.5 mi (2.2 nm), which is less than the guidelines of 2.9-12.7 mi (2.5-11 nm) suggested in the MPF (CDFG 2005b); however 6 of the 13 MPAs met the minimum guideline.

In terms of spacing, many existing MPAs are clustered closer together than the MPF spacing guidelines of 31-62 miles (27-54 nm) distance between MPAs. The spacing of existing MPAs leaves large parts of the coastline without MPAs; there are no MPAs between Big Creek SMR and Atascadero SMCA for example. In the Monterey-Pacific Grove area, several MPAs are within 4nm of each other. On the Big Sur coast, Julia Pfeiffer Burns SCMC and Big Creek SMR are 5nm apart. In the southern part of the region, Atascadero SMCA and Morro Beach SMCA are close together; similarly Pismo and Pismo-Oceano SCMA's are within 5nm of each other.

The existing MPAs do not span the depth range present in the study region (0-1400m). The average depth of existing MPAs is 19m. Only Julia Pfeiffer Burns SMCA extends beyond 100m. Therefore few habitats in the 100-200m range are represented and no habitats in the greater than 200m depth range are represented in existing MPAs.

#### **4.0 OTHER TYPES OF SPATIAL CLOSURES IN THE REGION**

When considering proposals for developing new MPAs, the Master Plan Framework (CDFG 2005b) calls for consideration of other management programs that may contribute to achieving regional goals and objectives and the goals of the Marine Life Protection Act. In addition to existing state MPAs, this assessment provides basic habitat representation data for three other types of spatial closures in the region (Appendix III). Included in this evaluation are (1) the Rockfish Conservation Area (RCA), (2) Vandenberg Air Force Base security zone, and (3) Diablo Canyon nuclear powerplant security zone. See Section 5.1.2 below for further description of these areas.

The Rockfish Conservation Area includes an area of 34nm<sup>2</sup> that has year-round protection from certain fishing activities. The RCA is offshore and therefore does not include intertidal or near-shore habitats (sandy and rocky shores, estuary, seagrasses, and kelp forests). Unlike existing MPAs, the RCA includes deep water rocky and soft bottom habitat and (based on coarse-scale data from Greene et al 2004 which under-represents the amount of rocky substrata), the RCA includes 8% of the soft bottom and 13% of the hard bottom habitat in the 100-200m depth range and 4% of the soft bottom and 42% of the hard bottom habitat in the >200m depth range (these percentages should be considered approximate).

The Vandenberg AFB security zone (Safety Zone 4) is 138 mi<sup>2</sup> (104.35 nm<sup>2</sup>) in size. The habitats present include sandy and rocky shores, kelp, and soft and hard bottom subtidal habitats.

The Diablo Canyon nuclear power plant security zone is 1.88 mi<sup>2</sup> (1.42 nm<sup>2</sup>) in size. The habitats present include sandy and rocky intertidal shores and kelp forests. Based on coarse-scale data, shallow soft bottom habitats are present. The presence of at least some shallow hard bottom habitats can be inferred by the presence of kelp which requires hard surfaces for

attachment. There have been extensive and long-term studies on the impacts of the powerplant's seawater intake and warm water outfalls on intertidal and nearshore biota.

## **5.0 SUMMARY EVALUATION AND RECOMMENDATIONS FOR EXISTING MPAS**

A summary evaluation of the extent to which existing MPAs contribute to regional goals, objectives, and design considerations will provide the basis for the Central Coast Regional Stakeholder Group to make recommendations for modifications to existing MPAs.

### **5.1 Summary Evaluation of Existing MPAs, Management Measures and Restrictions**

#### **5.1.1 Existing MPAs (including Año Nuevo Special Closure)**

The 12 existing MPAs and one special closure in the Central Coast Study Region encompass approximately 43 mi<sup>2</sup> (32.5 km<sup>2</sup>) of water surface area. While they are spread along most of the study region's coastline, there are notable gaps between Morro Bay and Big Creek in the south and between Elkhorn Slough and Pigeon Point in the north (with the exception of the special closure at Año Nuevo). A wide array of habitats is included to varying extents, though deeper water habitats are rarely included and many habitats are represented at low levels.

The central coast region is unique along the mainland coast by containing five of the State's 11 mainland no-take state marine reserves. Similar to the rest of the mainland, however, these areas are small, representing only 7.4 mi<sup>2</sup> (5.6 km<sup>2</sup>). The remaining 7 MPAs and one special closure allow the take of all finfish species and, with two exceptions (Pismo SMCA and Carmel Bay SMCA), allow the take of most common invertebrate species. In these areas no consideration of ecosystem benefits or interactions between fished and unfished species has been made.

Overall, the existing MPAs display the lack of coherent planning and purpose that inspired the legislature to pass the MLPA. Of the areas with specific objectives noted for their establishment, most were designed to protect single species or types of species. Though three MPAs were established with the intent of fostering scientific research and study in areas with little human impact (Hopkins SMR, Big Creek SMR, and Vandenberg SMR) all three are smaller than current scientific recommendations based on the ability of an area to be self sustaining (Starr et al 2002). The MPAs were established over a period of more than 30 years with no specific plan to coordinate between areas or for long-term monitoring of their success.

Habitats deeper than 98 ft are almost absent from existing MPAs, though significant protection for bottom habitats between 590 ft and 886 ft is provided through other management measures (see Section 5.1.2). Shallower than 98 ft, only a small portion of the existing MPA area includes hard bottom habitats.

There are only two major estuarine areas in the central coast region; Elkhorn Slough and Morro Bay. A portion of Elkhorn Slough is within both a State no-take MPA and a National Estuarine

Research Reserve. Part of the outer area of this estuary is impacted by cooling water intake and outfall from a coastal power plant.

Surface canopy and subtidal beds of giant kelp (*Macrocystis pyrifera*) and bull kelp (*Nereocystis luetkeana*) are found throughout the central coast study region. In most areas, these beds fluctuate seasonally and annually in their overall extent and many areas do not persistently support kelp. Within both persistent beds and less persistent areas very little of this critical habitat is contained in MPAs.

An evaluation of the effectiveness of three of the state marine reserves in the study region was conducted previously by some member of the Science Advisory Team and others (Starr et al 2002b; Starr et al 2002c). This evaluation concluded 1) marine reserves need to be extended into deeper waters and 2) the existing marine reserves in Central California need to be expanded because they do not cover area large enough to achieve the goal of conserving biodiversity or habitats of the region (Starr et al 2002b; Starr et al 2002c).

Overall, the existing array of MPAs along the Central Coast does not include representation of all habitat types and provides little in the way of ecosystem protection or coherent management. Based on the habitat gap analysis, improvements to this array are clearly possible. When recommending improvements, thought should be given not only to the impact of other existing measures and restrictions (see Section 5.1.2) but to the coherence and management of the system as a whole. In particular, the overall goals and objectives of the region should be taken into consideration so that the combination of MPAs, other management, and non-MPA restrictions meet the requirements of the MLPA.

### **5.1.2 Other existing management measures and restrictions**

Fisheries in California are constrained by a host of other management measures and restrictions. Within the Central Coast Study Region many restrictions are in place that may help meet the goals and objectives of the region and the MLPA. It is notable that protection for certain groundfish species has increased dramatically since the passage of the MLPA in 1999. This increased protection may meet some of the goals of the MLPA, in particular helping to sustain economically valuable species and rebuild those that are depleted.

The single largest change in management since 1999 is the establishment of the Rockfish Conservation Areas (RCAs) which stretch along the entire California coast. The RCAs are large area closures intended to protect a complex of species, especially shelf rockfish species designated by the Pacific Fishery Management Council (PFMC) as over-fished. The RCAs differ between gear types (e.g., trawl, non-trawl, and recreational), vary throughout the year and between years in their total extent, and allow for certain types of fishing within their boundaries. The RCA restrictions are adopted by the PFMC but are incorporated into State regulation as well.

Within the central coast study region, the area of the RCAs that is currently protected year-round from fishing activities that may impact over-fished groundfish is approximately 45 mi<sup>2</sup> (2.0

mi<sup>2</sup> greater than the area within MPAs). This area lies between 590 ft and 886 ft (100 and 150 fathoms) of depth protecting much of the continental shelf/slope break. Though detailed habitat information is unavailable for most of this area, it is fair to assume that the area includes representatives of all habitats within this depth range. At various times of the year more area is included depending on the gear type and user group, affording additional stock rebuilding potential.

Several State fishery restrictions also provide protection for certain species. Trawl nets (4½ inch or greater mesh) are generally prohibited in the region with some exceptions. Gill nets (3½ inch or greater mesh) are generally prohibited in waters shallower than 110 m (60 fathoms) in the region. Exceptions to the gill net restrictions include set and drift nets (4½ or greater mesh) used in the central coast region to fish for rockfish and lingcod, which are generally allowed in waters deeper than 73 m (40 fathoms). All abalone species are prohibited from take within the central coast region. Many fisheries are subject to restricted access programs (limiting the total number of participants), quotas, trip limits, and gear restrictions. All of the above regulations are designed to help promote sustainable fisheries, though their impact to habitat representation and ecosystem management is not measurable.

The Monterey Bay National Marine Sanctuary (Sanctuary) has regulations and programs which help achieve some objectives. In particular, the Sanctuary has prohibitions on discharge into Sanctuary waters that help increase the overall water quality protection of the region. The Sanctuary also supports and participates in monitoring and research activities. Sanctuary participation in long-term monitoring will likely reduce the cost to the State and is one reason the central coast was selected as the first MLPA study region. The Sanctuary also provides outreach programs and educational opportunities that can be folded into a long-term strategy for MPA education.

A few areas along the central coast have access restrictions which, while not being designated to protect or enhance living resources, provide some additional protection. The one mile radius safety zone around the Diablo Canyon Power Plant provides complete protection from fishing activities. This area could be considered as a part of a potential new MPA by the central coast regional stakeholder group. It should be noted that heated water outflow from the plant has significant impacts on portion of the current closure.

Similarly, the safety zones around Vandenberg Air Force Base prohibit stopping within the area. This effectively creates an area where only trolling is allowed as fishing vessels cannot stop to fish bottom type gear. A representative from Vandenberg is on the CCRSG can provide input on whether it is appropriate to establish formal limited-take or no-take MPAs in this area.

Finally, submarine cables are present in a variety of locations within the central coast. Cables that are not fully buried tend to limit the ability of trawl and some other bottom contact gears to be used. These areas would primarily impact trawl fisheries that are not allowed due to other regulations, but should be considered as potential areas where additional habitat protection may have smaller impacts on existing activities. As with the Diablo Canyon area, the impact of the cables themselves on natural habitats should be taken into consideration.

## **5.2 Recommendations for Modifications to Existing Central Coast MPAs**

This section to be completed after input from the Central Coast Regional Stakeholders Group – November 2005.

## REFERENCES CITED

Caffrey, J. ed. 2002. Changes in a California estuary : a profile of Elkhorn Slough. Moss Landing, California. Elkhorn Slough Foundation.

California Department of Fish and Game (CDFG), 2005a. Descriptions and Preliminary Evaluations of Existing California Marine Protected Areas in the Central Coast

CDFG, 2005b. California Marine Life Protection Act Initiative Draft Master Plan Framework: A Recommendation to the California Fish and Game Commission by the California Department of Fish and Game. May.

Estes JA and Paddock MJ *No-Take Reserves in Central California Kelp Forests: Metrics of Human Impact or the Tip of the Iceberg?* (in Starr 2002)

Friedman, C. S., P.L. Haaker, and I. Taniguchi. 2001(b). Density-Dependent Recruitment and Resistance to Withering Syndrome in a Population of Black Abalone (*Haliotis cracherodii*) at the Vandenberg Ecological Reserve. Marine Ecological Reserves Research Program. Project Number R/V-1. California Sea Grant College Program.

Marine Life Protection Act Initiative, 2005. Regional Profile of the Central Coast Study Region (Pigeon Point to Point Conception). Final. September 19, 2005.

National Gap Analysis Program, 1994. A handbook for gap analysis. Mosco, Idaho (see <http://www.gap.uidaho.edu>).

Paduan, J.D. and L.K. Rosenfeld, 1996. Remotely sensed surface currents in Monterey Bay from shore-based HF radar (CODAR). J. Geophys. Res. 101: 20669-20686.

Pattison, C. 2001. "Pismo Clam". In: *Californias Living Marine Resources: A Status Report*. Ed. By William S. Leet, Christopher M. Dewees, Richard Klingbeil and Eric J. Larson. University of California Agriculture and Natural Resources Publication SG 01-11

Starr RM, Car MH, Caselle J, Estes JA, Pomeroy C, Syms C, VenTresca DA, and Yoklavich, MM. 2002. *A Review of the Ecological Effectiveness of Subtidal Marine Reserves in Central California* A Report to the Monterey Bay National Marine Sanctuary

SWAT website. Coastal Biodiversity Survey. < <http://cbsurveys.ucsc.edu/>>

VenTresca DA, Gingras ML, Donnellan M, Fisher J, Brady B, King H, and King C Baseline In Situ Surveys And Landing Creels Of Nearshore Fishes Within The Vicinity Of Big Creek Ecological Reserve (in Starr 2002)

Yoklavich, M., G. Cailliet, R.N. Lea, H.G. Greene, R. Starr, J. De Marignac, and J. Field. 2002. *Deepwater habitat and fish resources associated with the Big Creek Ecological Reserve*. California Cooperative Fisheries Investigation Report. CalCOFI MS2002-03.

## **FURTHER REFERENCES FOR EXISTING MPAS**

### **Published, on effectiveness of the MPA**

#### ***Elkhorn Slough***

Yoklavich, M.M., G.M. Cailliet, J.P. Barry, D.A. Ambrose, and B.S. Antrim. 1991. Temporal and spatial patterns in abundance and diversity of fish assemblages in Elkhorn Slough, California. *Estuaries* 14(4):465-480.

Yoklavich, M.M., M. Stevenson, and G.M. Cailliet. 1992. Seasonal and spatial patterns of ichthyoplankton abundance in Elkhorn Slough, California. *Estuarine, Coastal and Shelf Science* 34:109-126.

#### ***Hopkins***

California State Water Resources Control Board (CSWRCB). 1979. California Marine Waters Areas of Special Biological Significance Reconnaissance Survey Report: Farallon Island. Water Quality Monitoring Report November 79-13. California State Water Resources Control Board, Sacramento, California.

Cosentino, N. 1999. Monitoring the rocky intertidal communities within the Gulf of the Farallones and Monterey Bay National Marine Sanctuaries, Final Report 1995-1999. Contract Report, Contract No. 1443CX8140-95-039, National Oceanic and Atmospheric Administration, Gulf of the Farallones National Marine Sanctuary, San Francisco, California.

Lowry, L.F. and J.S. Pearse. 1973. Abalones and sea urchins in an area inhabited by sea otters. *Marine Biology*. 23(3):213-219.

Miller, D.J. and J.J. Geibel. 1973. Summary of blue rockfish and lingcod life histories; a reef ecology study; and giant kelp, *Macrocystis pyrifera*, experiments in Monterey Bay, California. Calif. Dept. Fish and Game Fish Bulletin 158. 137 pp.

Paddack, M.J. and J.A. Estes. 2000. Kelp forest fish populations in marine reserves and adjacent exploited areas of central California. *Ecological Applications* 10(3):855-870.

Pearse, J.S. and A.H. Hines. 1987. Long-term population dynamics of sea urchins in a central California kelp forest: Rare recruitment and rapid decline. *Marine Ecology Progress Series*. 39(3):275-283.

Sagarin, R.D., Barry, J.P., Gilman, S.E., and C.H. Baxter. 1999. Climate-related change in an intertidal community over short and long time scales. *Ecological Monographs*. 69(4):465-490.

Schaeffer, T.N., Foster M. S., Landrau, M.E. Walder, R.K. 1999. Diver disturbance in kelp forests. California Fish & Game. 85(4). 170-176.

### **Carmel Bay**

Gibson, M.E. 1983. Carmel Bay. Marine oasis in the cold Pacific. Sea Frontiers. 29(3):130-138.

Schlining, K.L. and J.D. Spratt. 1999. Assessment of the Carmel Bay spot prawn (*Pandalus platyceros* Brandt 1851) resource and trap fishery adjacent to an ecological reserve in central California. pp. 751-762 in Von Vaupel Klein, J.C. and F.R. Schram (ed.) The biodiversity crisis and crustacea: Proceedings of the Fourth International Crustacean Congress, Amsterdam, The Netherlands, July 20-24, 1998. A.A. Balkema, Rotterdam/Brookfield.

### **Point Lobos**

Baldrige, A. and L.L. Rogers. 1991. Harbor seal predation on a wolf-eel. California Fish and Game. 77(4):210-211.

Hanggi, E.B. and R.J. Schusterman. 1994. Underwater acoustic displays and individual variation in male harbor seals, *Phoca vitulina*. Animal Behaviour. 48(6):1275-1283.

Long, D.J. 1992. Confirmation of the northern range of the snubnose sculpin (*Orthonopias triacis*). California Fish and Game. 78(4):160-162.

Paddack, M.J. and J.A. Estes. 2000. Kelp forest fish populations in marine reserves and adjacent exploited areas of central California. Ecological Applications 10(3):855-870.

Riedman, M.L. and J.A. Estes. 1988. Predation on seabirds by sea otters. CAN. J. ZOOL. 66(6):1396-1402.

VenTresca, D.A., M.L. Gingras, M. Donnellan, J. Fisher, B. Brady, H. King, and C. King. 2001. Potential of Marine Reserves to Enhance Nearshore Fisheries Assessing Fish Populations in the Recently Established Big Creek Ecological Reserve. Marine Ecological Reserves Research Program. Project Number 8-BC-N. California Sea Grant College Program.

### **Big Creek**

Ferguson, A. (ed.) 1984. Intertidal plants and animals of the Landels-Hill Big Creek Reserve, Monterey County, California Publication No. 14, Environmental Field Program 14, University of California, Santa Cruz. 106 pp.

Paddack, M.J. and J.A. Estes. 2000. Kelp forest fish populations in marine reserves and adjacent exploited areas of central California. Ecological Applications 10(3):855-870.

Pomeroy, C. 1999. Social considerations for marine resource management: Evidence from Big Creek Ecological Reserve. Reports of California Cooperative Oceanic Fisheries Investigations. 40:118-127.

Pomeroy, C. 2001. Marine Reserves as a Resource Management Tool: An Evaluative Study of Cooperative Data Collection at Big Creek. Marine Ecological Reserves Research Program. Project Number R/BC-2. California Sea Grant College Program.

VenTresca, D.A., M.L. Gingras, M. Donnellan, J. Fisher, B. Brady, H. King, and C. King. 2001. Potential of Marine Reserves to Enhance Nearshore Fisheries Assessing Fish Populations in the Recently Established Big Creek Ecological Reserve. Marine Ecological Reserves Research Program. Project Number 8-BC-N. California Sea Grant College Program.

VenTresca, D.A., Gingras, M.L., Ugoretz, J., Voss, A., Blair, S., Plant, J., Hornady, R., and C. Yoshiyama. 1998. The potential of marine reserves to enhance fisheries. Taking a Look at California's Ocean Resources: An Agenda for the Future, ASCE, Reston, VA (USA). 1:400-411.

Yoklavich, M.M., G.M. Cailliet, R.N. Lea, H.G. Greene, R.M. Starr, J. deMarignac, J. Field (Part One). Field, J.M., M.M. Yoklavich, J. de Marignac, G.M. Cailliet, R.N. Lea, S.M. Bros (Part Two). Yoklavich, M.M., H.G. Greene, J. Bizzarro, E. Sandoval, D. VenTresca, R. Kvittek. 2001. Deepwater Habitat and Fish Resources Associated with a Marine Reserve: Implications for Fisheries. Marine Ecological Reserves Research Program. Project Number R/BC 1. California Sea Grant College Program.

Yoklavich, M., R. Starr, J. Steger, H.G. Greene, F. Schwing, and C. Malzone. 1997. Mapping benthic habitats and ocean currents in the vicinity of central California's Big Creek Ecological Reserve. NOAA Technical Memorandum NMFS, NOAA-TM-NMFS-SWFSC-245. 52 pp.

### ***Atascadero Beach, Morro Beach, Pismo, Pismo-Oceano***

Pattison, C. 2001. Pismo Clam. In: Californias Living Marine Resources: A Status Report. Ed. By William S. Leet, Christopher M. Dewees, Richard Klingbeil and Eric J. Larson. University of California Agriculture and Natural Resources Publication SG 01-11

### **Unpublished, on effectiveness of the MPA**

#### ***Elkhorn Slough***

Cailliet, G.M., B. Antrim, D. Ambrose, S. Pace and M. Stevenson. 1977. Species composition, abundance and ecological studies of fishes, larval fishes and zooplankton in Elkhorn Slough. Pp. 216-386. In J. Nybakken, G. Cailliet and W. Broenkow. Ecologic and hydrographic studies of Elkhorn Slough, Moss Landing Harbor and nearshore coastal waters July 1974 to June 1976. Moss Landing Marine Laboratories Report, 465 pp.

### **Hopkins**

Paddack, M.J. 1996. The influence of marine reserves upon rockfish populations in central California kelp forests. M.S. Thesis, University of California, Santa Cruz. 40 pp.

### **Pacific Grove**

Lea, R.N. 1978. California Dept. of Fish and Game Cruise Report 78-KN-12. Central California Marine Sportfish Survey DJ F25R 6 pp. (hook-and-line surveys)

Lea, R.N. 1979a. California Dept. of Fish and Game Cruise Report 79-A-9. Central California Marine Sportfish Survey DJ F25R 6 pp. (hook-and-line surveys)

Lea, R.N. 1979b. California Dept. of Fish and Game Cruise Report 79-X-3. Central California Marine Sportfish Survey DJ F25R 7 pp. (hook-and-line surveys)

Miller, D. J., J. J. Geibel, and J.L. Houk. 1974. Results of the 1972 skindiver assessment survey. Pismo Beach to Oregon. Calif. Dept. Fish and Game, Marine Resources Technical Report No. 23: 61 pp.

Pearse, J.S. and L.F. Lowry. 1974. An annotated species list of the benthic algae and invertebrates in the kelp forest community at Point Cabrillo, Pacific Grove, California. Coastal Marine Laboratory, University of California, Santa Cruz. Tech Rep. 1: 73 p.

VenTresca, D.A. 1961-1963, 1965, 1968, 1980-1984, 1986-2001. Summary reports of Central California Council of Divers Free-diving competition spearfish meets in Carmel Bay. California Dept. Fish and Game, Monterey.

### **Carmel Bay**

DeMartini, J.D. and W.J. Barry. 1974. Environmental data statement for the proposed Carmel Bay underwater park. Paper prepared for Calif. Dept. Parks and Recre

Lea, R.N. 1978. California Dept. of Fish and Game Cruise Report 78-KN-12. Central California Marine Sportfish Survey DJ F25R 6 pp. (hook-and-line surveys)

Lea, R.N. 1979a. California Dept. of Fish and Game Cruise Report 79-A-9. Central California Marine Sportfish Survey DJ F25R 6 pp. (hook-and-line surveys)

Lea, R.N. 1979b. California Dept. of Fish and Game Cruise Report 79-X-3. Central California Marine Sportfish Survey DJ F25R 7 pp. (hook-and-line surveys)

Lea, R.N. D. VenTresca, and R. McAllister. 1982. California Dept. of Fish and Game Cruise Report 82-KB-10. Central California Marine Sportfish Survey. 7 pp. (hook-and-line surveys)

- Lea, R.N. and F. Henry. 1980. California Dept. of Fish and Game Cruise Report 80-X-5. Central California Marine Sportfish Survey DJ F25R 4 pp. (hook-and-line surveys)
- Malone, C. 1994. Temporal comparison of the intertidal biota of the Landels-Hill Big Creek Reserve and spatial comparison of the reserve with three other Central Californian sites: Oystercatcher Point, Carmel Point, and Natural Bridges. Senior Thesis, University of California, Santa Cruz, 89 pp.
- Miller, D. J., J. J. Geibel, and J.L. Houk. 1974. Results of the 1972 skindiver assessment survey. Pismo Beach to Oregon. Calif. Dept. Fish and Game, Marine Resources Technical Report No. 23: 61 pp.
- Schlining, K.L. and J.D. Spratt. 1999. Assessment of the Carmel Bay spot prawn (*Pandalus platyceros* Brandt 1851) resource and trap fishery adjacent to an ecological reserve in central California. pp. 751-762 in Von Vaupel Klein, J.C. and F.R. Schram (ed.) The biodiversity crisis and crustacea: Proceedings of the Fourth International Crustacean Congress, Amsterdam, The Netherlands, July 20-24, 1998. A.A. Balkema, Rotterdam/Brookfield.
- VenTresca, D.A. 1961-1963, 1965, 1968, 1980-1984, 1986-2001. Summary reports of Central California Council of Divers Free-diving competition spearfish meets in Carmel Bay. California Dept. Fish and Game, Monterey.

### **Point Lobos**

- Cazanian, G.V., D.J. Vanderwilt, A.C. Hurley, M.S. Foster, and J.L. Cox. 1979. California Marine Waters Areas of Special Biological Significance Reconnaissance Survey Report. Point Lobos Ecological Reserve. Water Quality Monitoring Report No. 79-9 submitted to California State water Resources Control Board, Division of Planning and Research, Surveillance and Monitoring Section. 75 pp.
- DeMartini, J.D. and W.J. Barry. 1977. A subtidal resources inventory for Point Lobos State Reserve. Report submitted to Dept. Parks and Recreation, Resource Preservation and Interpretation Division, Sacramento, as a resource element of the General Plan. 51 p.
- Drury, A. 1970. Point Lobos State Reserve. Dept. of Parks and Recreation, State of California.
- Lea, R.N. 1978. California Dept. of Fish and Game Cruise Report 78-KN-12. Central California Marine Sportfish Survey DJ F25R 6 pp. (hook-and-line surveys)  
100.
- Lea, R.N. 1979a. California Dept. of Fish and Game Cruise Report 79-A-9. Central California Marine Sportfish Survey DJ F25R 6 pp. (hook-and-line surveys)
- Lea, R.N. 1979b. California Dept. of Fish and Game Cruise Report 79-X-3. Central California Marine Sportfish Survey DJ F25R 7 pp. (hook-and-line surveys)

Lea, R.N. 1982. California Dept. of Fish and Game Cruise Report 82-KB-19. Central California Marine Sportfish Survey. 6 pp. (hook-and-line surveys)

Lea, R.N. 1993. California Dept. of Fish and Game Cruise Report 93-M-5 Leg 2. Central California Marine Sport Fish Project Biological Investigations. 9 pp. (hook-and-line surveys)

Nichols, D.R., M. Stone, M. Gordon, and R. Decausemaker. 1974. A marine survey of the north shore of Point Lobos State Reserve. Beta Research Oceanographic Laboratories, Inc. 118 p. (available at Point Lobos)

Paddack, M.J. 1996. The influence of marine reserves upon rockfish populations in central California kelp forests. M.S. Thesis, University of California, Santa Cruz. 40 pp.

Reilly, P.N., and D.A. VenTresca. 1999. Use of marine reserves to enhance nearshore sport fish populations. Final Performance Report, Federal Aid in Sport Fish Restoration Act. Grant Agreement F-50-R-11. California Dept. of Fish and Game. Project 5, Job 1, 28 pp.

Reilly, P.N., D.A. VenTresca, and M.L. Gingras. 1998. Use of marine reserves to enhance nearshore sport fish populations . Annual Job Performance Report, Federal Aid in Sport Fish Restoration Act. Grant Agreement F-50-R-10. California Dept. of Fish and Game. Project 5, Job 1, 7 pp.

Thompson, T. 1974. Diving survey of south shore of Point Lobos. Memo to Chuck Mehlert, Dept. Parks and Recreation. 3 pp.

### ***Julia Pfeiffer Burns***

Burdett, K.S., A.L Wagner, and J.S. Oliver. 1990. Biological survey of subtidal marine communities in Julia Pfeiffer Burns State Park. Moss Landing Marine Laboratories. Prepared for State of California Department of Parks and Recreation, Sacramento. 25 p. plus attachments.

Lea, R.N. 1979a. California Dept. of Fish and Game Cruise Report 79-A-9. Central California Marine Sportfish Survey DJ F25R 6 pp. (hook-and-line surveys)

Lea, R.N. 1979b. California Dept. of Fish and Game Cruise Report 79-X-3. Central California Marine Sportfish Survey DJ F25R 7 pp. (hook-and-line surveys)

Lea, R.N. D. VenTresca, and R. McAllister. 1982. California Dept. of Fish and Game Cruise Report 82-KB-10. Central California Marine Sportfish Survey. 7 pp. (hook-and-line surveys)

Seltenrich, C.P. J.D. Martini, and J. Barry. 1980. Water quality monitoring report No. 80-4: California Marine Waters Areas of Special Biological Significance Reconnaissance Survey Report, Julia Pfeiffer Burns Underwater Park. State Water Resources Control Board, Sacramento. 76 p.

## **Big Creek**

- Gingras, M.L. 1997. California Dept. of Fish and Game Cruise Report 97-M-8. Central California Marine Sport Fish Project. 5 pp. (scuba surveys)
- Gingras, M.L. 1998(a). California Dept. of Fish and Game Cruise Report 98-M-4. Central California Marine Sport Fish Project. 6 pp. (scuba surveys)
- Gingras, M.L. 1998(b). California Dept. of Fish and Game Cruise Report 98-M-5. Central California Marine Sport Fish Project. 3 pp. (scuba surveys)
- Goldman, K.J., and S.D. Anderson. 1999. Space utilization and swimming depth of white sharks, *Carcharodon carcharias*, at the South Farallon Islands, California. *Environmental Biology of Fishes* 56:351-364.
- Lea, R.N. 1982. California Dept. of Fish and Game Cruise Report 82-KB-19. Central California Marine Sportfish Survey. 6 pp. (hook-and-line surveys)
- Lea, R.N. 1993. California Dept. of Fish and Game Cruise Report 93-M-5 Leg 2. Central California Marine Sport Fish Project Biological Investigations. 9 pp. (hook-and-line surveys)
- Lea, R.N. and P.N. Reilly. 1999. Biological studies utilizing research submersibles. Final Performance Report, Federal Aid in Sport Fish Restoration Act. Grant Agreement F-50-R-11. California Dept. of Fish and Game. Project 24, Job 3, 3 pp.
- Malone, C. 1994. Temporal comparison of the intertidal biota of the Landels-Hill Big Creek Reserve and spatial comparison of the reserve with three other Central Californian sites: Oystercatcher Point, Carmel Point, and Natural Bridges. Senior Thesis, University of California, Santa Cruz, 89 pp.
- Paddack, M.J. 1996. The influence of marine reserves upon rockfish populations in central California kelp forests. M.S. Thesis, University of California, Santa Cruz. 40 pp.
- Pattison, C.P. 1995. California Dept. of Fish and Game Cruise Report 95-M-11. Central California Marine Sport Fish Project. 10 pp. (scuba surveys)
- Pomeroy, C. 1996. An evaluative study of cooperative data collected at Big Creek. : Project summary, University of California, California Sea Grant College: 18 pp.
- Reilly, P.N., and D.A. VenTresca. 1999. Use of marine reserves to enhance nearshore sport fish populations. Final Performance Report, Federal Aid in Sport Fish Restoration Act. Grant Agreement F-50-R-11. California Dept. of Fish and Game. Project 5, Job 1, 28 pp.
- Reilly, P.N., D.A. VenTresca, and M.L. Gingras. 1997. Use of marine reserves to enhance nearshore sport fish populations. Annual Job Performance Report, Federal Aid in Sport Fish

Restoration Act. Grant Agreement F-50-R-9. California Dept. of Fish and Game. Project 5, Job 1, 6 pp.

Reilly, P.N., D.A. VenTresca, and M.L. Gingras. 1998. Use of marine reserves to enhance nearshore sport fish populations . Annual Job Performance Report, Federal Aid in Sport Fish Restoration Act. Grant Agreement F-50-R-10. California Dept. of Fish and Game. Project 5, Job 1, 7 pp.

Reilly, P.N., D.A. VenTresca, and J.L. Houk. 1994. Determination of the feasibility of using marine reserves to enhance nearshore sport fish populations, using non-destructive, long-term sampling methodologies. Annual Job Performance Report, Federal Aid in Sport Fish Restoration Act. Grant Agreement F-50-R-6. California Dept. of Fish and Game. Project 2, Study 1, Job 1, 18 pp.

Reilly, P.N., D.A. VenTresca, and D.A. Osorio. 2000. Determine the feasibility of using marine reserves for enhancing nearshore fish populations. Annual Performance Report, Federal Aid in Sport Fish Restoration Act. Grant Agreement F-50-R-12. California Dept. of Fish and Game. Project 13, Job 2, 8 pp.

Reilly, P.N., D.A. VenTresca, and C.A. Pattison. 1995. Use of marine reserves to enhance nearshore sport fish populations. Annual Job Performance Report, Federal Aid in Sport Fish Restoration Act. Grant Agreement F-50-R-7. California Dept. of Fish and Game. Project 5, Job 1, 8 pp.

Reilly, P.N., D.A. VenTresca, and C.A. Pattison. 1996. Use of marine reserves to enhance nearshore sport fish populations. Annual Job Performance Report, Federal Aid in Sport Fish Restoration Act. Grant Agreement F-50-R-8. California Dept. of Fish and Game. Project 5, Job 1, 12 pp.

Smiley, J. 2000. Big Sur hook and line fishing survey, 1991-1999. (area adjacent to Big Creek Ecological Reserve). 5 pp.

VenTresca, D. A., et al. 1996. Early life history studies of nearshore rockfishes and lingcod off central California, 1987-92. Calif. Dept. Fish and Game Mar. Res. Div. Admin. Rept. 96-4:77.

VenTresca, D., J. Fisher, M. Donnellan, and B.C. Brady. 1999. California dept. Fish and Game Cruise Report 99-M-8 and 99-M-9. Central California Marine Sport Fish Project. 6 pp. (scuba surveys)

Wilson, C.E.. 1996. California Dept. of Fish and Game Cruise Report 96-M-5. Central California Marine Sport Fish Project. 11 pp. (scuba and hook-and-line surveys)

Yoklavich, M., R. Starr, J. Steger, H.G. Greene, F. Schwing, and C. Malzone. 1997. Mapping benthic habitats and ocean currents in the vicinity of central California's Big Creek Ecological Reserve. NOAA Technical Memorandum NMFS, NOAA-TM-NMFS-SWFSC-245. 52 pp.

**Atascadero Beach, Morro Beach, Pismo, Pismo-Oceano**

Pattison, C.P. California Dept. 1985-2000. Fish and Game, Morro Bay. Annual surveys for Pismo clam relative abundance and size frequency, 1985-2000.

**Vandenberg**

Friedman, C. S., P.L. Haaker, and I. Taniguchi. 2001(a). Density dependent recruitment of black abalone and resistance to withering syndrome at the Vandenberg Ecological Reserve. Paper presented at CalCOFI Symposium, La Jolla, California, November 2001.

**Published, on use of the MPA as a research tool**

**Elkhorn Slough**

Byers, J. 1999. The distribution of an introduced mollusk and its role in the long-term demise of a native confamilial species. *Biological Invasions*, 1, 339-352.

Grosholz, E.D. and G.M. Ruiz. 1995. Spread and potential impact of the recently introduced European green crab, *Carcinus maenas*, in central California. *Marine Biology*, 122, 239-247.

Talent, L.G. 1982. Food habits of the gray smoothhound, *Mustelus californicus*, the brown smoothhound, *Mustelus henlei*, the shovelnose guitarfish, *Rhinobatos productus*, and the bat ray, *Myliobatis californica*, in Elk Horn Slough, California. *California Fish and Game* 68(4):224-234.

Wasson, K., C.J. Zabin, L. Bedinger, M.C. Diaz., and J.S. Pearse. 2001. Biological invasions of estuaries without international shipping: The importance of intraregional transport. *Biological Conservation*, 102, 143-153.

**Hopkins**

Brawley, S.H. 1989. Factors affecting recruitment of *Fucus distichus*: Timing of fertilization and polyspermy. *Journal of Phycology*. 25(2)suppl:16.

DeBevoise, A.E. 1975. Predation on the chiton *Cyanoplax hartwegii* (Mollusca: Polyplacophora). *Veliger*. 18(Suppl.):47-50.

Fadallah, Y.H. 1982. Reproductive ecology of the coral *Astrangia lajollaensis*: Sexual and asexual patterns in a kelp forest habitat. *Oecologia*. 55(3):378-388.

- Holts, L.J. and K.A. Beauchamp. 1993. Sexual reproduction in the corallimorpharian sea anemone *Corynactis californica* in a central California kelp forest. *Marine Biology*. 116(1):129-136.
- Lyman, B.W. 1975. Activity patterns of the chiton *Cyanoplax hartwegii* (Mollusca: Polyplacophora). *Veliger*. 18(Suppl.):63-69.
- Russo, A.R. 1984. Space partitioning within populations of sea anemones (genus: *Anthopleura*) in the California intertidal zone. *Internationale Revue der gesamten Hydrobiologie*. 69(4):521-528.
- Seiff, S.R. 1975. Predation upon subtidal *Tonicella lineata* of Mussel Point, California (Mollusca: Polyplacophora). *Veliger*. 18(Suppl.):54-56.
- Smith, A.M. 1992. Alternation between attachment mechanisms by limpets in the field. *Journal of Experimental Marine Biology and Ecology*. 160(2):205-220.
- Tomanek, L. and G.N. Somero. 1997. The effect of temperature on protein synthesis in snails of the genus *Tegula* from the sub- and intertidal zone. *American Zoologist*. 37(5):188A.
- Tomanek, L. and G.N. Somero. 1998. Features of a lethal heat shock: Impairment of synthesis of heat shock proteins 70 and 90 during recovery in snails of the genus *Tegula* from the sub- and intertidal zone. *American Zoologist*. 38(5):159A.
- Watanabe, J.M. and L.R. Cox. 1975. Spawning behavior and larval development in *Mopalia lignosa* and *Mopalia muscosa* (Mollusca: Polyplacophora) in central California. *Veliger*. 18(Suppl.):18-27.
- Williams, R. 1975. Nitrogenous materials released from *Mopalia muscosa* (Gould, 1846), an intertidal chiton. *Veliger*. 18(Suppl.):128.

### **Pacific Grove**

- Nelson, P. A. 2001. Behavioral ecology of the young-of-the-year kelp rockfish, *Sebastes atrovirens* Jordan and Gilbert (Pisces: Scorpaenidae). *Journal of Experimental Marine Biology and Ecology* 256:33-50.

### **Carmel Bay**

- Davis, G.E. and J.M. Engle. 1991. Ecological condition and public use of the Cabrillo National Monument intertidal zone in 1991. Cooperative National Park Resources Studies Unit, University of California, Institute of Ecology. U.S. Geological Survey open-file report 00-61 4006962101.
- Graham, M.H. 1996. Effect of high irradiance on recruitment of the giant kelp *Macrocystis* (Phaeophyta) in shallow water. *Journal of Phycology*. 32(6):903-906.

- Hallacher, L.E. 1977. On feeding behavior of the basking shark, *Cetorhinus maximus*. Environ. Biol. Fish. 2(3):297-298.
- Hallacher, L.E. 1984. Relocation of original territories by displaced black-and-yellow rockfish, *Sebastes chrysomelas*, from Carmel Bay, California. California Fish and Game. 70(3):158-162.
- Hallacher, L.E. and D.A. Roberts. 1985. Differential utilization of space and food by the inshore rockfishes (Scorpaenidae: Sebastes) of Carmel Bay, California. Environmental Biology of Fishes 12(2):91-110.
- Hoelzer, G.A. 1988. Juvenile movement patterns in a territorial scorpaenid fish before and during settlement. Marine Ecology Progress Series 45:193-195.
- Kenner, M.C. and M.T. Lares. 1991. Size at first reproduction of the sea urchin *Strongylocentrotus purpuratus* in a Central California kelp forest. Marine Ecology Progress Series. 76(3):303-306.
- Konar, B. and M.S. Foster. 1992. Distribution and recruitment of subtidal geniculate coralline algae. Journal of Phycology. 28(3):273-280.
- Reed, D.C. and M.S. Foster. 1984. The effects of canopy shading on algal recruitment and growth in a giant kelp forest. Ecology. 65(3):937-948.
- Singer, M.M. 1983. Food habits of juvenile rockfishes (*Sebastes*) in a central California kelp forest. Fishery Bulletin. 83(4):531-542.
- VanWagenen, R.F., Foster, M.S., and F. Burns. 1981. Sea Otter Predation on Birds Near Monterey, California. Journal of Mammalogy. 62(2):433-434.
- Watanabe, J.M. and C. Harrold. 1991. Destructive grazing by sea urchins *Strongylocentrotus spp.* in a central California kelp forest: Potential roles of recruitment, depth, and predation. Marine Ecology Progress Series. 71(2):125-141.
- Wedi, S.E. and D.F. Dunn. 1983. Gametogenesis and reproductive periodicity of the subtidal sea anemone *Urticina lofotensis* (Coelenterata: Actiniaria) in California. Biological Bulletin, Marine Biological Laboratory, Woods Hole. 165(2):458-472.

### **Point Lobos**

- Gingras, M.L. 1997. California Dept. of Fish and Game Cruise Report 97-M-8. Central California Marine Sport Fish Project. 5 pp. (scuba surveys)
- Gingras, M.L. 1998(a). California Dept. of Fish and Game Cruise Report 98-M-4. Central California Marine Sport Fish Project. 6 pp. (scuba surveys)

Johansen, H.W. and L.F. Austin. 1970. Growth rates in the articulated coralline *Calliarthron* (Rhodophyta). *Can. Jour. Bot.* 48:125-132.

### **Big Creek**

Pomeroy, C. 2001. Marine Reserves as a Resource Management Tool: An Evaluative Study of Cooperative Data Collection at Big Creek. Marine Ecological Reserves Research Program. Project Number R/BC-2. California Sea Grant College Program.

Pomeroy, C. and J. Beck. 1998. Cooperative management of the state's marine ecological reserves: Preliminary evidence from Big Creek. *Taking a Look at California's Ocean Resources: An Agenda for the Future*, ASCE, Reston, VA (USA). 1:105-116.

### **Vandenberg**

Friedman, C. S., P.L. Haaker, and I. Taniguchi. 2001(b). Density-Dependent Recruitment and Resistance to Withering Syndrome in a Population of Black Abalone (*Haliotis cracherodii*) at the Vandenberg Ecological Reserve. Marine Ecological Reserves Research Program. Project Number R/V-1. California Sea Grant College Program.

Watson, W., R.L. Charter, H.G. Moser, R.D. Vetter, D.A. Ambrose, S.R. Charter, L.L. Robertson, E.M. Sandknop, E.A. Lynn and J. Stannard. 1999. Fine-scale distributions of planktonic fish eggs in the vicinities of Big Sycamore Canyon and Vandenberg Ecological Reserves, and Anacapa and San Miguel islands, California. *Reports of California Cooperative Oceanic Fisheries Investigations [CalCOFI Rep.]*, vol. 40.

### **Unpublished, on use of the MPA as a research tool**

#### **Hopkins**

Ammann, A. J. 2001. Evaluation of a standard monitoring unit for the recruitment of fish in central California, M.A. Thesis, University of California, Santa Cruz. 92 pp.

Fadallah, Y.H. 1981. The reproductive biology of three species of corals from central California. Ph.D. Dissertation. University of California, Santa Cruz.

Holyoak, A.R. 1992. Population dynamics, colony growth, and budding of the ascidian *Polyclinum planum*. Ph.D. Dissertation University of California, Santa Cruz.

more can be found at: <http://www.marine.stanford.edu/HMSweb/marine-indexes.html>

#### **Pacific Grove**

VenTresca, D. A., et al. 1996. Early life history studies of nearshore rockfishes and lingcod off central California, 1987-92. Calif. Dept. Fish and Game Mar. Res. Div. Admin. Rept. 96-4:77

### **Carmel Bay**

Ammann, A. J. 2001. Evaluation of a standard monitoring unit for the recruitment of fish in central California, M.A. Thesis, University of California, Santa Cruz. 92 pp.

Andrews, H.L. 1938. An ecological study of living forms in the kelp beds of Monterey Bay and Carmel Bay, California. Ph.D. dissertation, University of Illinois at Urbana-Champaign.

Carr, M. H. 1983 . Spatial and Temporal Patterns of Recruitment of Young-of-the-Year Rockfishes (Genus *Sebastes*) into a Central California Kelp Forest, San Francisco State University. M.A. Thesis. 104 pp.

Nakata, M.H. 1970. The distribution and abundance of marine intertidal fauna around a primary sewage effluent in Carmel Bay, California. Hopkins Marine Station student paper. 86 p.

Singer, M. M. 1982. Food Habits and Activity Patterns of Juvenile Rockfishes (*Sebastes*) in a Central California Kelp Forest. M.A. Thesis, San Jose State University, San Jose, California, 75 pp.

### **Point Lobos**

Castleton, M. R. 2000. Depth and substrate preference of pre-adult cabezon (*Scorpaenichthys marmoratus*) in Point Lobos Marine Reserve. Capstone Project Paper, faculty of Earth Systems Science and Policy, Center for Science, Technology, and Information Resources, California State University, Monterey Bay. 28 pp.

**APPENDIX I**

**DRAFT EVALUATION MATRIX  
FOR EXISTING CENTRAL COAST MARINE PROTECTED AREAS**

**APPENDIX I: DRAFT EVALUATION MATRIX FOR EXISTING CENTRAL COAST MARINE PROTECTED AREAS**

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	Año Nuevo Special Closure	Elkhorn Slough SMR	Hopkins SMR	Pacific Grove SMCA	Carmel Bay SMCA	Point Lobos SMR	Julia Pfeiffer Burns SMCA	Data Sources
<b>OVERALL EVALUATION</b>	Green = Effective; Yellow - Effective with some modification; Red - Ineffective			Green/Yellow (RSG)	Green (RSG)	Green (RSG)	Yellow (RSG)	Green (RSG)	Green (RSG)	?	
<b>REPRESENTATIVE HABITATS</b>											
<b>Intertidal</b>											
Dominant intertidal geologic substrate				sandstone, siltstone, mudstone (Tp)		granite (Kgr)			sandstone/ conglomerate	Franciscan complex; Cretaceous and Jurassic sandstone with shale (KJf) (from Lucia)	SWAT Coastal Biodiversity Survey
Sandy or gravel beaches	Linear (mi)	Amount in MPA/Region Total	223.66	6.06	0.00*	0.32	2.73	3.64	1.01	0.37	NOAA-ESI 2002
Rocky intertidal and cliff	Linear (mi)	Amount in MPA/Region Total	209.21	2.73	0.23	0.70	4.99	3.32	8.63	3.71	NOAA-ESI 2002
Coastal marsh	Linear (mi)	Amount in MPA/Region Total	36.53	0.00	9.97	0.00	0.00	0.00*	0.00	0.00	NOAA-ESI 2002
Tidal flats	Linear (mi)	Amount in MPA/Region Total	23.48	0.00**	9.97	0.00	0.00	0.00*	0.00	0.00	NOAA-ESI 2002
<b>Estuary</b>	Area (nm <sup>2</sup> )	Amount in MPA/Region Total	7.94	0.00	0.59	0.00	0.00	0.00	0.00	0.00	GIS Analysis
<b>Seagrass beds (0-30m): Surfgrass</b>	Linear (mi)	Amount in MPA/Region Total	161.09	4.60	4.60	0.77	4.32	4.06	5.93	3.44	Minerals Management Service/Tenera Inc.
<b>Seagrass beds (0-30m): Eelgrass</b>	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	1.07	0.00	0.01	0.00*	0.00*	0.00*	0.00*	0.00	Elkhorn Slough Foundation and Morro Bay National Estuary Program
<b>Soft bottom (Fine Scale)</b>											Fine-scale based on Kvittek et al multibeam and sidescan sonar; available for only about 25% of the region
0-30 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	24.21	ND	ND	0.08	0.35	0.93	0.19	ND	Total amount is only that which has been mapped to date.
30-100 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	93.72	N/A	N/A	N/A	N/A	0.08	0.19	1.13	Total amount is only that which has been mapped to date.
100-200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	1.93	N/A	N/A	N/A	N/A	N/A	N/A	ND	Total amount is only that which has been mapped to date.
>200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	0.29	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Total amount is only that which has been mapped to date.
<b>Soft bottom (Coarse Scale)</b>											Greene et al 2004; coarse scale data overestimates soft substrata
0-30 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	294.14	1.86	0.00**	0.08	0.33	1.01	0.18	0.57	see above
30-100 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	575.78	N/A	N/A	N/A	N/A	0.22	0.19	2.05	see above
100-200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	58.46	N/A	N/A	N/A	N/A	N/A	N/A	0.02	see above
>200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	105.52	N/A	N/A	N/A	N/A	N/A	N/A	N/A	see above
<b>Rocky reef; hard bottom (Fine Scale)</b>											Fine-scale based on Kvittek et al multibeam and sidescan sonar; available for only about 25% of the region
0-30 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	20.16	ND	ND	0.03	0.54	0.63	0.27	ND	Total amount is only that which has been mapped to date.
30-100 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	20.59	N/A	N/A	N/A	N/A	0.34	0.22	0.01	Total amount is only that which has been mapped to date.
100-200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	0.40	N/A	N/A	N/A	N/A	N/A	N/A	ND	Total amount is only that which has been mapped to date.
>200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	0.01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Total amount is only that which has been mapped to date.

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	<i>Año Nuevo Special Closure</i>	<i>Elkhorn Slough SMR</i>	<i>Hopkins SMR</i>	<i>Pacific Grove SMCA</i>	<i>Carmel Bay SMCA</i>	<i>Point Lobos SMR</i>	<i>Julia Pfeiffer Burns SMCA</i>	<i>Data Sources</i>
<b>Rocky reef; hard bottom (Coarse Scale)</b>											Greene et al 2004; coarse scale data underestimates hard substrata
0-30 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	46.66	0.31	0.00	0.03	0.46	0.58	0.27	0.00*	see above
30-100 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	26.78	N/A	N/A	N/A	N/A	0.23	0.22	0.00	see above
100-200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	13.91	N/A	N/A	N/A	N/A	N/A	N/A	0.00	see above
>200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	16.16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	see above
<b>Undetermined Habitat - For use with fine scale data</b>											
0-30 meters		Amount in MPA/Region Total	303.92	2.20 / 2.20	ND	0.040 / 0.146	0.67 / 1.50	0.74 / 2.31	0.32 / 0.78	0.58 / 0.58	Fine Scale - See Note
30-100 meters		Amount in MPA/Region Total	489.13	N/A	ND	N/A	N/A	0.04 / 0.45	0.01 / 0.41	0.90 / 2.05	Fine Scale - See Note
100-200 meters		Amount in MPA/Region Total	70.03	N/A	ND	N/A	N/A	N/A	N/A	0.03 / 0.03	Fine Scale - See Note
<b>Undetermined Habitat - For use with coarse scale data</b>											
0-30 meters		Amount in MPA/Region Total	303.92	0.00	0.00	0.00	0.05	0.06	0.04	0.00	Fine Scale - See Note
30-100 meters		Amount in MPA/Region Total	489.13	N/A	0.00	N/A	N/A	0.00	0.01	0.00	Fine Scale - See Note
100-200 meters		Amount in MPA/Region Total	70.03	N/A	0.00	N/A	N/A	N/A	N/A	0.00	Fine Scale - See Note
<b>Kelp forest (0-30m)</b>											
<b>1989 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	17.94	0.01	0.00	0.45	0.45	0.62	0.82	0.36	CDFG Kelp 1989 aerial survey
<b>1999 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	2.56	0.00	0.00	<0.01	0.07	0.01	0.03	0.03	CDFG Kelp 1999 aerial survey
<b>2002 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	12.55	0.00	0.00	0.05	0.32	0.62	0.20	0.11	CDFG Kelp 2002 aerial survey
<b>2003 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	9.53	0.00	0.00	0.04	0.23	0.24	0.19	0.09	CDFG Kelp 2003 aerial survey
<b>Persistent Kelp</b>	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	3.18	0.00	0.00	0.02	0.07	0.13	0.10	0.01	Present in 3 of 4 CDFG aerial survey datasets
<b>Nereocystis presence</b>											
<b>Macrocystis presence</b>											
<b>Pinnacles</b>											
0-30 meters	Count	Amount in MPA/Region Total		0	0	0**	0**	100	23	0*	Bathymetry data
30-100 meters	Count	Amount in MPA/Region Total		N/A	N/A	N/A	N/A	26	22	0*	Bathymetry data
100-200 meters	Count	Amount in MPA/Region Total		N/A	N/A	N/A	N/A	N/A	N/A	0	Bathymetry data
>200 meters	Count	Amount in MPA/Region Total		N/A	N/A	N/A	N/A	N/A	N/A	N/A	Bathymetry data
<b>Submarine canyon</b>											
0-30 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	0.56	0.00	0.00	0.00	0.00	0.18	0.00*	0.00	Coarse-scale substrata (Greene et al 2004)
30-100 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	4.42	N/A	N/A	N/A	N/A	0.01	0.00*	0.06	Coarse-scale substrata (Greene et al 2004)
100-200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	6.06	N/A	N/A	N/A	N/A	N/A	N/A	0.01	Coarse-scale substrata (Greene et al 2004)
>200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	42.77	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Coarse-scale substrata (Greene et al 2004)

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	<i>Año Nuevo Special Closure</i>	<i>Elkhorn Slough SMR</i>	<i>Hopkins SMR</i>	<i>Pacific Grove SMCA</i>	<i>Carmel Bay SMCA</i>	<i>Point Lobos SMR</i>	<i>Julia Pfeiffer Burns SMCA</i>	<i>Data Sources</i>
Freshwater plume	Presence/Absence	Presence of major river	Need to fill in	A	p	A	A	P	A	A	NHD hydrography dataset
Retention area	Presence/Absence	Presence of warm water or headland	unknown	A?	A?	A?	A?	P?	A?	A?	PFEL sea surface temperature, warm water; presence of headland
Upwelling cell	Presence/Absence	Presence of cold water or headland	3 major ones at Davenport, Sur, Conception; smaller amount on Big Sur Coastland	P	A	A	P	P	P	P	PFEL sea surface temperature, cold water; presence of headland
<b>SIZE AND SPACING GUIDELINES</b>											
Area	Area (mi <sup>2</sup> )	N/A	N/A	2.20	1.35	0.16	1.54	2.79	1.19	2.65	GIS analysis
Alongshore Span	Straight length (mi) alongshore	at least 2.88 to 6.21 mi, preferably 6.21 to 12.65 mi	N/A	5.52	app. 3.16	0.52	3.45	3.11	1.96	2.07	Nautical Chart
Shoreline Length	Linear distance following coastline (mi)	N/A	N/A	7.00	19.22	0.79	4.47	5.73	6.19	3.46	GIS analysis
Distance Between	Straight distance (mi) to next MPA north and south	within 31 to 62 mi	N/A	24.2 N, 36.8 S	63.3 or 36.8 N, 15 S	15 N, 0 S	0 N, 4.6 S	4.6 N, 0 S	0 N, 26.5 S	26.5 N, 5.8 S	GIS analysis
Shore to deep water	Depth range (ft) (average)	N/A	N/A	0-33 (11.5)	0-10	0-60 (19)	0-60 (19)	0-203 (49)	0-233 (94)	0-357.5 (149)	Legal boundary; GIS analysis; Bathymetry
Offshore extent	Maximum linear distance offshore (mi)	N/A	N/A	100 feet	0 (Estuarine)	0.29	0.46	1.15 (offshore portion)	0.86	1.32	Legal boundary; Nautical Chart
<b>CCRSR DESIGN CONSIDERATIONS</b>											
1. Minimize negative socio-economic impacts and optimize positive socio-economic impacts for all users, to the extent possible, while following the Master Plan Framework design guidelines for the establishment of regional MPA network components.	Not measurable for existing areas										
2. Recognize relevant portions of existing state and federal fishery management areas, to the extent possible, when designing new MPAs or modifying existing ones.	Compare MPA extent to other management measures	Overlap with year-round all gear RCA (and recreational year-round area)	45.36 mi <sup>2</sup> (519.87 mi <sup>2</sup> )	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.50) finfish take allowed	0.00 (0.23)	0.00 (0.13) finfish take allowed	GIS Analysis
3. To the extent possible, site MPAs to prevent fishing effort shifts that would result in serial depletion.	Not measurable for existing areas										
4. When crafting MPA proposals, include considerations for design found in the Nearshore Fishery Management Plan and the draft Abalone Recovery and Management Plan	Are Nearshore FMP species protected by regulations and present in area? / Are red and black abalone present?	# of the 19 nearshore finfish protected / Assess presence of 2 species	19 / 2	0 (finfish take allowed) / 1 (black only)	0 (species not present) / 0 (species not present)	19 (all protected) / 2	0 (finfish take allowed) / 2	0 (finfish take allowed) / 2	19 (all species protected) / 2	0 (finfish take allowed) / 2	Title 14, CCR
5. In evaluating the siting of MPAs, considerations shall include the needs and interests of all users.	Not measurable for existing areas										
6. 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.	Not measurable for existing areas										
7. 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.	Compare MPA locations to terrestrial protected areas, research institutions, etc	Assess coastal protection and potential partners	N/A	Año Nuevo State Reserve	National Estuarine Research Reserve	Hopkins Marine Station	Some lifeguard presence, adjacent to urban area	Carmel River State Beach-ranger presence	Point Lobos State Reserve	Julia Pfeiffer Burns State Park	GIS
8. To the extent possible, site MPAs to facilitate use of volunteers to assist in monitoring and management.	Compare MPA locations to existing program areas	Assess presence of existing volunteer programs		Docent program	Docent program	Bay Net volunteers stationed nearby, many divers, HMS nearby, 14/1398	Bay Net volunteers stationed nearby, many divers, HMS nearby, 273/1398	many divers, HMS nearby, 264/1398 REEF surveys	Docent program, many divers, HMS nearby, 129/1398 REEF survrys		K. Gaffney, S. Shimek
9. To the extent possible, site MPAs to take advantage of existing long-term monitoring studies.	Compare MPA locations to existing program areas	Assess presence of existing monitoring sites	N/A	Historical survey data available	ESNERR (water quality and ecology), The Pelagic Shark Research	1 PISCO, Old DFG Permanent Transect,	2 DFG Old Permanent Transects	2 PISCO, Cooperative Fish Trapping Surveys, CenCal DFG monitoring	2 PISCO	1 PISCO	GIS Analysis
10. To the extent possible, design MPA boundaries that facilitate ease of public recognition and ease of enforcement.	Query enforcement: are existing boundaries recognizable	Report on enforcement concerns	N/A	offshore boundary difficult to determine (distance from shore)		prefer straight line offshore as opposed to depth contour	prefer straight line offshore as opposed to depth contour		prefer straight line offshore as opposed to depth contour		DFG Staff

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	<i>Año Nuevo Special Closure</i>	<i>Elkhorn Slough SMR</i>	<i>Hopkins SMR</i>	<i>Pacific Grove SMCA</i>	<i>Carmel Bay SMCA</i>	<i>Point Lobos SMR</i>	<i>Julia Pfeiffer Burns SMCA</i>	<i>Data Sources</i>
<b>REGIONAL GOALS AND PROVISIONAL OBJECTIVES</b>											
<b>Goal 1. To protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.</b>											
Obj1. Protect areas of high species diversity and maintain species diversity and abundance, consistent with natural fluctuations, of populations in representative habitats.	<b>Amount (area) of each habitat and presence of areas of biodiversity (Section 3.3 profile)</b>	quantative assessment of presence of areas of biodiversity significance; quantity of each									
Obj2. Protect areas with diverse habitat types in close proximity to each other.	<b>habitats present; area</b>	<b>#habitats from above present / area of MPA</b>	26 habitats / 865 nm <sup>2</sup> = 0.03	6 / 1.66	4 / 1.02	6 / 0.12	6 / 1.16	10 / 2.11	8 / .90	9 / 2	GIS Analysis
Obj3. Protect natural size and age structure and genetic diversity of populations in representative habitats.	<b>Assume take affects natural size and age structure. go by take regulations; list of species protected</b>	<b>Initial Review: Number of "key" species from SAT list protected.</b>	13 (Note: List getting revised, this is Aug 30 version)	2- red abalone, black abalone	0 (species not present)	7 - red & black abalone, black, black-and-yellow, blue, copper, gopher, kelp, and olive rockfish, lingcod.	2- red abalone, black abalone	2- red abalone, black abalone	12 - red & black abalone, black, black-and-yellow, blue, bocaccio, canary, copper, gopher, grass, kelp, olive, widow, and yellowtail rockfish, lingcod.	2- red abalone, black abalone	Title 14, CCR, SAT key species list, SAT species by depth
Obj4. Protect natural trophic structure and food webs in representative habitats.	<b>Assume take affects natural size and age structure. Assume "no-take" protects entire</b>	<b>Initial Review: Is the area no take?</b>	N/A	No	Yes	Yes	No	No	Yes	No	Title 14, CCR, SAT key species list, SAT species by depth
Obj5. Protect ecosystem structure, function, integrity and ecological processes to facilitate recovery of natural communities from disturbances both natural and human induced.	<b>Act states that no-take reserves do this</b>	<b>Is the area no take?</b>	N/A	No	Yes	Yes	No	No	Yes	No	MPA Designation
<b>Goal 2. To help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted.</b>											
Obj1. 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.	<b>Presence and protection of rare, threatened, endangered, depleted, or overfished species</b>	<b>Number of rare, threatened, endangered, depleted, or overfished species/ Are these species protected in the MPA? / Is the MPA large enough to encompass the</b>									Title 14, CCR, SAT key species list, SAT species by depth
Obj2. Protect larval sources and enhance reproductive capacity of species most likely to benefit from MPAs through retention of large, mature individuals.	<b>Assume take affects natural size and age structure. go by take regulations; list of species protected</b>	<b>Number of "key" species present</b>	13 (Note: List beign revised, this is Aug 30 version)	2- red abalone, black abalone	0 (species not present)	7 - red & black abalone, black, black-and-yellow, blue, copper, gopher, kelp, and olive rockfish, lingcod, cabezon.	2- red abalone, black abalone	2- red abalone, black abalone	12 - red & black abalone, black, black-and-yellow, blue, bocaccio, canary, copper, gopher, grass, kelp, olive, widow, and yellowtail rockfish, lingcod, cabezon, kelp.	2- red abalone, black abalone	Title 14, CCR, SAT key species list, SAT species by depth

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	<i>Año Nuevo Special Closure</i>	<i>Elkhorn Slough SMR</i>	<i>Hopkins SMR</i>	<i>Pacific Grove SMCA</i>	<i>Carmel Bay SMCA</i>	<i>Point Lobos SMR</i>	<i>Julia Pfeiffer Burns SMCA</i>	<i>Data Sources</i>
Obj3. 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.	Does the MPA meet objective? / summarize regulations	List species which are protected, if not all species are protected	N/A	No, certain invertebrate species protected only seasonally	Objective not met; all species are protected .	Objective not met; all species are protected .	Yes, certain species (mollusks and crustaceans) are protected while other fishing allowed	Yes, invertebrates protected while recreational finfish take allowed	Objective not met; all species are protected .	Yes, protects some invertebrate species	Title 14, CCR, SAT key species list, SAT species by depth
<b>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.</b>											
Obj1. Ensure some MPAs are close to population centers and research and education institutions and include areas of traditional nonconsumptive recreational use and are accessible for recreational, educational, and study opportunities.	Distance to :Pop centers: Sta Cruz, Monterey, Moss Landing, Morro Bay, Avila Beach, Pismo; Distance to Research /Educational inst. access values such as parking, entry fees, facilities available	Distance from pop centers and educational/ research institutions / existence of shore and water public access / traditional non-consumptive site?	N/A	20 nm to Santa Cruz, Some facilities available	Adjacent to Moss Landing Marine Laboratories, 14 nm to Monterey, 19 nm to Santa Cuz, facilities available	Adjacent to Monterey and Hopkins Marine Station, research facilities on site	Adjacent to Monterey, near Hopkins Marine Station, public facilities and easy access	Adjacent to Carmel, Public access to most areas from shoreline	5 nm to Monterey, Public access through State Park, diving limited on daily basis	30 nm to Monterey, Public access through State Park	Nautical chart
Obj2. 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.	Number of each type of MPA and indication of habitat replication inside and outside	Number of habitats that are replicated; identify which are not	26 total Habitats	Coastal Marsh; Tidal Flats; Soft Bottom 100-200; Soft Bottom >200; Rocky 30-100 (3 areas only); Rocky 100-200; Rocky >200; Submarine Canyons (all depths)							GIS Analysis
Obj3. 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.	Do any of these MPAs have these programs? (PISCO, CRANE, etc)	Assess programs present (include volunteer efforts?)	N/A	None	?	1 PISCO, Old DFG Permanent Transect	2 DFG Old Permanent Transects	2 PISCO, Cooperative Fish Trapping Surveys	2 PISCO, docent programs	1 PISCO	GIS Analysis
Obj4. Protect or enhance recreational experience by ensuring natural size and age structure of marine populations.	Consumptive - Short Term: Document most popular recreational species in area; List species subject to protection; Non-consumptive - Short Term: List species subject to protection	Consumptive - Initial Review: List of previously fished species protected; Non-consumptive - Initial Review: List of previously fished species protected;									
<b>Goal 4. To protect marine natural heritage, including protection of representative and unique marine life habitats in central California waters, for their intrinsic value.</b>											
Obj1. Include within MPAs the following habitat types: estuaries, heads of submarine canyons, and pinnacles.	Habitat amounts or presence	Presence of habitats		None	Estuary	None	None	Pinnacles, canyon	Pinnacles	Pinnacles, canyon	
Obj2. Protect, and replicate to the extent possible, representatives of all marine habitats identified in the MLPA or the MPF across a range of depths.	Habitat amounts or presence, and replication	Gap analysis of habitat amounts and replication in MPA relative to study region									
<b>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.</b>											
Obj1. 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	Not measurable for existing areas										
Obj2. To the extent possible, effectively use scientific guidelines in the Master Plan Framework.	Alongshore span and spacing	Report out on span and spacing	N/A	Span - moderate Spacing - Yes	Span - Moderate Spacing - Moderate	Span - no Spacing - yes	Span - moderate Spacing - Yes	Span - moderate Spacing - Yes	Span - no Spacing - yes	Span - no Spacing - yes	Nautical Chart: GIS

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	Año Nuevo Special Closure	Elkhorn Slough SMR	Hopkins SMR	Pacific Grove SMCA	Carmel Bay SMCA	Point Lobos SMR	Julia Pfeiffer Burns SMCA	Data Sources
<b>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.</b>											
Obj1. 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	Not measurable for existing areas										
Obj2. 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.	Not measurable for existing areas										
<b>Species of Interest</b>											
Sea Lions	presence (# stakeholders)			P*							CCRSg
Sea Otters	presence (# stakeholders)				P*	P*	P*	P*	P*		CCRSg
Harbor Seals	presence (# stakeholders)				P*			P*	P*		CCRSg
Elephant Seals	presence (# stakeholders)			P*							CCRSg
Snowy Plovers	presence (# stakeholders)										CCRSg
Other birds	presence (# stakeholders)			P*	P*						CCRSg
White Sea Bass	presence (# stakeholders)										CCRSg
Halibut	presence (# stakeholders)				P*		P*	P*			CCRSg
Assorted Flat Fish	presence (# stakeholders)										CCRSg
Surf Perch	presence (# stakeholders)							P*	P*		CCRSg
pile perch	presence (# stakeholders)						P*	P*	P*		CCRSg
rubberlip perch	presence (# stakeholders)						P*	P*	P*		CCRSg
kelp bass	presence (# stakeholders)						P*		P*		CCRSg
calico bass	presence (# stakeholders)						P*	P*			CCRSg
kelp greenling	presence (# stakeholders)						P*	P*	P*		CCRSg
california sheephead	presence (# stakeholders)						P*	P*	P*		CCRSg
Cabezon	presence (# stakeholders)					P*	P*	P*	P*		CCRSg
longfin sculpin	presence (# stakeholders)								P*		CCRSg
Salmon	presence (# stakeholders)										CCRSg
Steelhead	presence (# stakeholders)										CCRSg
Brown Rockfish	presence (# stakeholders)										CCRSg
vermillion rockfish	presence (# stakeholders)					P*	P*	P*	P*		CCRSg
gopher rockfish	presence (# stakeholders)					P*					CCRSg
grass rockfish	presence (# stakeholders)						P*		P*		CCRSg
cooper rockfish	presence (# stakeholders)								P*		CCRSg
black and yellow rockfish	presence (# stakeholders)								P*		CCRSg
starry rockfish	presence (# stakeholders)										CCRSg
yellowtail rockfish	presence (# stakeholders)										CCRSg
China Rockfish	presence (# stakeholders)							P*			CCRSg
sharks	presence (# stakeholders)				P*				P*		CCRSg
skates/rays	presence (# stakeholders)				P*						CCRSg
Sand Crabs	presence (# stakeholders)										CCRSg

giant pacific octopus	presense (# stakeholders)							P*	P*		CCRSG
spot prawn	presense (# stakeholders)							P*			CCRSG
lobster	presense (# stakeholders)							P*			CCRSG
Clams	presense (# stakeholders)				P*						CCRSG
scallops	presense (# stakeholders)							P*	P*		CCRSG
sponges	presense (# stakeholders)						P*	P*	P*		CCRSG
hydrocoral	presense (# stakeholders)							P*, P**	P*		CCRSG
bull kelp	presense (# stakeholders)			P*			P*				CCRSG
giant kelp	presense (# stakeholders)						P*			DFG	CCRSG
<b>Use Data</b>											
<b>Not heavily used</b>	<b># stakeholders</b>			1		1					CCRSG
<b>Heavily used</b>	<b># stakeholders</b>			2	6	9	8	6	8		CCRSG
fishing	# stakeholders				1	1	7	2	2		CCRSG
surfing	# stakeholders						2				CCRSG
horseback riding, hiking, ATVs, etc	# stakeholders										CCRSG
beachgoers	# stakeholders								1		CCRSG
divers	# stakeholders			1	1	6	7	6	8		CCRSG
intertidal visitors/ birders/ wildlife viewing	# stakeholders			2	6		3	1	2		CCRSG
kayaking	# stakeholders				5	3	5	1	5		CCRSG
boating	# stakeholders				2		1	2	2		CCRSG
researchers/school groups	# stakeholders				4	10	2	1			CCRSG

**APPENDIX I: DRAFT EVALUATION MATRIX FOR EXISTING CENTRAL COAST MARINE PROTECTED AREAS**

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	Big Creek SMR	Atascadero Beach SMCA	Morro Beach SMCA	Pismo SMCA	Pismo-Oceano SMCA	Vandenberg SMR	Data Sources*
<b>OVERALL EVALUATION</b>				Green/Yellow (RSG)	Yellow/Red (RSG)	Green/Yellow (RSG)	Red (RSG)	Yellow (RSG)	Yellow (RSG)	
<b>REPRESENTATIVE HABITATS</b>										
<b>Intertidal</b>										
Dominant intertidal geologic substrate				Franciscan complex; Cretaceous and Jurassic sandstone with shale (KJf) (from Lucia and Duck Ponds)					Monterey Shale (Tm)	SWAT Coastal Biodiversity Survey
Sandy or gravel beaches	Linear (mi)	Amount in MPA/Region Total	223.66	1.17	1.61	1.75	0.39	3.95	2.68	NOAA-ESI 2002
Rocky intertidal and cliff	Linear (mi)	Amount in MPA/Region Total	209.21	1.91	0.48	0.37	0.00	0.00	5.35	NOAA-ESI 2002
Coastal marsh	Linear (mi)	Amount in MPA/Region Total	36.53	0.00	0.00	0.00	0.00	0.00	0.00	NOAA-ESI 2002
Tidal flats	Linear (mi)	Amount in MPA/Region Total	23.48	0.00	0.00	0.00	0.00	0.00	0.00	NOAA-ESI 2002
<b>Estuary</b>	Area (nm <sup>2</sup> )	Amount in MPA/Region Total	7.94	0.00	0.00	0.00	0.00	0.00	0.00	GIS Analysis
<b>Seagrass beds (0-30m): Surfgrass</b>	Linear (mi)	Amount in MPA/Region Total	161.09	3.04	0.00	0.00	0.00	0.00	5.93	Minerals Management Service/Tenera Inc.
<b>Seagrass beds (0-30m): Eelgrass</b>	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	1.07	0.00	0.00	0.00	0.00	0.00	0.00	Elkhorn Slough Foundation and Morro Bay National Estuary Program
<b>Soft bottom (Fine Scale)</b>										Fine-scale based on Kvitek et al multibeam and sidescan sonar; available for only about 25% of the region
0-30 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	24.21	0.24	ND	ND	ND	ND	0.89	Total amount is only that which has been mapped to date.
30-100 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	93.72	1.13	ND	ND	N/A	ND	N/A	Total amount is only that which has been mapped to date.
100-200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	1.93	N/A	N/A	N/A	N/A	N/A	N/A	Total amount is only that which has been mapped to date.
>200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	0.29	N/A	N/A	N/A	N/A	N/A	N/A	Total amount is only that which has been mapped to date.
<b>Soft bottom (Coarse Scale)</b>										Greene et al 2004; coarse scale data overestimates soft substrata
0-30 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	294.14	0.49	2.30	2.19	0.08	8.94	2.46	see above
30-100 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	575.78	1.11	4.02	4.62	N/A	4.35	N/A	see above
100-200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	58.46	N/A	N/A	N/A	N/A	N/A	N/A	see above
>200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	105.52	N/A	N/A	N/A	N/A	N/A	N/A	see above

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	Big Creek SMR	Atascadero Beach SMCA	Morro Beach SMCA	Pismo SMCA	Pismo-Oceano SMCA	Vandenberg SMR	Data Sources*
<b>Rocky reef; hard bottom (Fine Scale)</b>										Fine-scale based on Kvitek et al multibeam and sidescan sonar; available for only about 25% of the region
0-30 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	20.16	0.16	ND	ND	ND	ND	0.03	Total amount is only that which has been mapped to date.
30-100 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	20.59	0.06	ND	ND	N/A	ND	N/A	Total amount is only that which has been mapped to date.
100-200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	0.40	N/A	N/A	N/A	N/A	N/A	N/A	Total amount is only that which has been mapped to date.
>200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	0.01	N/A	N/A	N/A	N/A	N/A	N/A	Total amount is only that which has been mapped to date.
<b>Rocky reef; hard bottom (Coarse Scale)</b>										Greene et al 2004; coarse scale data underestimates hard substrata
0-30 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	46.66	0.46	0.00*	0.00*	0.00	0.00	0.01	see above
30-100 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	26.78	0.09	0.00	0.00*	N/A	0.00	N/A	see above
100-200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	13.91	N/A	N/A	N/A	N/A	N/A	N/A	see above
>200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	16.16	N/A	N/A	N/A	N/A	N/A	N/A	see above
<b>Undetermined Habitat - For use with fine scale data</b>										
0-30 meters		Amount in MPA/Region Total	303.92	0.68 / 1.07	2.31 / 2.31	2.20 / 2.20	0.08 / 0.08	8.95 / 8.95	1.55 / 2.48	Fine Scale - See Note
30-100 meters		Amount in MPA/Region Total	489.13	0 / 1.19	4.03 / 4.03	4.63 / 4.63	N/A	4.35 / 4.35	N/A	Fine Scale - See Note
100-200 meters		Amount in MPA/Region Total	70.03	N/A	N/A	N/A	N/A	N/A	N/A	Fine Scale - See Note
<b>Undetermined Habitat - For use with coarse scale data</b>										
0-30 meters		Amount in MPA/Region Total	303.92	0.00	0.00	0.00	0.00	0.00	0.00	Fine Scale - See Note
30-100 meters		Amount in MPA/Region Total	489.13	0.00	0.00	0.00	N/A	0.00	N/A	Fine Scale - See Note
100-200 meters		Amount in MPA/Region Total	70.03	N/A	N/A	N/A	N/A	N/A	N/A	Fine Scale - See Note
<b>Kelp forest (0-30m)</b>										
<b>1989 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	17.94	0.36	0.00	0.00	0.00	0.00	0.00	CDFG Kelp 1989 aerial survey
<b>1999 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	2.56	0.07	0.00	0.00	0.00	0.00	0.00	CDFG Kelp 1999 aerial survey
<b>2002 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	12.55	0.28	0.00	0.00	0.00	0.00	0.00	CDFG Kelp 2002 aerial survey
<b>2003 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	9.53	0.17	0.00	0.01	0.00	0.00	< 0.01	CDFG Kelp 2003 aerial survey
<b>Persistent Kelp</b>	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	3.18	0.08	0.00	0.00	0.00	0.00	0.00	Present in 3 of 4 CDFG aerial survey datasets
<b>Nereocystis presence</b>										
<b>Macrocystis presence</b>										

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	Big Creek SMR	Atascadero Beach SMCA	Morro Beach SMCA	Pismo SMCA	Pismo-Oceano SMCA	Vandenberg SMR	Data Sources*
<b>Pinnacles</b>										
0-30 meters	Count	Amount in MPA/Region Total		1	0	0	0	0	0*	Bathymetry data
30-100 meters	Count	Amount in MPA/Region Total		7	0	0	N/A	0	N/A	Bathymetry data
100-200 meters	Count	Amount in MPA/Region Total		N/A	N/A	N/A	N/A	N/A	N/A	Bathymetry data
>200 meters	Count	Amount in MPA/Region Total		N/A	N/A	N/A	N/A	N/A	N/A	Bathymetry data
<b>Submarine canyon</b>										
0-30 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	0.56	0.00	0.00	0.00	0.00	0.00	0.00	Coarse-scale substrata (Greene et al 2004)
30-100 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	4.42	0.00	0.00	0.00	N/A	0.00	N/A	Coarse-scale substrata (Greene et al 2004)
100-200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	6.06	N/A	N/A	N/A	N/A	N/A	N/A	Coarse-scale substrata (Greene et al 2004)
>200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	42.77	N/A	N/A	N/A	N/A	N/A	N/A	Coarse-scale substrata (Greene et al 2004)
<b>Freshwater plume</b>	<b>Presence/Absence</b>	<b>Presence of major river</b>	Need to fill in	P	A	A	A	P?	A	NHD hydrography dataset
<b>Retention area</b>	<b>Presence/Absence</b>	<b>Presence of warm water or headland</b>	unknown	A?	A?	A?	A?	A?	A?	PFEL sea surface temperature, warm water; presence of headland
<b>Upwelling cell</b>	<b>Presence/Absence</b>	<b>Presence of cold water or headland</b>	3 major ones at Davenport, Sur, Conception; smaller amount on Big Sur Coast and	P	A	A	A	A	P	PFEL sea surface temperature, cold water; presence of headland
<b>SIZE AND SPACING GUIDELINES</b>										
Area	Area (mi <sup>2</sup> )	N/A	N/A	2.26	6.33	6.82	0.08	13.30	2.48	GIS analysis
Along Shore Span	Straight length (mi) alongshore	at least 2.88 to 6.21 mi, preferably 6.21 to 12.65 mi	N/A	2.19	1.61	1.96	0.38	3.80	3.68	Nautical Chart
Shoreline Length	Linear distance following coastline (mi)	N/A	N/A	3.05	2.07	2.09	0.38	3.95	6.66	GIS analysis
Distance Between	Straight distance (mi) to next MPA north and south	within 31 to 62 mi	N/A	5.8 N, 61 S	61 N, 4.6 S	4.6 N, 17.3 S	17.3 N, 5.8 S	5.8 N, 25.3 S	25.3 N, 31 S	GIS analysis
Shore to deep water	Depth range (ft) (average)	N/A	N/A	0-298 (95.8)	0-236 (130.2)	0-243 (128)	0-10 (4.9)	0-134.5 (78.4)	0-59 (40.7)	Legal boundary; GIS analysis; Bathymetry
Offshore extent	Maximum linear distance offshore (mi)	N/A	N/A	1.15	3.45	3.45	1,000 feet	3.45	0.86	Legal boundary; Nautical Chart
<b>CCRSR DESIGN CONSIDERATIONS</b>										
1. Minimize negative socio-economic impacts and optimize positive socio-economic impacts for all users, to the extent possible, while following the Master Plan Framework design guidelines for the establishment of regional MPA network components.										
2. Recognize relevant portions of existing state and federal fishery management areas, to the extent possible, when designing new MPAs or modifying existing ones.										
	Not measurable for existing areas									
	Compare MPA extent to other management measures	Overlap with year-round all gear RCA (and recreational year-round area)	45.36 mi <sup>2</sup> (519.87 mi <sup>2</sup> )	0.00 (0.79)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	Big Creek SMR	Atascadero Beach SMCA	Morro Beach SMCA	Pismo SMCA	Pismo-Oceano SMCA	Vandenberg SMR	Data Sources*
3. To the extent possible, site MPAs to prevent fishing effort shifts that would result in serial depletion.	Not measurable for existing areas									
4. When crafting MPA proposals, include considerations for design found in the Nearshore Fishery Management Plan and the draft Abalone Recovery and Management Plan	Are Nearshore FMP species protected by regulations and present in area? / Are red and black abalone present?	# of the 19 nearshore finfish protected / Assess presence of 2 species	19 / 2	19 (all protected) / 2	0 (finfish take allowed) / 0	0 (finfish take allowed) / 0	0 (finfish take allowed) / 0	0 (finfish take allowed) / 0	19 (all protected) / 2	Title 14, CCR
5. In evaluating the siting of MPAs, considerations shall include the needs and interests of all users.	Not measurable for existing areas									
6. 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.	Not measurable for existing areas									
7. 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.	Compare MPA locations to terrestrial protected areas, research institutions, etc	Assess coastal protection and potential partners	N/A	Landels-Hill Big Creek Reserve (on site manager)		Montana de Oro State Park			Vandenberg AFB - Access Restricted	GIS
8. To the extent possible, site MPAs to facilitate use of volunteers to assist in monitoring and management.	Compare MPA locations to existing program areas	Assess presence of existing volunteer programs		Voluntary monitoring by commercial fishermen coordinated by reserve manager						
9. To the extent possible, site MPAs to take advantage of existing long-term monitoring studies.	Compare MPA locations to existing program areas	Assess presence of existing monitoring sites	N/A	1 PISCO, 3 or more DFG Old Permanent Transects	DFG Intertidal Transects (Historical)	DFG Intertidal Transects (Historical)	DFG Intertidal Transects (Historical)	DFG Intertidal Transects (Historical)	DFG Abalone Intertidal Transects	GIS Analysis
10. To the extent possible, design MPA boundaries that facilitate ease of public recognition and ease of enforcement.	Query enforcement: are existing boundaries recognizable	Report on enforcement concerns	N/A	prefer straight line offshore as opposed to depth contour	prefer straight line offshore as opposed to distance	prefer straight line offshore as opposed to distance	Very small area difficult to enforce	prefer straight line offshore as opposed to distance	prefer straight line offshore as opposed to depth contour	DFG Staff
<b>REGIONAL GOALS AND PROVISIONAL OBJECTIVES</b>										
<b>Goal 1. To protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.</b>										
Obj1. Protect areas of high species diversity and maintain species diversity and abundance, consistent with natural fluctuations, of populations in representative habitats	Amount (area) of each habitat and presence of areas of biodiversity (Section 3.3 profile)	qualitative assessment of presence of areas of biodiversity significance; quantity of each habitat								
Obj2. Protect areas with diverse habitat types in close proximity to each other.	habitats present; area	#habitats from above present / area of MPA	26 habitats / 865 nm <sup>2</sup>	8 / 1.71	4 / 4.78	5 / 5.15	2 / 0.06	3 / 10.04	5 / 1.87	GIS Analysis
Obj3. Protect natural size and age structure and genetic diversity of populations in representative habitats.	Assume take affects natural size and age structure. go by take regulations; list of species protected	Initial Review: Number of "key" species from SAT list protected.	13 (Note: List getting revised, this is Aug 30 version)	12 - red & black abalone, black, black-and-yellow, blue, bocaccio, canary, copper, grass, kelp, olive, vermilion, widow, and yelloweye rockfish, lingcod, cabezon, kelp greenling, surfperches	0	0.00	0.00	0.00	7 - red & black abalone, black, blue, brown, copper, olive, and vermilion rockfish, lingcod	Title 14, CCR, SAT key species list, SAT species by depth

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	Big Creek SMR	Atascadero Beach SMCA	Morro Beach SMCA	Pismo SMCA	Pismo-Oceano SMCA	Vandenberg SMR	Data Sources*
Obj4. Protect natural trophic structure and food webs in representative habitats.	<b>Assume take affects natural size and age structure. Assume "no-take" protects entire food web</b>	Initial Review: Is the area no take?	N/A	Yes	No	No	No	No	Yes	Title 14, CCR, SAT key species list, SAT species by depth
Obj5. Protect ecosystem structure, function, integrity and ecological processes to facilitate recovery of natural communities from disturbances both natural and human induced.	<b>Act states that no-take reserves do this</b>	Is the area no take?	N/A	Yes	No	No	No	No	Yes	MPA Designation
<b>Goal 2. To help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted.</b>										
Obj1. 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.	<b>Presence and protection of rare, threatened, endangered, depleted, or overfished species</b>	<b>Number of rare, threatened, endangered, depleted, or overfished species/ Are these species protected in the MPA? / Is the MPA large enough to encompass the typical movements of these species and prey species?</b>								Title 14, CCR, SAT key species list, SAT species by depth
Obj2. Protect larval sources and enhance reproductive capacity of species most likely to benefit from MPAs through retention of large, mature individuals.	<b>Assume take affects natural size and age structure. go by take regulations; list of species protected</b>	<b>Number of "key" species present</b>	13 (Note: List getting revised, this is Aug 30 version)	12 - red & black abalone, black, black-and-yellow, blue, bocaccio, canary, copper, grass, kelp, olive, vermillion, widow, and yelloweye rockfish, lingcod, cabezon, kelp greenling, surfperches	0.00	0.00	0.00	0.00	7 - red & black abalone, black, blue, brown, copper, olive, and vermillion rockfish, lingcod	Title 14, CCR, SAT key species list, SAT species by depth
Obj3. 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.	<b>Does the MPA meet objective? / summarize regulations</b>	<b>List species which are protected, if not all species are protected</b>	N/A	Objective not met; all species are protected .	Yes, ceratin species (Pismo clams) are protected.	Yes, ceratin species (Pismo clams) are protected.	Yes, ceratin species (invertebrates) are protected.	Yes, ceratin species (Pismo clams) are protected.	Objective not met; all species are protected .	Title 14, CCR, SAT key species list, SAT species by depth

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	Big Creek SMR	Atascadero Beach SMCA	Morro Beach SMCA	Pismo SMCA	Pismo-Oceano SMCA	Vandenberg SMR	Data Sources*
<b>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.</b>										
Obj1. Ensure some MPAs are close to population centers and research and education institutions and include areas of traditional nonconsumptive recreational use and are accessible for recreational, educational, and study opportunities.	Distance to :Pop centers: Sta Cruz, Monterey, Moss Landing, Morro Bay, Avila Beach, Pismo; Distance to Research /Educational inst. access values such as parking, entry fees, facilities available.	Distance from pop centers and educational/ research institutions / existence of shore and water public access / traditional non-consumptive site?	N/A	38 nm to Monterey, Public Access prohibited, some onsite facilities for researchers	Adjacent to Morro Bay, Public beach access	Adjacent to Morro Bay, Public beach access, adjacent to Montana de Oro State Park	Adjacent to Pismo Beach, Public Beach Access	8 nm to Pismo Beach, Public Beach Access	40 nm to Pismo Beach, 50 nm to Santa Barbara, No public access, research access on limited basis	Nautical chart
Obj2. 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.	Number of each type of MPA and indication of habitat replication inside and outside	Identify which habitats are not replicated in 3 or more MPAs	26 total Habitats	Coastal Marsh; Tidal Flats; Soft Bottom 100-200; Soft Bottom >200; Rocky 30-100 (3 areas only); Rocky 100-200; Rocky >200; Submarine Canyons (all depths)					GIS Analysis	
Obj3. 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.	Do any of these MPAs have these programs? (PISCO, CRANE, etc)	Assess programs present	N/A	1 PISCO, 3 or more DFG Old Permanent Transects	0.00	0.00	0.00	0.00	DFG Abalone Intertidal Transects	GIS Analysis
Obj4. Protect or enhance recreational experience by ensuring natural size and age structure of marine populations.	<i>Consumptive - Short Term:</i> Document most popular recreational species in area; <i>List species subject to protection; Non-consumptive - Short Term:</i> List species subject to protection;	<i>Consumptive - Initial Review:</i> List of previously fished species protected; <i>Non-consumptive - Initial Review:</i> List of previously fished species protected;								
<b>Goal 4. To protect marine natural heritage, including protection of representative and unique marine life habitats in central California waters, for their intrinsic value.</b>										
Obj1. Include within MPAs the following habitat types: estuaries, heads of submarine canyons, and pinnacles.	Habitat amounts or presence	Presence of habitats		Pinnacles	None	None	None	None	None	
Obj2. Protect, and replicate to the extent possible, representatives of all marine habitats identified in the MLPA or the MPF across a range of depths.	Habitat amounts or presence, and replication	Gap analysis of habitat amounts and replication in MPA relative to study region								
<b>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.</b>										
Obj1. 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.	Presence of MPA-specific objectives; Presence of monitoring plan/program; Presence of evaluation strategy	Assess current objectives, monitoring, and evaluation								
Obj2. To the extent possible, effectively use scientific guidelines in the Master Plan Framework.	Size, spacing	Report out on size and spacing	N/A	Span - No Spacing - Moderate	Span - No Spacing - Moderate	Span - No Spacing Yes	Span - No Spacing Yes	Span - Moderate Spacing - yes	Span - Moderate Spacing - yes	Nautical Chart: GIS

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	Big Creek SMR	Atascadero Beach SMCA	Morro Beach SMCA	Pismo SMCA	Pismo-Oceano SMCA	Vandenberg SMR	Data Sources*
<b>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.</b>										
Obj1. 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	N/A; future									
Obj2. 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.	N/A; future									
<b>Species of Interest</b>										
Sea Lions	presense (# stakeholders)								1	CCRSG
Sea Otters	presense (# stakeholders)			P*, P**	P*	P*	P*		1	CCRSG
Harbor Seals	presense (# stakeholders)			P*, P**	P*					CCRSG
Elephant Seals	presense (# stakeholders)									CCRSG
Snowy Plovers	presense (# stakeholders)				P*	P*				CCRSG
Other birds	presense (# stakeholders)									CCRSG
White Sea Bass	presense (# stakeholders)							P*	1	CCRSG
Halibut	presense (# stakeholders)			P*, P**	P*	P*		P*	1	CCRSG
Assorted Flat Fish	presense (# stakeholders)					P*				CCRSG
Surf Perch	presense (# stakeholders)			P*, P**	P*	P*		P*		CCRSG
pile perch	presense (# stakeholders)			P*, P**						CCRSG
rubberlip perch	presense (# stakeholders)			P*, P**						CCRSG
kelp bass	presense (# stakeholders)									CCRSG
calico bass	presense (# stakeholders)									CCRSG
kelp greenling	presense (# stakeholders)			P*, P**						CCRSG
california sheephead	presense (# stakeholders)			P*, P**						CCRSG
Cabezon	presense (# stakeholders)			P*, P**	P*	P*				CCRSG
longfin sculpin	presense (# stakeholders)									CCRSG
Salmon	presense (# stakeholders)			P*, P**		P*		P*		CCRSG
Steelhead	presense (# stakeholders)				P*					CCRSG
Brown Rockfish	presense (# stakeholders)								P*	CCRSG
vermillion rockfish	presense (# stakeholders)			P*, P**						CCRSG
gopher rockfish	presense (# stakeholders)			P*, P**						CCRSG
grass rockfish	presense (# stakeholders)			P*, P**						CCRSG
cooper rockfish	presense (# stakeholders)									CCRSG
black and yellow rockfish	presense (# stakeholders)			P*, P**						CCRSG
starry rockfish	presense (# stakeholders)			P*, P**						CCRSG
yellowtail rockfish	presense (# stakeholders)			P*, P**						CCRSG
China Rockfish	presense (# stakeholders)			P*, P**	P*	P*				CCRSG
sharks	presense (# stakeholders)									CCRSG
skates/rays	presense (# stakeholders)									CCRSG
Sand Crabs	presense (# stakeholders)					P*				CCRSG
giant pacific octopus	presense (# stakeholders)									CCRSG
spot prawn	presense (# stakeholders)									CCRSG
lobster	presense (# stakeholders)									CCRSG
Clams	presense (# stakeholders)				P*	P*, P**	P*	P*		CCRSG
scallops	presense (# stakeholders)									CCRSG
sponges	presense (# stakeholders)									CCRSG
hydrocoral	presense (# stakeholders)									CCRSG
bull kelp	presense (# stakeholders)			P*, P**						CCRSG
giant kelp	presense (# stakeholders)			P*, P**						CCRSG
<b>Use Data</b>										
<b>Not heavily used</b>	# stakeholders			5		2			3	CCRSG
<b>Heavily used</b>	# stakeholders				5	4	1	1		CCRSG
fishing	# stakeholders				2	2		1		CCRSG
surfing	# stakeholders				4	2	1			CCRSG
horseback riding, hiking, ATVs, etc	# stakeholders				1	1		1		CCRSG
beachgoers	# stakeholders				2	2	1	1		CCRSG
divers	# stakeholders									CCRSG
intertidal visitors/ birders/ wildlife viewing	# stakeholders									CCRSG
kayaking	# stakeholders									CCRSG
boating	# stakeholders									CCRSG
researchers/school groups	# stakeholders									CCRSG

## **APPENDIX II**

### **DRAFT GAP ANALYSIS OF HABITAT REPRESENTATION IN EXISTING CENTRAL COAST MARINE PROTECTED AREAS**

**APPENDIX II: DRAFT GAP ANALYSIS OF HABITAT REPRESENTATION IN EXISTING CENTRAL COAST MARINE PROTECTED AREAS**

MPA Abbreviations: AN: Año Nuevo, ES: Elkhorn Slough, H: Hopkins, PG: Pacific Grove, CB: Carmel Bay, PL: Point Lobos, JPB: Julia Pfeiffer Burns, BC: Big Creek, AB: Atascadero Beach, MB: Morro Beach, P: Pismo, PO: Pismo-Oceano, V: Vandenberg

\* Habitats identified as present by the stakeholder group, but not quantified with spatial data at this time.

	<i>How measured?</i>	<i>Total amount in Region</i>	<i>MPA's with this habitat</i>	<i>Amount in State Marine Reserves</i>	<i>Percent of Total in State Marine Reserves</i>	<i>Amount in State Marine Conservation Areas</i>	<i>Percent of Total in State Marine Conservation Areas</i>	<i>Amount in Special Closure</i>	<i>Percent of Total in Special Closure</i>	<i>Amount in all existing MPAs in region</i>	<i>Percent of Total in existing MPAs</i>	<i>Spatial Data Source</i>
<b>HABITATS</b>												
<b>Intertidal</b>												
Sandy or gravel beaches	Linear (mi)	223.66	AN, ES*, H, PG, CB, PL, JPB, BC, AB, MB, P, PO, V	5.18	2.32%	14.43	6.45%	6.06	2.71%	25.66	11.47%	NOAA-ESI 2002
Rocky intertidal and cliff	Linear (mi)	209.21	AN, ES, H, PG, CB, PL, JPB, BC, AB, MB, V	16.82	8.04%	12.86	6.15%	2.73	1.31%	32.42	15.50%	NOAA-ESI 2002
Coastal marsh	Linear (mi)	36.53	ES, CB*	9.97	27.31%	0.00	0.00%	0.00	0.00%	9.98	27.31%	NOAA-ESI 2002
Tidal flats	Linear (mi)	23.48	AN*, ES, CB*	9.97	42.49%	0.00	0.00%	0.00	0.00%	9.98	42.50%	NOAA-ESI 2002
<b>Seagrass beds (0-30m): Surfgrass</b>	Linear (mi)	161.09	AN, ES*, H, PG, CB, PL, JPB, BC, V	20.27	12.58%	11.82	7.34%	4.60	2.86%	36.69	22.77%	Minerals Management Service / Tenera Inc.
<b>Seagrass beds (0-30m): Eelgrass</b>	Area (mi <sup>2</sup> )	1.07	ES, H*, PG*, CB*, PL*	0.01	1.23%	0.00	0.00%	0.00	0.00%	0.01	1.23%	Elkhorn Slough Foundation; Morro Bay National Estuary Program
<b>Fine-scale Soft bottom</b>												Fine-scale based on Kvitck et al multibeam and sidescan sonar; available for only about 25% of the region
0-30 meters	Area (mi <sup>2</sup> )	24.21	AN, ES*, H, PG, CB, PL, JPB, BC, AB, MB, P, PO, V	1.40	5.79%	1.29	5.32%	0.00	0.00%	2.69	11.11%	Total amount is only that which has been mapped to date.
30-100 meters	Area (mi <sup>2</sup> )	93.72	CB, PL, JPB, BC, AB, MB, PO	1.32	1.41%	1.21	1.29%	0.00	0.00%	2.53	2.70%	Total amount is only that which has been mapped to date.
100-200 meters	Area (mi <sup>2</sup> )	1.93	CB*, PL*, JPB	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	Total amount is only that which has been mapped to date.
>200 meters	Area (mi <sup>2</sup> )	0.29	AB*, MB*, V*	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	Total amount is only that which has been mapped to date.
<b>Coarse-scale Soft bottom</b>												Greene et al 2004; coarse scale data overestimates soft substrata
0-30 meters	Area (mi <sup>2</sup> )	294.14	AN, ES*, H, PG, CB, PL, JPB, BC, AB, MB, P, PO, V	3.21	1.09%	15.43	5.25%	1.86	0.63%	20.51	6.97%	see above
30-100 meters	Area (mi <sup>2</sup> )	575.78	CB, PL, JPB, BC, AB, MB, PO	1.29	0.22%	15.26	2.65%	0.00	0.00%	16.55	2.87%	see above
100-200 meters	Area (mi <sup>2</sup> )	58.46	CB*, PL*, JPB	0.00	0.00%	0.02	0.04%	0.00	0.00%	0.02	0.04%	see above
>200 meters	Area (mi <sup>2</sup> )	105.52	AB*, MB*, V*	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	see above

	<i>How measured?</i>	<i>Total amount in Region</i>	<i>MPA's with this habitat</i>	<i>Amount in State Marine Reserves</i>	<i>Percent of Total in State Marine Reserves</i>	<i>Amount in State Marine Conservation Areas</i>	<i>Percent of Total in State Marine Conservation Areas</i>	<i>Amount in Special Closure</i>	<i>Percent of Total in Special Closure</i>	<i>Amount in all existing MPAs in region</i>	<i>Percent of Total in existing MPAs</i>	<i>Spatial Data Source</i>
<b>Fine-scale Rocky reef; hard bottom</b>												Fine-scale based on Kvitck et al multibeam and sidescan sonar; available for only about 25% of the region
0-30 meters	Area (mi <sup>2</sup> )	20.16	AN, H, PG, CB, PL, JPB*, BC, AB*, MB*, V*	0.49	2.43%	1.17	5.79%	0.00	0.00%	1.66	8.23%	Total amount is only that which has been mapped to date.
30-100 meters	Area (mi <sup>2</sup> )	20.59	CB, PL, JPB*, BC, MB*	0.28	1.34%	0.35	1.70%	0.00	0.00%	0.63	3.04%	Total amount is only that which has been mapped to date.
100-200m	Area (mi <sup>2</sup> )	0.40	CB*, PL*	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	Total amount is only that which has been mapped to date.
>200 meters	Area (mi <sup>2</sup> )	0.01	none	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	Total amount is only that which has been mapped to date.
<b>Coarse-scale Rocky reef; hard bottom</b>												Greene et al 2004; coarse scale data underestimates hard substrata
0-30 meters	Area (mi <sup>2</sup> )	46.66	AN, H, PG, CB, PL, JPB*, BC, AB*, MB*, V*	0.76	1.63%	1.04	2.23%	0.31	0.66%	2.11	4.52%	see above
30-100 meters	Area (mi <sup>2</sup> )	26.78	CB, PL, JPB*, BC, MB*	0.30	1.14%	0.23	0.87%	0.00	0.00%	0.54	2.01%	see above
100-200 meters	Area (mi <sup>2</sup> )	13.91	CB*, PL*	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	see above
>200 meters	Area (mi <sup>2</sup> )	16.16	none	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	see above
<b>Kelp forest (0-30m)</b>												
<b>1989 Kelp</b>	Area (mi <sup>2</sup> )	17.94	AN, H, PG, CB, PL, JPB, BC	1.63	9.08%	1.43	7.97%	0.01	0.07%	3.07	17.12%	1989 CDFG aerial survey
<b>1999 Kelp</b>	Area (mi <sup>2</sup> )	2.56	H, PG, CB, PL, JPB, BC	0.09	3.63%	0.11	4.15%	0.00	0.00%	0.20	7.77%	1999 CDFG aerial survey
<b>2002 Kelp</b>	Area (mi <sup>2</sup> )	12.55	H, PG, CB, PL, JPB, BC	0.53	4.22%	1.05	8.33%	0.00	0.00%	1.58	12.55%	2002 CDFG aerial survey
<b>2003 Kelp</b>	Area (mi <sup>2</sup> )	9.53	H, PG, CB, PL, JPB, BC, MB, V	0.40	4.17%	0.57	5.97%	0.00	0.00%	0.98	10.28%	2003 CDFG aerial survey
<b>Persistent Kelp</b>	Area (mi <sup>2</sup> ); present in 3 of 4 years	3.18	BC, CB, H, JPB, PG, PL	0.20	6.30%	0.21	6.76%	0.00	0.00%	0.42	13.06%	Present in 3 of 4 CDFG aerial survey datasets
<b>Pinnacles</b>												
0-30 meters	Count		H*, PG*, CB, PL, JPB*, BC*, V*	24		100		0		124		Bathymetry data
30-100 meters	Count		CB*, PL*, JPB*, BC*	29		26		0		55		
100-200 meters	Count		CB*	0		0		0		0		
>200 meters	Count		none	0		0		0		0		
<b>Submarine canyon</b>												
0-30 meters	Area (mi <sup>2</sup> )	0.56	CB, PL*	0.00	0.00%	0.18	32.62%	0.00	0.00%	0.19	32.82%	Coarse-scale substrata (Greene et al 2004)
30-100 meters	Area (mi <sup>2</sup> )	4.42	CB, PL*, JPB	0.00	0.00%	0.08	1.77%	0.00	0.00%	0.08	1.80%	Coarse-scale substrata (Greene et al 2004)
100-200 meters	Area (mi <sup>2</sup> )	6.06	CB*, JPB	0.00	0.00%	0.01	0.20%	0.00	0.00%	0.01	0.22%	Coarse-scale substrata (Greene et al 2004)
>200 meters	Area (mi <sup>2</sup> )	42.77	none	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	Coarse-scale substrata (Greene et al 2004)
<b>Freshwater plume</b>	Presence of major river	not mapped	ES, CB, BC?, PO?,	P		P		A		P		NHD hydrography dataset
<b>Retention area</b>	Presence of warm water/headland	not mapped	CB?	A		P?		A		P?		PFEL sea surface temperature, warm water; presence of headland
<b>Upwelling zone</b>	Presence of coldwater/headland	not mapped	AN, PG, CB, PL, JPB, BC, V?	P		P		P		P		PFEL sea surface temperature, cold water; presence of headland

SIZE AND SPACING GUIDELINES	How measured?	MPF Guideline	MPA's meeting this guideline	SMRs meeting this guideline	SMCAs meeting this guideline	SC meeting this guideline	Average (Range)	MPA's NOT meeting this guideline	Spatial Data Source			
Area	Area (mi <sup>2</sup> )	N/A	N/A	N/A	N/A	N/A	3.32 average area (0.08-13.28)		GIS analysis			
Alongshore span	Straight length (mi) alongshore	2.88 to 12.65 mi	AN, ES, PG, CB, PO, V	ES, V	PG, CB, PO	AN	2.58 average length (0.38-5.52)	H, PL, JPB, BC, AB, MB, P	GIS analysis			
Shoreline Length	Linear distance following coastline (mi)	N/A					5.00 average length (0.38 - 19.21)		GIS analysis			
Distance Between	Straight distance (mi) to next MPA north and south	31 to 62 mi	AN, ES, V	ES, V		AN	18.4 average distance	H, PG, CB, PL are all within 4.6 mi, JPB and BC are 5.75 mi apart, AB and MB are 4.6 mi apart, and P and PO are 5.75 mi apart	GIS analysis			
Shore to deep water	Depth range (ft) (average)	N/A	7 (CB, PL, JPB, BC, AB, MB, PO) deeper than 98 feet, 1 (JPB) deeper than 328 feet				63 average depth	ES and P are only 0-10 ft, AN, H, PG, and V are all under 79 ft	Bathymetry data			
Offshore extent	Maximum linear distance offshore (mi)	N/A	AB, MB, and PO are furthest (3.45), JPB, BC, PL, CB, and V are next (.86-1.32), PG and H are next (.29-.46)				1.28 average offshore extent	P, AN, and ES are all less than 1000 ft	GIS analysis			

## **APPENDIX III**

### **DRAFT ANALYSIS OF HABITATS IN OTHER TYPES OF SPATIAL CLOSURE AREAS IN THE CENTRAL COAST**

APPENDIX III: DRAFT ANALYSIS OF HABITATS IN OTHER TYPES OF SPATIAL CLOSURE AREAS IN THE CENTRAL COAST

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	<b>Diablo Canyon Exclusion Zone</b>	<b>Vandenberg Safety Zones</b>	<b>Fixed RCA</b>	<b>Data Sources</b>
<b>OVERALL EVALUATION</b>							
<b>REPRESENTATIVE HABITATS</b>							
<b>Intertidal</b>							
<b>Dominant intertidal geologic substrate</b>							
Sandy or gravel beaches	Linear (mi)	Amount in MPA/Region Total	223.66	2.00	50.16		NOAA-ESI 2002
Rocky intertidal and cliff	Linear (mi)	Amount in MPA/Region Total	209.21	4.06	11.90		NOAA-ESI 2003
Coastal marsh	Linear (mi)	Amount in MPA/Region Total	36.53	0.00	6.33		NOAA-ESI 2004
Tidal flats	Linear (mi)	Amount in MPA/Region Total	23.48	0.00	0.00		NOAA-ESI 2005
<b>Seagrass beds (0-30m): Surfgrass</b>	Linear (mi)	Amount in MPA/Region Total	161.09	0.00	0.00	0.00	Minerals Management Service / Tenera Inc
<b>Seagrass beds (0-30m): Eelgrass</b>	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	1.07	0.00	0.00	0.00	Elkhorn Slough Foundation; Morro Bay NEP
<b>Estuaries</b>	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	7.90	0.00	0.00	0.00	Wetlands Inventory; CNDDDB; USGS
<b>Soft bottom (Fine Scale)</b>							
0-30 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	24.21	ND	ND	ND	
30-100 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	93.72	ND	ND	ND	
100-200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	1.93	ND	ND	ND	
>200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	0.29	ND	ND	ND	
<b>Soft bottom (Coarse Scale)</b>							
0-30 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	294.14	0.74	52.68	0.00	Greene et al 2004; overestimates soft substrata
30-100 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	575.78	1.11	67.49	0.21	Greene et al 2004; overestimates soft substrata
100-200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	58.46	0.00	0.00	4.73	Greene et al 2004; overestimates soft substrata
>200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	105.52	0.00	0.00	31.81	Greene et al 2004; overestimates soft substrata
<b>Rocky reef; hard bottom (Fine Scale)</b>							
0-30 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	20.16				
30-100 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	20.59				
100-200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	0.40				

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	<b>Diablo Canyon Exclusion Zone</b>	<b>Vandenberg Safety Zones</b>	<b>Fixed RCA</b>	<b>Data Sources</b>
>200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	0.01				
<b>Rocky reef; hard bottom (Coarse Scale)</b>							
0-30 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	46.66	0.00	15.06	0.00	Greene et al 2004; overestimates soft substrata
30-100 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	26.78	0.00	2.61	0.16	Greene et al 2004; overestimates soft substrata
100-200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	13.91	0.00	0.00	1.87	Greene et al 2004; overestimates soft substrata
>200 meters	Area (mi <sup>2</sup> ); Type if known	Amount in MPA/Region Total	16.16	0.00	0.00	6.73	Greene et al 2004; overestimates soft substrata
<b>Kelp forest (0-30m)</b>							
<b>1989 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	17.94	0.01	0.61		CDFG aerial survey 1989
<b>1999 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	2.56	0.04	0.04		CDFG aerial survey 1999
<b>2002 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	12.55	0.08	ND		CDFG aerial survey 2002
<b>2003 Kelp Data</b>	Area (mi <sup>2</sup> ); Type	Amount in MPA/Region Total	9.53	0.17	0.60		CDFG aerial survey 2003
<b>Persistent Kelp</b>	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	3.18	0.01	0.00		Present in 3 of 4 years of CDFG surveys
<b>Nereocystis presence</b>							
<b>Macrocystis presence</b>							
<b>Pinnacles</b>							
0-30 meters	Count	Amount in MPA/Region Total		ND	ND	ND	
30-100 meters	Count	Amount in MPA/Region Total		ND	ND	ND	
100-200 meters	Count	Amount in MPA/Region Total		ND	ND	ND	
>200 meters	Count	Amount in MPA/Region Total		ND	ND	ND	
<b>Submarine canyon</b>							
0-30 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	0.56				Greene et al 2004
30-100 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	4.42				Greene et al 2004
100-200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	6.06				Greene et al 2004
>200 meters	Area (mi <sup>2</sup> )	Amount in MPA/Region Total	42.77				Greene et al 2004

	<i>How measured?</i>	<i>Proposed Benchmark / Metric</i>	<i>Total amount in Region</i>	<b>Diablo Canyon Exclusion Zone</b>	<b>Vandenberg Safety Zones</b>	<b>Fixed RCA</b>	<b>Data Sources</b>
<b>Freshwater plume</b>	<b>Presence/Absence</b>	<b>Presence of major river</b>	Not mapped				
<b>Retention area</b>	<b>Presence/Absence</b>	<b>Presence of warm water or headland</b>	Not mapped				
<b>Upwelling cell</b>	<b>Presence/Absence</b>	<b>Presence of cold water or headland</b>	3 major ones at Davenport, Sur, Conception; smaller amount on Big Sur Coast and Arguello				
<b>SIZE AND SPACING GUIDELINES</b>							
Area	<b>Area (mi<sup>2</sup>)</b>	<b>N/A</b>	N/A				
Along Shore Span	<b>Straight length (mi) alongshore</b>	<b>2.88 to 12.65 mi</b>	N/A				
Shoreline Length	<b>Linear distance following coastline (mi)</b>	<b>N/A</b>	N/A				
Distance Between	<b>Straight distance (mi) to next MPA north and south</b>	<b>31 to 62 mi</b>	N/A				
Shore to deep water	<b>Depth range (ft) (average)</b>	<b>N/A</b>	N/A				
Offshore extent	<b>Maximum linear distance offshore (mi)</b>	<b>N/A</b>	N/A				
<b>CCRSB DESIGN CONSIDERATIONS</b>							
1. Minimize negative socio-economic impacts and optimize positive socio-economic impacts for all users, to the extent possible, while following the Master Plan Framework design guidelines for the establishment of regional MPA network components.	<b>Not measurable for existing areas</b>						
2. Recognize relevant portions of existing state and federal fishery management areas, to the extent possible, when designing new MPAs or modifying existing ones.	<b>Compare MPA extent to other management measures</b>	<b>Overlap with year-round all gear RCA (and recreational year-round area)</b>	45.36 mi <sup>2</sup> (519.87 mi <sup>2</sup> )				
3. To the extent possible, site MPAs to prevent fishing effort shifts that would result in serial depletion.	<b>Not measurable for existing areas</b>						
4. When crafting MPA proposals, include considerations for design found in the Nearshore Fishery Management Plan and the draft Abalone Recovery and Management Plan	<b>Are Nearshore FMP species protected by regulations and present in area? / Are red and black abalone present?</b>	<b># of the 19 nearshore finfish protected / Assess presence of 2 species</b>	19 / 2				
5. In evaluating the siting of MPAs, considerations shall include the needs and interests of all users.	<b>Not measurable for existing areas</b>						
6. 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.	<b>Not measurable for existing areas</b>						

7. 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.	<b>Compare MPA locations to terrestrial protected areas, research institutions, etc</b>	<b>Assess coastal protection and potential partners</b>	N/A				
8. To the extent possible, site MPAs to facilitate use of volunteers to assist in monitoring and management.	<b>Compare MPA locations to existing program areas</b>	<b>Assess presence of existing volunteer programs</b>					
9. To the extent possible, site MPAs to take advantage of existing long-term monitoring studies.	<b>Compare MPA locations to existing program areas</b>	<b>Assess presence of existing monitoring sites</b>	N/A				
10. To the extent possible, design MPA boundaries that facilitate ease of public recognition and ease of enforcement.	<b>Query enforcement: are existing boundaries recognizable</b>	<b>Report on enforcement concerns</b>	N/A				
<b>REGIONAL GOALS AND PROVISIONAL OBJECTIVES</b>							
<b>Goal 1. To protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.</b>							
Obj1. Protect areas of high species diversity and maintain species diversity and abundance, consistent with natural fluctuations, of populations in representative habitats	<b>Amount (area) of each habitat and presence of areas of biodiversity (Section 3.3 profile)</b>	<b>qualitative assessment of presence of areas of biodiversity significance; quantity of each habitat</b>					
Obj2. Protect areas with diverse habitat types in close proximity to each other.	<b>habitats present; area</b>	<b>#habitats from above present / area of MPA</b>	26 habitats / 865 nm <sup>2</sup>				
Obj3. Protect natural size and age structure and genetic diversity of populations in representative habitats.	<b>Assume take affects natural size and age structure. go by take regulations; list of species protected</b>	<b>Initial Review: Number of "key" species from SAT list protected.</b>	13 (Note: List getting revised, this is Aug 30 version)				
Obj4. Protect natural trophic structure and food webs in representative habitats.	<b>Assume take affects natural size and age structure. Assume "no-take" protects entire food web</b>	<b>Initial Review: Is the area no take?</b>	N/A				
Obj5. Protect ecosystem structure, function, integrity and ecological processes to facilitate recovery of natural communities from disturbances both natural and human induced.	<b>Act states that no-take reserves do this</b>	<b>Is the area no take?</b>	N/A				
<b>Goal 2. To help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted.</b>							
Obj1. 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.	<b>Presence and protection of rare, threatened, endangered, depleted, or overfished species</b>	<b>Number of rare, threatened, endangered, depleted, or overfished species/ Are these species protected in the MPA? / Is the MPA large enough to encompass the typical movements of these species and prey species?</b>					

Obj2. Protect larval sources and enhance reproductive capacity of species most likely to benefit from MPAs through retention of large, mature individuals.	<b>Assume take affects natural size and age structure. go by take regulations; list of species protected</b>	<b>Number of "key" species present</b>	13 (Note: List getting revised, this is Aug 30 version)				
Obj3. 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.	<b>Does the MPA meet objective? / summarize regulations</b>	<b>List species which are protected, if not all species are protected</b>	N/A				
<b>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.</b>							
Obj1. Ensure some MPAs are close to population centers and research and education institutions and include areas of traditional nonconsumptive recreational use and are accessible for recreational, educational, and study opportunities.	<b>Distance to :Pop centers: Sta Cruz, Monterey, Moss Landing, Morro Bay, Avila Beach, Pismo; Distance to Research /Educational inst. access values such as parking, entry fees, facilities available.</b>	<b>Distance from pop centers and educational/ research instituions / existance of shore and water public access / traditional non-</b>	N/A				
Obj2. 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.	<b>Number of each type of MPA and indication of habitat replication inside and outside</b>	<b>Identify which habitats are not replicated in 3 or more MPAs</b>	26 total Habitats				
Obj3. 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.	<b>Do any of these MPAs have these programs? (PISCO, CRANE, etc)</b>	<b>Assess programs present</b>	N/A				
Obj4. Protect or enhance recreational experience by ensuring natural size and age structure of marine populations.	<b>Consumptive - Short Term: Document most popular recreational species in area; List species subject to protection; Non-consumptive - Short Term: List species subject to protection;</b>	<b>Consumptive - Initial Review: List of previously fished species protected; Non-consumptive - Initial Review: List of previously fished species protected;</b>					
<b>Goal 4. To protect marine natural heritage, including protection of representative and unique marine life habitats in central California waters, for their intrinsic value.</b>							
Obj1. Include within MPAs the following habitat types: estuaries, heads of submarine canyons, and pinnacles.	<b>Habitat amounts or presence</b>	<b>Presence of habitats</b>					
Obj2. Protect, and replicate to the extent possible, representatives of all marine habitats identified in the MLPA or the MPF across a range of depths.	<b>Habitat amounts or presence, and replication</b>	<b>Gap analysis of habitat amounts and replication in MPA relative to study region</b>					
<b>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.</b>							

Obj1. 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.	Presence of MPA-specific objectives; Presence of monitoring plan/program; Presence of evaluation strategy	Assess current objectives, monitoring, and evaluation					
Obj2. To the extent possible, effectively use scientific guidelines in the Master Plan Framework.	Size, spacing	Report out on size and spacing	N/A				
<b>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.</b>							
Obj1. 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	N/A; future						
Obj2. 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.	N/A; future						